CABI One Health

RESEARCH

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Operationalising community engagement in One Health through community conversations in the Horn of Africa

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Abstract

Background: Rural communities in the Horn of Africa face high exposure to interconnected health risks, such as zoonotic diseases, food and water safety issues, and antimicrobial resistance, that benefit from an integrated One Health (OH) approach. However, these populations remain underserved by conventional top-down health interventions. We assessed whether community conversations (CCs), a participatory and action-oriented dialogue method, could improve OH-related knowledge, attitudes, and practices (KAP) among (agro-) pastoralists. *Methods*: A pre-post study was conducted in 19 communities in Ethiopia, Kenya, and Somalia from June to October 2024. Community members (n = 358) participated in four CC sessions over 2–3 months, guided by trained facilitators using a standardised facilitation manual. KAP outcomes were assessed using validated psychometric models with fixed-parameter scoring: a bifactor 2-PL IRT model for knowledge, a bifactor graded response model for attitudes, and a network-based composite score for practices. Within-person changes were assessed using paired Wilcoxon or McNemar tests, and predictors of KAP change were examined using mixed-effects regression models accounting for community clustering. *Results*: Participation in the CC intervention was associated with significant improvements in OH knowledge (mean theta scores pre- and post-intervention: 0.04 vs 1.39; $p < 0.001$), attitudes (0.07 vs 1.07; $p < 0.001$), and practices (mean network-weighted composite scores pre- and post-intervention: 1.06 vs 1.66; $p < 0.001$). Positive gains were observed across all three countries and most participant subgroups, with shifts in knowledge and attitudes emerging as significant predictors of improved practices. *Conclusions*: CCs were effective in improving OH KAP in the study communities. The findings support CCs as a scalable, community engagement model with potential to strengthen health behaviours in resource-limited contexts.

One Health impact statement

Pastoral and agro-pastoral communities in the Horn of Africa face interconnected human, animal, and environmental health risks arising from their close interaction with livestock. This study demonstrates how community conversations (CCs) – a facilitated, dialogue-based approach using illustrations and guided reflection – can strengthen community understanding of zoonotic diseases, antimicrobial resistance and food safety and support practical actions that reduce these risks. By improving knowledge, attitudes, and practices (KAP), CCs help protect both people and animals and contribute to more resilient communities.

Development of the CCs drew on expertise from human and animal health and social science, while incorporating relevant environmental considerations, to design a holistic, culturally grounded One Health intervention. This interdisciplinary approach produced a facilitator guide and achieved meaningful shifts in KAP outcomes that would not have been achievable through typical top-down, single-sector interventions.

Keywords: One Health, community conversations (CCs), community engagement, pastoralist, zoonoses, AMR, food safety, KAP

Introduction

One Health (OH) is a multisectoral approach that recognises the interconnectedness of human, animal, and environmental health (Prata *et al*., 2022). Although efforts to broaden the scope of OH increasingly recognise the need for community-level engagement (Henley *et al*., 2021; Sangong *et al*., 2025; Winkler *et al*., 2025), its operationalisation remains largely top-down. Most OH initiatives continue to be designed and delivered at the global level, often

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led by the quadripartite alliance (Mettenleiter *et al*., 2023), with national governments setting priorities and strategies with external funding support. A mapping exercise of the OH landscape across sub-Saharan Africa identified several persistent structural gaps that undermine long-term sustainability of OH initiatives, including weak subnational coordination platforms, exclusion of community-level actors from OH governance, and limited community-level data on health burdens (Fasina *et al*., 2022).

Critically, engagement with the communities most affected by health risks at the human–animal–environment interface remains limited in the design and implementation of many OH initiatives (Milazzo *et al*., 2025). Yet, rural communities that live closely with animals are at the frontlines of zoonotic spillover risk and endemic zoonoses transmission (Henley *et al*., 2021; Milazzo *et al*., 2025; Sangong *et al*., 2025). Bridging this gap requires community-driven OH interventions that empower rural populations to identify, understand, and act upon health risks that affect their health, animals, land and livelihoods. However, at the current time, practical models for achieving meaningful community engagement within OH remain scarce (Sangong *et al*., 2025).

Pastoralist and agro-pastoralist communities in the Horn of Africa face significant barriers to health and development due to their remote locations, transboundary mobility, and long-standing marginalisation (Pavanello, 2009; Wild *et al*., 2020). These populations are particularly vulnerable to health risks, such as zoonotic diseases, antimicrobial resistance (AMR), and food safety challenges, that stem from close human–animal interactions, limited health infrastructure, and weak community-level surveillance systems (Cavalerie *et al*., 2021; Alemu *et al*., 2023; Barasa, 2024). In this context, externally designed, top-down health interventions are typically delivered through centralised programmes with limited adaptation to local realities. These have often proven inadequate, highlighting the need for participatory approaches that engage communities as active agents in their own health and well-being (Catley *et al*., 2013).

Community conversations (CCs) are a community engagement approach that promotes interactive discussion between community members and trained facilitators (Lemma *et al*., 2021). These regular, action-oriented dialogues enable communities to recognise shared problems, discuss their implications, and plan practical solutions (Born, 2012). When communities collectively identify problems and associated consequences, they transform their interpretive frame of reference, which sparks changes in reasoning and emotional and mental models (Mulema *et al*., 2020). Community engagement through CCs helps communities to feel that they are part of the change, compared to traditional top-down training approaches. CCs are a promising community education intervention that has been successfully used in the health sector to address mental health of minorities (Knifton *et al*., 2010), reduce lymphoedema (Tora *et al*., 2022), and improve HIV competency (Campbell *et al*., 2013). To date, its use by the public health and veterinary sectors to address OH challenges has been limited, even though the approach is well suited to such issues. We hypothesised that because CCs encourage communities to think about human, animal, and environmental health together, they can support more holistic and locally grounded solutions than sector-specific interventions that are typically delivered top-down.

This study assessed the impact of a CC intervention on OH knowledge, attitudes, and practices (KAP) of (agro-)pastoralist communities in the Horn of Africa. The CC sessions covered multiple interconnected topics best addressed through a OH approach ("OH hazards"). This included human, animal, and environmental risks associated with zoonoses, AMR and food safety hazards, reflecting the diverse hazards faced in these settings. By combining a validated measurement tool with an intervention addressing wide-ranging OH hazards, this study offers robust evidence of the potential for CCs to advance OH objectives in underserved communities.

Methods

STUDY DESIGN AND SETTING

We used a pre-post intervention design to assess changes in KAP associated with a CC intervention in (agro-)pastoralist communities in arid and semi-arid lands of Ethiopia, Kenya, and Somalia. In Ethiopia, the study was conducted in Filtu and Moyale Woredas (District) in the Somali region, which share a border along the Dawa. In Kenya, sites were in Marsabit and Isiolo counties, which span desert highlands and drylands and have strong trade linkages with Ethiopia (ILRI, 2018). In Somalia, study sites included Mudug Region in Puntland, a semi-desert plateau with contested authority; Awdal Region in Somaliland, a stable cross-border corridor with Ethiopia; and Gedo Region in Jubaland, with its fertile river valleys supporting agro-pastoralism but affected by insecurity. All sites are characterised by variable rainfall, recurrent drought, and fragile ecosystems that shape livelihoods, settlement patterns, and access to services (Odongo *et al*., 2025). Pastoralism and agro-pastoralism dominate in the study areas, with sheep, goats, cattle, and camels central to subsistence, income, and cultural identity (FAO, 2021; Tofu *et al*., 2023). Seasonal migration and, in some areas, farming and cross-border trade are common across the study sites.

Implementation of CCs in Ethiopia, Kenya, and southern Somalia was carried out in collaboration with the One Health for Humans, Environment, Animals and Livelihoods (HEAL) project, a regional initiative that integrates human, animal, and environmental health services through community-based One Health Units (Mor *et al*., 2024a). In northern Somalia, CCs were implemented with local university partners with whom the research team had previously collaborated through the One Health Regional Network for the Horn of Africa (HORN) project (ILRI, 2022) and the Capacitating One Health in Eastern and Southern Africa (COHESA) project (Richards *et al*., 2024). In Awdal, sites were drawn from Amoud University's health outreach programme, a free service run by its Centre for Community Services (AU, 2008), which provided an opportunity to extend beyond human health to an OH approach. In Mudug, sites were selected from communities served by Red Sea University's Faculty of Veterinary Medicine, where students routinely deliver animal health services and undertake practice-based community engagement activities.

SAMPLE SIZE AND SAMPLING DESIGN

Using Statulator (https://statulator.com/SampleSize/ss2PM.html#), we calculated that 256 paired samples were required to detect an effect size of 0.25, assuming power of 80%, a two-sided level of significance of 5% and design effect of 2. Assuming 25 participants per site and 10% loss (i.e., refusal to participate in KAP or drop out), we expected that ~22 paired samples could be collected per site. Thus, to achieve the minimum sample size of 256 paired samples, we estimated that the research would need to take place in at least 12 sites (~264 paired samples). As the intervention was being implemented independent of the research, it was possible to assess CCs in a larger number of sites. Thus, in total, 19 sites were selected to participate in the research (9 in Ethiopia, 4 in Kenya and 6 in Somalia; Fig. 1). Site selection aimed to balance representation across countries while accounting for logistical and security constraints, especially in Somalia. In HEAL project implementation sites, a multi-stage sampling design was used to select 15 communities proportional to project coverage (i.e. 9 of 18 communities in Ethiopia, 4 of 8 in Kenya, 2 of 4 in southern Somalia). In addition, four communities in northern Somalia (2 in Somaliland and 2 in Puntland) were selected to expand representation of diverse pastoral systems in that country. Selection of sites was done using simple random sampling in Ethiopia and Kenya. In Somalia, sites were purposively selected to ensure proximity to university and HEAL partner NGO offices, which allowed the research teams to avoid overnight stays.

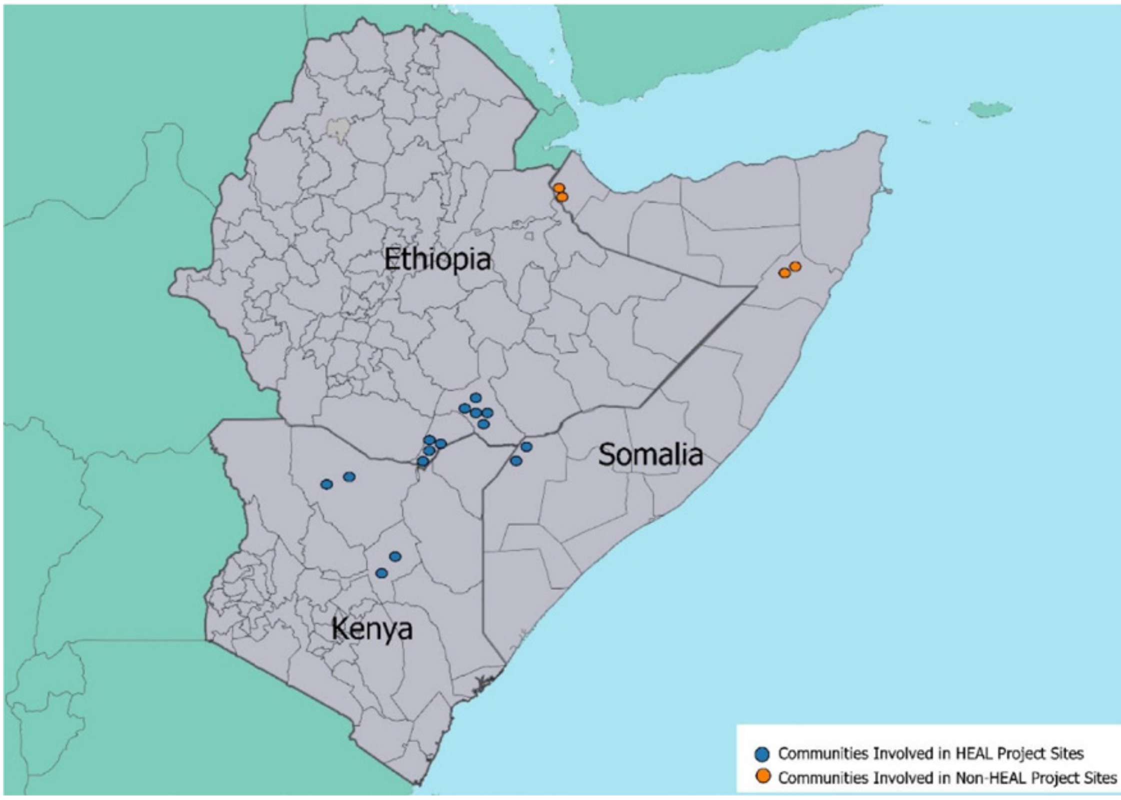

Fig. 1. Countries and specific communities where community conversations (CCs) and associated pre-post research were conducted. Blue dots represent HEAL project study communities, while orange dots indicate the four additional communities in northern Somalia.

PARTICIPANTS

Participants were adult members of (agro-)pastoralist communities in the study sites who provided voluntary consent to participate in the study. In HEAL project implementation sites, participants were members of existing community forums called Multi-Stakeholder Innovation Platforms (MSIPs), which bring together men and women representing diverse groups (e.g., livestock keepers, teachers, elders, local leaders, youth). All MSIP members in the selected communities were invited to participate in the CC intervention and associated research. Group sizes ranged from 13 to 25 participants, depending on the size of the platform. Participants from non-HEAL communities in northern Somalia were purposively selected in collaboration with local universities and community leaders to ensure a comparable mix of genders, ages, and social roles as in HEAL sites. Only participants who agreed to complete both pre- and post-intervention surveys were enrolled in the study. Community members who declined to participate in the survey were still allowed to attend the CC sessions.

INTERVENTION

The CC intervention and associated research was conducted in all study communities between June and October 2024. The CC intervention used in this study was adapted from a participatory dialogue model developed by researchers at the International Livestock Research Institute (ILRI) and partners (Lemma *et al*., 2025b). A facilitator guide was co-developed by the authorship team, drawing on diverse expertise in public health, veterinary science, and social research, together with implementing partners, to ensure contextual relevance and cultural and linguistic appropriateness (Mor *et al*., 2024b). The guide outlined a structured curriculum covering four core themes, selected for their relevance to common health challenges in (agro-)pastoralist settings (Table 1). Within each theme, sessions included storytelling, group reflection, open discussion, and collective problem-solving exercises. Discussions used real-life scenarios (e.g., stories of a rabid dog bite or anthrax outbreak) and culturally sensitive illustrations to stimulate dialogue. The CC intervention was designed not just to transfer information but to stimulate collective reasoning and locally led action. By combining lived experience with key public health messages, the approach aimed to enhance awareness and support sustained changes in behaviour.

Each site conducted the four CC sessions over a 2–3-month period, spaced approximately 2 weeks apart. Sessions were guided by two to three locally recruited facilitators trained in the CC methodology and lasted about 3 h. The format followed a standardised structure: (i) the theme was introduced using a story or case study with subsequent guided exploration of local perceptions and practices; (ii) new content was introduced to address knowledge gaps; (iii) key messages were shared to consolidate learning; and (iv) community actions were collaboratively identified and communities made commitment to behaviour change. Between sessions, participants were encouraged to share what they learned with others in their households and communities. Each new session began with a recap of prior discussions and reflection on how participants had applied their learning.

DATA COLLECTION

A previously validated, structured KAP questionnaire (Mumin and Mor, 2025) was used for pre- and post-intervention data collection. From the full set of validated items, a sub-set of items reflecting content covered during the CC sessions was selected to form a rapid assessment tool (Supplementary File 1, Table 1). The final tool included 13 knowledge items (dichotomous: True = 1; False and “Don’t know” = 0), 7 attitude items (3-point scale, with higher scores indicating more positive attitudes), and 16 practice items (4-point scale capturing frequency or consistency of behaviours, with higher scores representing more desirable practices). The survey was administered in person by trained local research assistants using mobile phones or tablets pre-loaded with the survey in the KoboCollect application (KoBoToolbox, 2025). Trainers

Table 1. Overview of community conversation (CCs) intervention, including the theme, example hazards, key messages, and community actions emphasised during each session. Source: Mor *et al.* (2024b).

Session	Theme	Exemplary OH hazards	Key messages	Community actions (examples)
1	Hazards arising through day-to-day interactions with animals	Rift Valley fever	1. Keep your home and living area clean.	• Keep animals out of your house. If you must bring animals indoors, keep them away from where humans sleep and eat • Regularly clean and sweep areas where animals have been living
			2. Protect yourselves when butchering animals or assisting animals to give birth.	• Cover your hands using gloves or plastic bags • Cover your nose and mouth with a mask or cloth • Always wash your hands and arms with soap and water before and immediately after slaughtering an animal or assisting animals to give birth. If soap is not available, you can use ash or hand sanitiser
			3. Protect vulnerable members of the community.	• Re-assign duties so that vulnerable people don't have as much close contact with animals • During shortages of soap and water, prioritise vulnerable community members
			4. Protect yourselves and your animals from insect bites.	• Use mosquito nets while sleeping • Regularly empty containers holding standing water to remove mosquito breeding sites around the home and communal areas • Apply acaricides to animals to prevent bites from ticks
2	Hazards arising from animal bites	Rabies	1. Avoid animal bites and alert animal health workers of strange behaviour	• Teach children to stay away from dogs when they are sleeping, eating, or feeding their young • If you see a dog that is suspected to have rabies or is showing symptoms of the disease, immediately tell an animal health worker before it infects other dogs or people
			2. Protect dogs from rabies	• Vaccinate your dog against rabies every year. • Keep your dog in your yard or a closed area so they don't roam freely in public areas
			3. Care for any animal bites immediately and seek urgent medical attention	• If a bite or scratch happens, wash the wound with soap and water for at least 15 min. • Go straight to a health centre or animal bite treatment centre. Do not wait to see if you get sick.
3	Hazards arising from food and water	Diarrhoeal diseases; brucellosis	1. Cook food well to help stop the spread of any sickness.	• Boil milk before drinking it, storing it for future use, or using it to make yoghurt, ghee, or butter. • Cook meat thoroughly before eating
			2. Wash your hands regularly with soap and water, or ash when these are not available	• Key moments when you should wash your hands include: ◦ Before eating ◦ After using toilet ◦ before and after slaughtering and butchering an animal ◦ Before and after milking ◦ After touching animal manure
			3. Reduce environmental contamination with human faeces and animal manure	• Use latrines where possible • Allow manure to dry for at least 3 months before applying to crops. Drying manure will kill the germs present in the manure. • Use separate drinking water sources for people and animals

4	Hazards arising from sick and dead animals	Anthrax; AMR	1. Protect yourselves and your animals from other sick and dead animals	• Avoid eating the meat and blood from a sick animal or animal that you find dead (including domestic animals and wildlife). • If you must handle a sick animal, wear rubber gloves or plastic bags to protect your hands. • If a person in your community gets sick or dies after contact with an animal, or eating meat from a sick animal, go to the nearest health centre and tell a health worker immediately to protect yourself and others.
			2. Dispose of dead animals safely	• Immediately notify the nearest animal or human health worker, or local administration, about any sudden or unexpected animal death. • If no help is available: Burn the carcass to ashes or bury it at least 2 m deep
			3. Reduce the use of antibiotics	• Do not give antibiotics to healthy animals. • Only use antibiotics in sick animals under the supervision of an animal health worker or veterinarian. • Always follow the prescribed dose and full course of antibiotics. Using too little, too much, or stopping early puts both human and animal health at risk.

fluent in both English and the local language (Somali or Borana) were recruited and trained to orally deliver the questionnaire in the appropriate language. Pre-intervention assessments were conducted on the same day or 1 day prior to the first CC session, while post-intervention assessments were completed within 2 weeks of the final CC session i.e. 2.5–3.5 months after the first CCs in each community.

DATA ANALYSIS

Data management

Pre- and post-response data were downloaded from the KoBoToolbox server and imported into R (version 4.3.1) for cleaning and analysis. Supplementary Files 2 and 3 contain the R scripts for the KAP analyses, providing details of the analytic workflow. All relevant variables were recoded into numeric formats suitable for statistical analysis. Data from participants who only completed the pre-intervention survey were excluded from further analysis.

Knowledge domain analysis

The distribution of responses to individual knowledge items was visualised using stacked bar charts. To assess item-level changes in binary knowledge responses, McNemar's tests were applied to compare pre- and post-intervention paired proportions. Beyond item-level analysis, overall knowledge was assessed using a fixed-parameter bifactor two-parameter logistic (2PL) item response theory (IRT) model, with item parameters fixed based on prior validation work (Mumin and Mor, 2025). This approach maintained comparability with the validated instrument and avoided re-estimating parameters on a modest sample, ensuring consistent scoring across studies (Wang and Reeve, 2021; Choe and Han, 2022). For each participant, theta scores representing latent knowledge were estimated separately for the pre- and post-intervention data using expected a posteriori (EAP) scoring without re-estimating item parameters (Kahraman and Kamata, 2004; Cella *et al*., 2019; Tang *et al*., 2023), implemented in the *mirt* package in R (Chalmers, 2012). To explore group differences in knowledge levels prior to the intervention, we examined baseline theta scores across demographic subgroups using Kruskal–Wallis or Mann–Whitney U tests, depending on the number of categories. Subgroups included gender, age group, household role, literacy status, production system, livestock income, and livestock rearing experience. The difference between paired pre-post theta scores was then calculated for each participant ("change in theta scores"). The normality of these difference scores was assessed using the Shapiro–Wilk test, and change was assessed using Wilcoxon signed-rank tests with effect sizes reported as rank-biserial correlations.

A linear mixed-effects model was used to identify predictors of knowledge gain (change in theta scores), with community included as a random intercept (n = 19). A hypothesis driven block-wise modelling strategy was used (Greenland, 1989). The initial model included forced core covariates: country, age group, and gender. Subsequent blocks added (i) socio-economic status (literacy, income dependence on livestock), (ii) household role, and (iii) production system. Each block was assessed for model improvement using likelihood ratio tests. The final model included all blocks, and performance was assessed using marginal and conditional R^2, intraclass correlation coefficients (ICC), and multicollinearity diagnostics.

Attitudes domain analysis

Attitude data, consisting of ordinal Likert-type items, were analysed using a fixed-parameter bifactor graded response model (GRM) to estimate change in theta scores. Changes were assessed using Wilcoxon signed-rank tests for paired samples, comparing pre- and post-intervention scores for each item. Descriptive analysis, baseline subgroup comparisons of theta scores, and a block-wise linear mixed-effects model were conducted following the same procedures described above. In the mixed-effects model, demographic characteristics were included as covariates, and the knowledge change score was added as a forced core predictor.

Practice domain analysis

Practice items were analysed using Exploratory Graph Analysis (EGA), a network-based method that groups related items into dimensions based on how participants responded to them (Golino and Epskamp, 2017). In earlier work (Mumin and Mor, 2025), we identified a stable five-dimension structure using EGA and selected items with network loadings ≥ 0.10. For this analysis, we used the same structure to score participants at both timepoints. Composite scores were then calculated using strength centrality weights derived from a correlation network of the five dimensions, accounting for inter-dimension relationships (Christensen *et al*., 2025). To assess item-level changes in the practice domain, Wilcoxon signed-rank tests were used to compare pre- and post-intervention responses. All descriptive analysis and subsequent analyses of baseline composite scores comparisons, and a block-wise linear mixed model followed the same approach described in section 'Knowledge Domain Analysis'. Alongside demographic factors, knowledge and attitude change in theta scores were included as forced core covariates in the model, based on the theoretical premise that improvements in knowledge and attitudes could influence changes in behaviour (Ajzen, 1991).

Results

PARTICIPANTS

A total of 369 individuals participated in the CC intervention across the 19 study communities in Ethiopia, Kenya, and Somalia. Of these, 358 completed both the pre- and post-intervention KAP surveys (147 from Ethiopia, 77 from Kenya, 134 from Somalia). Of the 11 non-completions, 5 were from Ethiopia (96.7% response rate), 5 were from Kenya (93.9%), and 1 was from Somalia (99.3%). These participants were excluded from further analysis.

The demographic characteristics of participants who completed both pre- and post-intervention KAP surveys are shown in Table 2. Overall, there was a near-balanced gender distribution, with female participation lower in Ethiopia and higher in Kenya, reflective of MSIP gender composition in these countries. Participants were predominantly adults aged 31 years and older, with the 31–45 age group comprising the largest proportion across all countries. Most respondents were household heads, though a substantial proportion in Somalia were grandparents. Literacy levels varied, with a higher prevalence of illiteracy in Ethiopia and Kenya compared to Somalia. Production systems ranged from predominantly pastoralist in Kenya to agro-pastoralist in Ethiopia, with Somalia showing a more mixed pattern. Livestock was a key income source for most households, with 40.5% of respondents reporting that more than half of their household income came from livestock-related activities.

KNOWLEDGE OUTCOMES

Figure 2A displays the distribution of correct responses to each knowledge item at baseline. Knowledge levels varied across items, with higher proportions of correct responses observed for general zoonotic concepts (e.g., "Animal bites can spread diseases") and lower levels for items related to antimicrobial resistance (e.g., "Drug residues remain in milk post-treatment"). At baseline (Supplementary File 1, Table 2), knowledge scores differed significantly by country ($p < 0.001$), with the highest median score observed in Kenya (0.53), followed by Somalia (0.18), and Ethiopia (−0.48). Statistically significant differences were also observed by age group ($p = 0.035$), household role ($p = 0.022$), and livestock-derived income ($p = 0.003$). No significant differences were found by gender, literacy status, or production system at baseline.

Figure 2B shows the corresponding distributions of the responses to each knowledge item post-intervention. Correct response rates

Table 2. Demographic characteristics of respondents who participated in the community conversation intervention and pre-post-KAP, by country (N = 358). Frequencies and column-wise percentages are shown for each variable across Ethiopia, Kenya, and Somalia.

		Frequency, n (%)			
Characteristic	**Category**	**Ethiopia, N = 147**	**Kenya, N = 77**	**Somalia, N = 134**	**Total, N = 358**
Gender	Male	93 (63.3)	31 (40.3)	70 (52.2)	194 (54.2)
	Female	54 (36.7)	46 (59.7)	64 (47.8)	164 (45.8)
Age group	≤30 years	16 (10.9)	10 (13.0)	37 (27.6)	63 (17.6)
	31–45 years	82 (55.8)	38 (49.4)	46 (34.3)	166 (46.4)
	≥46 years	49 (33.3)	29 (37.7)	51 (38.1)	129 (36.0)
Household role	Head	108 (73.5)	40 (51.9)	63 (47.0)	211 (58.9)
	Grandparents	3 (2.0)	1 (1.3)	43 (32.1)	47 (13.1)
	Others[a]	36 (24.5)	36 (46.8)	28 (20.9)	100 (27.9)
Literacy status	Literate	54 (36.7)	17 (22.1)	72 (53.7)	143 (39.9)
	Illiterate[b]	93 (63.3)	60 (77.9)	62 (46.3)	215 (60.1)
Production system	Pastoral	56 (38.1)	70 (90.9)	63 (47.0)	189 (52.8)
	Agro-pastoral	81 (55.1)	1 (1.3)	50 (37.3)	132 (36.9)
	Others[c]	10 (6.8)	6 (7.8)	21 (15.7)	37 (10.3)
Livestock-derived income	<50%[d]	42 (28.6)	22 (28.6)	52 (38.8)	116 (32.4)
	~50%	64 (43.5)	9 (11.7)	24 (17.9)	97 (27.1)
	>50%	41 (27.9)	46 (59.7)	58 (43.3)	145 (40.5)

[a]"Others" includes spouses (n = 85), sons/daughters (n = 14), and siblings (n = 1) of household head.
[b]"Illiterate" includes 9 participants from Ethiopia who did not provide a response and were assumed to be illiterate.
[c]"Others" includes mixed farming (n = 24) and crop-based systems (n = 4).
[d]"<50%" includes 15 participants who reported earning no income from livestock.

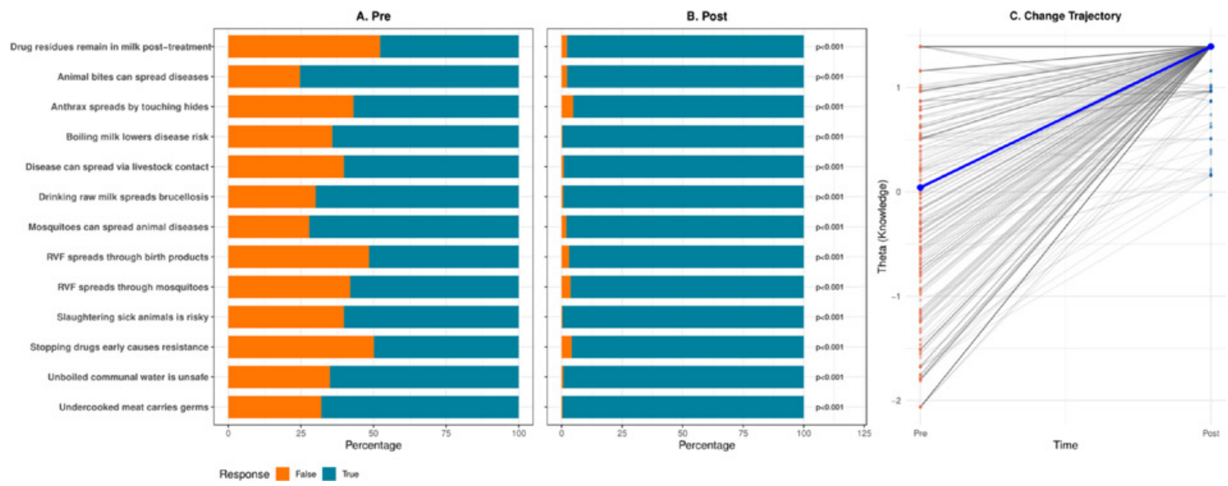

Fig. 2. Changes in knowledge following the community conversation intervention in study sites in Ethiopia, Kenya, and Somalia. (A) and (B) show pre- and post-intervention distributions of correct responses for individual knowledge items, respectively. Each horizontal bar represents the percentage of participants selecting the correct answer. p-values indicate the significance of changes in item-level responses (McNemar's test). (C) displays individual (grey lines) and median (blue line) trajectories of pre- to post-intervention knowledge theta scores derived from the IRT model.

increased significantly for all 13 items following the CC intervention ($p < 0.001$). Figure 2C presents the overall change in knowledge theta scores. Median theta scores increased significantly from 0.04 at baseline to 1.39 post-intervention ($V = 44{,}885$, $p < 0.001$) with a large effect size ($r = 0.78$). Individual change trajectories showed improvement in 81.6% of participants.

In the multivariable mixed-effects model, country, household role, and livestock-derived income level were significantly associated with knowledge gain after adjusting for covariates and site-level clustering (Table 3). Compared to Ethiopia, participants in Kenya had on average 1.23 points less improvement in knowledge scores ($p = 0.004$), while those in Somalia had 0.66 points less

Table 3. Knowledge scores before and after the community conversations intervention in Ethiopia, Kenya, and Somalia (n = 358). Median scores were derived from a fixed-parameter bifactor 2PL model. Subgroup analysis of change in theta scores was conducted using a linear mixed-effects model with a random intercept for site (19 sites).

			Median knowledge score			Change in theta score (subgroup analysis)[b]	
Characteristic	**Category**	**N**	**Pre-test**	**Post-test[a]**	**Change in theta score**	**Model estimate (95% CI)**	**p-value**
Country	Ethiopia (ref)	147	−0.52	1.39	1.82	0.00	-
	Kenya	77	0.62	1.39	0.43	−1.23 (−2.07, −0.39)	0.004
	Somalia	134	0.19	1.39	1.20	−0.66 (−1.39, 0.08)	0.080
Gender	Female (ref)	164	0.22	1.39	1.04	0.00	-
	Male	194	−0.11	1.39	1.30	0.06 (−0.24, 0.36)	0.717
Age group	<30 (ref)	63	0.55	1.39	0.78	0.00	-
	31–45	166	−0.16	1.39	1.42	0.07 (−0.21, 0.35)	0.610
	>46	129	−0.07	1.39	1.29	0.05 (−0.23, 0.34)	0.713
Household role	Head (ref)	211	−0.01	1.39	1.28	0.00	-
	Grandparent	47	−0.42	1.39	1.81	0.48 (0.08, 0.89)	0.019
	Others	100	0.50	1.39	0.77	0.12 (−0.20, 0.43)	0.463
Literacy status	Illiterate (ref)	215	0.20	1.39	1.08	0.00	-
	Literate	143	−0.01	1.39	1.32	0.06 (−0.15, 0.27)	0.590
Production system	Pastoral (ref)	189	−0.02	1.39	1.17	0.00	-
	Agro-pastoral	132	−0.06	1.39	1.46	−0.00 (−0.29, 0.29)	0.991
	Others	37	0.51	1.39	0.88	−0.06 (−0.40, 0.28)	0.715
Livestock derived income	<50% (ref)	116	0.28	1.39	1.11	0.00	-
	~50%	97	0.50	1.39	0.89	0.08 (−0.19, 0.35)	0.562
	>50%	145	−0.25	1.39	1.35	0.31 (0.06, 0.55)	0.015

[a]Post-intervention theta values were identical across all subgroups (1.39), reflecting a ceiling effect in the knowledge domain following the intervention.
[b]Site-level variance = 0.45; residual variance = 0.70; intraclass correlation coefficient (ICC) = 0.39. Marginal R^2 = 0.167; Conditional R^2 = 0.492.

improvement (p = 0.080), grandparents had, on average, a 0.48-point knowledge gain above and beyond household heads (p = 0.019). Participants from households deriving more than half of their income from livestock demonstrated, on average, a 0.31-point higher improvement in knowledge score compared to those with less than 50% (p = 0.015). No significant associations were observed for gender, age group, literacy status, or production system.

ATTITUDES OUTCOMES

Figure 3A shows the distribution of responses to each attitude item prior to the intervention. The highest levels of positive attitudes were observed for hand hygiene (e.g., importance of handwashing before eating food) and general zoonotic risk (e.g. concern about animal bites spreading disease), while the lowest were seen for antimicrobial resistance-related items (i.e. importance of stopping treatment when animals improve [negatively phrased]). Baseline attitude scores varied significantly by age group (p = 0.010), household income from livestock (p < 0.001), household role (p = 0.005), and production system (p = 0.044). No significant differences were observed by country, gender, or literacy status at baseline (Supplementary File 1, Table 3).

Distributions of post-intervention responses to the same attitude items are shown in Fig. 3B. Positive attitudes increased substantially across all items, except for one related to antimicrobial resistance (i.e. importance of stopping treatment when animals improve), which showed only modest improvement. Nevertheless, significant improvements were observed across all items (p < 0.05). Figure 3C presents the overall change in attitude theta scores. Median theta increased significantly from −0.07 at baseline to 1.07 post-intervention (V = 50,679.5, p < 0.001), with a large effect size (r = 0.75). Individual-level trajectories showed improvement in 76.8% of participants.

In the multivariable mixed-effects model, knowledge gain, country, and age group were significantly associated with improvements in attitude scores after adjusting for covariates and site-level clustering (Table 4). Participants with greater knowledge gain showed significantly larger improvements in attitude scores (β = 0.81, p < 0.001). Compared to Ethiopia, participants in Kenya had on average, a 0.52-point greater improvement in attitude scores (p = 0.002), while no significant difference was observed for Somalia (p = 0.497). Participants over the age of 46 had on average, a 0.20-point greater improvement compared to those under 30 (p = 0.045). No significant associations were observed for gender, household role, literacy status, production system, or livestock-derived income.

PRACTICE OUTCOMES

At baseline (Fig. 4A), frequent preventive behaviours included handwashing before food preparation or eating, seeking care after

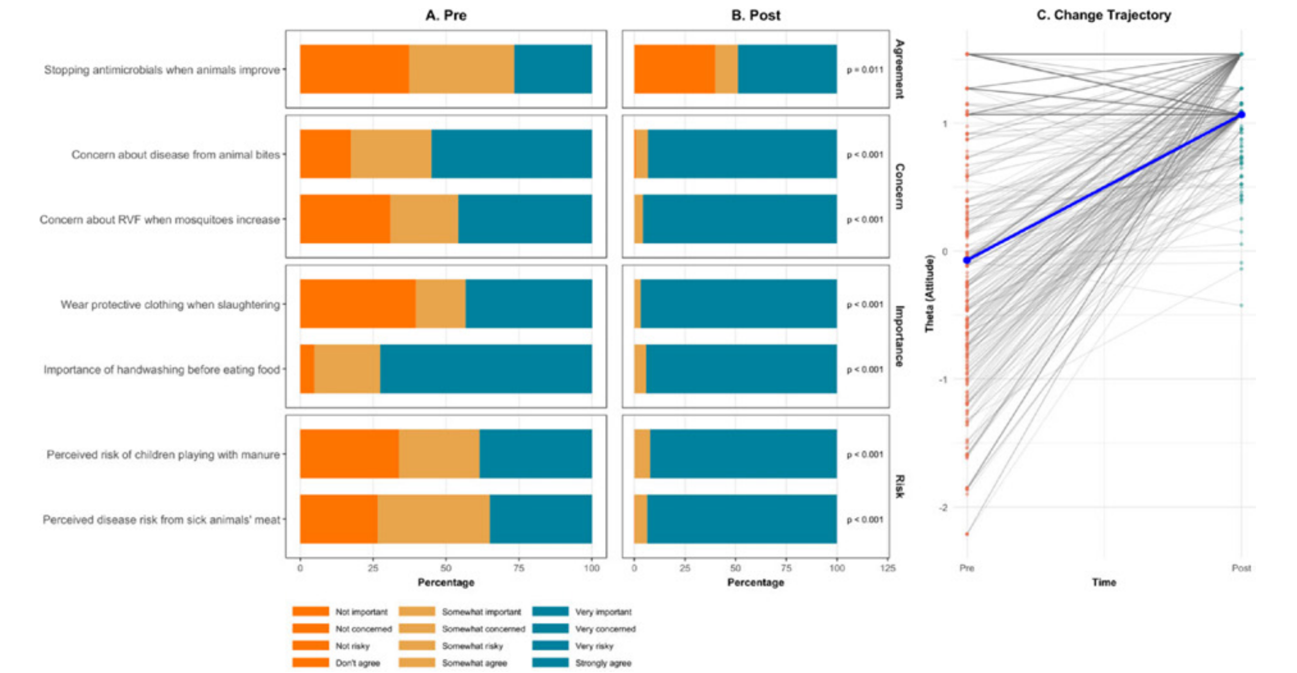

Fig. 3. Changes in attitudes following the community conversations intervention in study sites in Ethiopia, Kenya, and Somalia. (A) and (B) show pre- and post-intervention agreement levels with attitude statements, respectively. Each horizontal bar represents the percentage of participants selecting each response option, grouped by attitude domain. p-values indicate the significance of change in theta scores in response distributions (Wilcoxon signed-rank test). (C) displays individual (grey lines) and median (blue line) trajectories of pre- to post-intervention theta scores from the attitude IRT model.

dog bites and animal health professional consultation with a notable proportion of participants responding "Yes, always". However, adherence was lower for practices involving reporting animal outbreaks and appropriate antimicrobial use, such as completing full treatment courses or avoiding milk and meat from treated animals. For negatively phrased items, many participants reported engaging in high-risk behaviours, with frequent "Yes, always" responses for touching animal waste or birth products without gloves and consuming unboiled milk suggesting widespread unsafe practices at baseline. At baseline (Supplementary File 1, Table 4), practice scores differed significantly by household role ($p = 0.034$) and livestock-derived income ($p < 0.001$). Participants categorised as "Others," primarily sons, daughters, or siblings, had the highest median score (1.11), while grandparents had the lowest (0.85). Participants from households deriving approximately half of their income from livestock reported the highest scores (1.18), compared to those earning >50% (0.86). No significant differences were observed by country, gender, age group, literacy status, or production system at baseline.

Following the intervention, reported behaviours improved substantially for most positive and negatively phrased items (Fig. 4B). The proportion of "Yes, always" responses increased markedly for recommended practices, particularly in areas of reaching out to animal health professionals, avoiding meat of treated animals, and disposing of dead animals. On the other hand, negatively phrased items showed a clear shift towards safer behaviours, with a majority of participants now reporting "No, never" across all items. Figure 4C presents the overall change in composite practice scores. Median scores increased from 1.06 at baseline to 1.66 post-intervention ($V = 61{,}720$, $p < 0.001$), with a large effect size ($r = 0.80$). Individual trajectories showed consistent upward trends across 89.1% of participants.

In the multivariable mixed-effects model, change in composite practice scores was significantly associated with knowledge gain, attitude gain, and country, after adjusting for covariates and site-level clustering (Table 5). Each one-point increase in attitude gain was associated with a 0.22-point improvement in composite practice score ($p < 0.001$), while knowledge gain was associated with a 0.08-point increase ($p = 0.003$). Compared to Ethiopia, participants in Kenya and Somalia showed significantly smaller improvements in practice scores, with mean differences of −0.28 ($p = 0.001$) and −0.27 ($p < 0.001$), respectively. No significant associations were observed for gender, age group, literacy status, household role, production system, or livestock-derived income.

Discussion

To our knowledge, this is the first and largest study to quantitatively assess the impact of a CCs intervention on KAP related to OH, and public health more generally. Our CC intervention addressed a wide range of OH topics spanning human, animal, and environmental health. By combining a validated OH-KAP tool with a pre-post design and advanced statistical modelling, our findings provide robust evidence that CCs can improve OH-related KAP in livestock-dependent populations in the Horn of Africa. Other community-level interventions, such as structured OH education programmes implemented in South Africa (Berrian *et al*., 2018), have shown improvements in community awareness but tend to rely more on top-down information delivery rather than dialogical processes. Our findings directly address recent calls for community-centred approaches to operationalise OH in resource-limited contexts where top-down strategies often fall short (Henley *et al*., 2021; Omuse *et al*., 2025; Sangong *et al*., 2025; Winkler *et al*., 2025). This contribution is particularly significant in light of the stakeholder analysis by Fasina *et al*. (2022), which showed that pastoralists and livestock keepers in sub-Saharan Africa have typically been treated as 'One Health defenders' in OH initiatives; stakeholders with high interest but limited influence. In contrast, the CC model creates structured spaces for communities to engage as active agents in health dialogue, enabling a shift from passive recipients to be informed co-creators of health solutions.

Previous KAP surveys in OH contexts have typically focused on single OH issues such as zoonoses (Abdi *et al*., 2015), food safety (Odongo *et al*., 2017), or antimicrobial resistance (Sindato *et al*., 2020). While these studies have provided important insights, they generally used instruments that had not undergone formal

Table 4. Attitude scores before and after the community conversations intervention in Ethiopia, Kenya, and Somalia (n = 358). Median scores were derived from a fixed-parameter bifactor graded response model (GRM). Subgroup analysis of change in theta scores in median attitude score was conducted using a linear mixed-effects model with a random intercept for site (19 sites).

			Median attitude score			Change in theta score (subgroup analysis)[a]	
Characteristic	**Category**	**N**	**Pre-test**	**Post-test**	**Change in theta score**	**Model estimate (95% CI)**	**p-value**
Knowledge gain						0.81 (0.74,0.88)	<0.001
Country	Ethiopia (ref)	147	−0.27	1.07	1.46	0.00	-
	Kenya	77	0.12	1.16	0.93	0.52 (0.19, 0.86)	0.002
	Somalia	134	−0.05	1.15	1.22	0.10 (−0.19, 0.38)	0.497
Gender	Female (ref)	164	−0.07	1.07	1.29	0.00	-
	Male	194	−0.06	1.07	1.22	−0.07 (−0.27, 0.14)	0.531
Age group	<30 (ref)	63	0.28	1.07	0.70	0.00	-
	31–45	166	−0.16	1.10	1.39	0.15 (−0.05, 0.34)	0.137
	>46	129	−0.12	1.07	1.32	0.20 (0.00, 0.40)	0.045
Household role	Head (ref)	211	−0.06	1.07	1.21	0.00	-
	Grandparent	47	−0.59	1.07	1.61	−0.00 (−0.29, 0.28)	0.985
	Others	100	0.06	1.07	1.02	−0.04 (−0.26, 0.17)	0.698
Literacy status	Illiterate (ref)	215	−0.11	1.07	1.32	0.00	-
	Literate	143	−0.05	1.16	1.18	0.10 (−0.05, 0.24)	0.186
Production system	Pastoral (ref)	189	−0.12	1.16	1.35	0.00	-
	Agro-pastoral	132	−0.07	1.07	1.16	−0.05 (−0.24, 0.14)	0.583
	Others	37	0.28	1.54	0.79	−0.12 (−0.35, 0.11)	0.307
Livestock derived income	<50% (ref)	116	−0.03	1.27	1.20	0.00	-
	~50%	97	0.24	1.07	0.47	−0.16 (−0.34, 0.03)	0.092
	>50%	145	−0.45	1.15	1.55	0.05 (−0.12, 0.21)	0.584

[a]Site-level variance = 0.05; residual variance = 0.35; intraclass correlation coefficient (ICC) = 0.12. Marginal R^2 = 0.670; Conditional R^2 = 0.709.

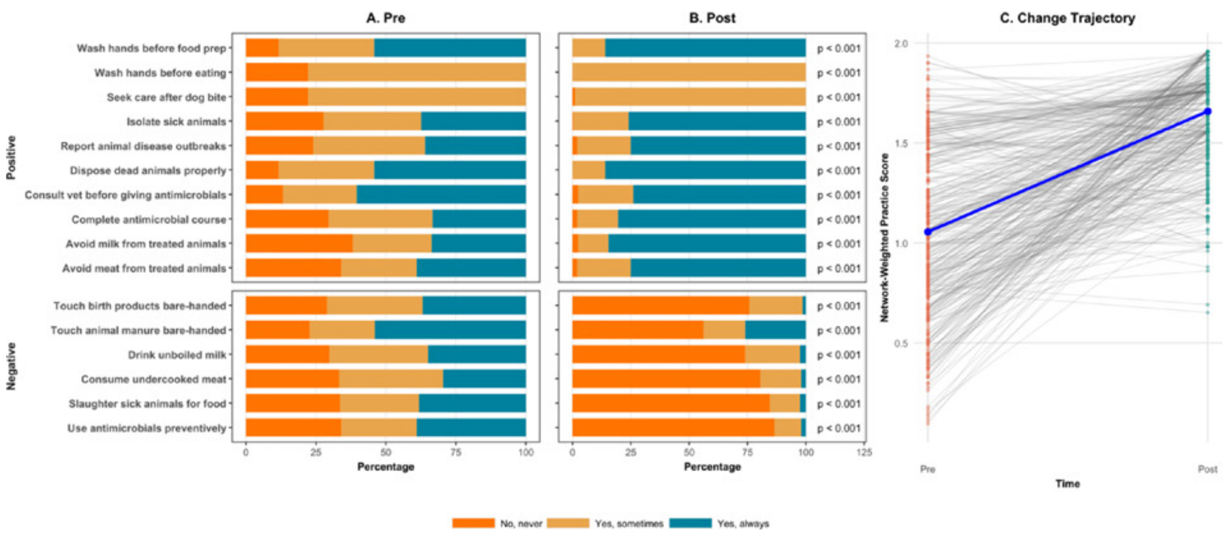

Fig. 4. Changes in self-reported practices following the community conversations intervention in study sites in Ethiopia, Kenya, and Somalia. (A) and (B) show the distribution of responses to positively and negatively phrased practice items at baseline and post-intervention, respectively. Each horizontal bar represents the percentage of participants selecting each response option, grouped by positive and negative-phrased practices. p-values from paired Wilcoxon signed-rank tests shown for each item (all p < 0.001). (C) displays individual (grey lines) and median (blue line) trajectories in network-weighted composite practice scores.

Table 5. Practice scores before and after the community conversations intervention in Ethiopia, Kenya, and Somalia (n = 358). Median scores were derived from network-weighted composite scoring. Subgroup analysis of change in median practice score was conducted using a linear mixed-effects model with a random intercept for site (19 sites).

			Median practice score			Change in composite score (subgroup analysis)[a]	
Characteristic	**Category**	**N**	**Pre-test**	**Post-test**	**Change in composite score**	**Model estimate (95% CI)**	**p-value**
Knowledge gain						0.08 (0.03, 0.14)	0.003
Attitude gain						0.22 (0.17, 0.28)	<0.001
Country	Ethiopia (ref)	147	1.02	1.76	0.73	0.00	-
	Kenya	77	1.10	1.59	0.42	−0.28 (−0.44, −0.11)	0.001
	Somalia	134	1.05	1.55	0.44	−0.27 (−0.41, −0.13)	<0.001
Gender	Female (ref)	164	1.06	1.60	0.49	0.00	-
	Male	194	1.05	1.67	0.52	0.05 (−0.05, 0.15)	0.362
Age group	<30 (ref)	63	1.13	1.60	0.42	0.00	-
	31–45	166	1.02	1.75	0.59	−0.06 (−0.16, 0.03)	0.181
	>46	129	1.05	1.59	0.49	−0.02 (−0.11, 0.08)	0.741
Household role	Head (ref)	211	1.05	1.71	0.55	0.00	-
	Grandparent	47	0.85	1.55	0.58	−0.01 (−0.15, 0.13)	0.875
	Others	100	1.11	1.74	0.41	0.00 (−0.10, 0.11)	0.928
Literacy status	Illiterate (ref)	215	1.07	1.66	0.46	0.00	-
	Literate	143	1.00	1.66	0.51	0.01 (−0.06, 0.08)	0.740
Production ystem	Pastoral (ref)	189	0.97	1.60	0.53	0.00	-
	Agro-pastoral	132	1.11	1.74	0.42	−0.05 (−0.14, 0.04)	0.284
	Others	37	1.23	1.66	0.47	0.06 (−0.06, 0.17)	0.335
Livestock derived income	<50% (ref)	116	1.10	1.66	0.49	0.00	-
	~50%	97	1.18	1.76	0.37	−0.05 (−0.14, 0.04)	0.319
	>50%	145	0.86	1.56	0.55	0.00 (−0.08, 0.08)	0.948

[a]Site-level variance = 0.01; residual variance = 0.08; intraclass correlation coefficient (ICC) = 0.12. Marginal R^2 = 0.580; Conditional R^2 = 0.631.

validation, and mostly relied on simple additive scoring approaches that risk oversimplifying complex underlying constructs (Boynton and Greenhalgh, 2004; Launiala, 2009). The lack of validated instruments has limited comparability across settings and hindered the rigorous evaluation of community-based OH interventions. This study builds on our recent work to develop and psychometrically validate a standardised OH-KAP tool (Mumin and Mor, 2025), which jointly assesses KAP across topics typically addressed in OH initiatives, namely zoonoses, AMR, and food safety. By applying this validated instrument, we provide strong evidence that CCs can drive measurable improvements in OH-related KAP in (agro-)pastoralist populations. Beyond demonstrating the impact of CCs, the study also contributes to the evidence base on community-level OH-KAP in the Horn of Africa, a region where such data are scarce (Fasina *et al.*, 2022). Documenting baseline KAP levels and their determinants across diverse agro-pastoral communities generates community-level information that policy makers and OH intervention designers can use to prioritise interventions and allocate resources effectively.

In this study, baseline KAP levels were generally low across the (agro-)pastoralist communities, likely reflecting the longstanding challenges of accessing health and veterinary services in remote areas (Griffith *et al.*, 2020; Gizaw *et al.*, 2021). Notably, baseline knowledge was highest in Kenya, likely reflecting comparatively longer history of OH investment and relative political stability, which have enabled more sustained health and extension programming (World Bank, 2025). Kenya established a national OH coordinating mechanism, the Zoonotic Disease Unit, as early as 2012 (Fasina *et al.*, 2022). It also has a well-developed system of community-based animal health workers and sustained investment in health extension (Riviere-Cinnamond and Eregae, 2003; Griffith *et al.*, 2020; Bukachi *et al.*, 2024). In contrast, Ethiopia's lowland pastoral areas and Somalia's conflict-affected regions have faced more limited and interrupted health engagement (Rettberg *et al.*, 2017; Nikoloski *et al.*, 2025).

Our research demonstrates that CCs can substantially improve OH-related KAP and generate broad-based behavioural change even within a short implementation timeframe (2–3 months). Previous qualitative assessments of CCs in Ethiopia have described mechanisms of change, including collective problem identification, peer-to-peer learning, and co-creation of action plans, leading to OH outcomes such as improved zoonotic disease prevention and enhanced AMR awareness (Mulema *et al.*, 2020; Lemma *et al.*, 2025a). Our findings complement these qualitative insights by demonstrating quantifiable gains using a validated instrument and capturing a wide range of OH-related outcomes rather than focusing on single topics of relevance to OH. By empowering communities with the knowledge and tools to co-create OH action plans, CCs provide a practical mechanism for addressing the sub-national coordination gap, where formal OH platforms are often absent or under-resourced (Fasina *et al*., 2022). Further, while the current intervention was delivered with donor support, embedding CCs within extension programs offers a pathway to reduce reliance on external funding, which continues to characterise much of OH programming in sub-Saharan Africa (Fasina *et al*., 2022).

Beyond the overall effectiveness of CCs, the multivariable analyses provided important insights. Knowledge gain emerged as the strongest predictor of both attitudinal shifts and reported practices, reinforcing the theorised pathway in which knowledge shapes attitudes that, in turn, drive practices (Zarei *et al*., 2024). While this assumption is common in public health (Rosenstock, 1974), it has rarely been demonstrated empirically in OH interventions. The finding that attitude gain is a stronger predictor of practice improvement than knowledge gain is also theoretically coherent; knowledge acquisition is a necessary but insufficient condition for behaviour change. Without the motivational shift that attitudinal change provides, translation to practice remains limited, a pattern widely documented in public health (Rosenstock, 1974; Ajzen, 1991).

The CC intervention demonstrated robust effects across countries and participant subgroups. Nevertheless, cross-country comparisons highlighted that gains were smaller in Kenya and Somalia than in Ethiopia. These differences may partly reflect baseline disparities, where higher starting knowledge in Kenya left less scope for improvement. Alternatively, contextual challenges such as political instability in Somalia may make behaviour change more difficult to implement in this setting. All participant groups benefited from the CC intervention, showing improvements across diverse sociodemographic profiles such as gender, age, education, and livelihood.

This study has several notable strengths. The use of a validated OH-KAP instrument, combined with psychometric evaluation methods and mixed-effects modelling adjusting for site-level clustering, as used in this study, provides methodological rigour beyond most community engagement evaluations. Further, the multi-country design offers comparative insights across diverse (agro-)pastoralists contexts, while high participant retention strengthens confidence in feasibility of the approach. Nonetheless, several limitations should be acknowledged. Although all facilitators underwent similar training and used the same manual to guide conversations, the individuals were different across sites. This was necessary due to the temporal intensity and geographic spread of the intervention, as well as local language requirements. Nevertheless, we cannot rule out that some of the variation seen across countries is due to variability in facilitator educational background, training and community engagement experience. Second, the assessment measured only short-term change in KAP; whether improvements are sustained or translate into measurable health outcomes remains unknown. Although the pre-post paired design strengthens inference, the absence of a control group limits attribution of observed effects solely to the CC intervention. To align measurement with CC session content, we selected a subset of items from the validated tool (Mumin and Mor, 2025), which facilitated rapid assessment but reduced coverage of broader OH domains. Most items focused on veterinary and human health, with limited attention to environmental determinants such as water, rangeland, or waste management. Future adaptations should strengthen environmental domains to better capture their multisectoral nature. Finally, it is important to acknowledge that community-level KAP improvements, while meaningful, cannot be a substitute for the institutional responses that OH requires: adequate human and financial resources at government level, functional laboratory and surveillance systems, and robust policy engagement mechanisms (Fasina *et al*., 2022). CCs should be understood as creating the community-level demand and readiness for these institutional responses, not replacing them.

CONCLUSION

This study provides empirical evidence for the effectiveness of CCs as a community engagement method in OH, with several implications for research, policy, and practice.

For researchers, the study highlights the value of applying the validated OH-KAP tool (Mumin and Mor, 2025) and robust analytic methods to assess baseline KAP and impact of awareness creation and behaviour-change interventions. Future research should assess the long-term impacts of CCs, examine whether knowledge and behavioural shifts translate into measurable improvements in health outcomes, and compare CCs with other community engagement models.

For policy makers, CCs offer a low-cost mechanism for simultaneously strengthening intersectoral collaboration, building subnational capacities, and promoting community sensitisation – priorities identified by Fasina *et al*. (2022). Formally integrating CCs into national and sub-national OH strategies as a standard mechanism for community engagement alongside technical interventions such as vaccination, surveillance, and extension, can support behaviour change and strengthen action against zoonoses, foodborne illness and AMR. To sustain and scale CCs, policy makers should allocate domestic resources and institutionalise them within national veterinary extension and community health worker programmes, reducing reliance on donor funding. Institutionalising CCs would also create a structural interface between communities and health systems, foster co-learning, amplify community voices within OH governance, and ensure that interventions are both feasible and acceptable to the community.

For implementers and frontline practitioners, including from government, NGO sector and universities with community outreach programmes, CCs offer a practical tool for community engagement that can be delivered with minimal material inputs and adapted to diverse local realities. They are accessible regardless of literacy or education level, promote bi-directional learning, and foster collective ownership of health actions. A facilitator manual is available to guide implementation (https://hdl.handle.net/10568/151543), and can be adapted to different cultural contexts, specific OH hazards or institutional settings, as was done recently in Sierra Leone (Osman *et al*., 2026).

Taken together, these findings position CCs as a scalable, community-driven approach with significant potential to address OH hazards, including zoonoses, food safety, and AMR.

ABBREVIATIONS

AMR antimicrobial resistance

CCs community conversations

EGA Exploratory Graph Analysis

GRM graded response model

HEAL One Health for Humans, Environment, Animals and Livelihoods

HIV Human Immunodeficiency Virus

ICC intraclass correlation coefficient

ILRI International Livestock Research Institute

IRT item response theory

KAP knowledge, attitudes, and practices

MSIP Multi-Stakeholder Innovation Platforms

OH One Health

2PL two-parameter logistic model

AU Amoud University

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

ETHICS STATEMENT

Ethics approval was obtained from the International Livestock Research Institute (ILRI-IREC2023-74) and the University of Liverpool (13922). Additional administrative approvals were obtained from local authorities as required. All participants provided written consent.

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AUTHORS' CONTRIBUTIONS

FIM, ML, MK, and SM jointly conceptualised the study and co-developed the overall CCs approach. YH contributed to the data collection, community mobilisation and facilitator training in Somalia. ML and SM led the development of the CCs facilitator manual. FIM and ML trained the CCs facilitators. FIM led the field data collection, FIM and SM conducted the data analysis and prepared the initial draft of the manuscript. ML and MK reviewed and revised the manuscript. All authors read and approved the final version.

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DATA AVAILABILITY

The Community Conversation (CCs) facilitator manual is available at https://hdl.handle.net/10568/151543. The raw pre-post data used for this study is availble on request.

CONSENT FOR PUBLICATION

Not applicable.

SUPPLEMENTARY MATERIAL

The supplementary material is available in the online version of this article.

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References

Abdi, I.H., Affognon, H.D., Wanjoya, A.K., Onyango-Ouma, W. and Sang, R. (2015) Knowledge, attitudes and practices (KAP) on rift valley fever among pastoralist communities of Ijara district, north eastern Kenya. *PLoS Neglected Tropical Diseases* 9(11), e0004239. DOI: 10.1371/journal.pntd.0004239.

Ajzen, I. (1991) The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50(2), 179–211. DOI: 10.1016/0749-5978(91)90020-T.

Alemu, S.T., Ero, D. and Mor, S.M. (2023) One Health insights into pastoralists' perceptions on zoonotic diseases in Ethiopia: Perspectives from south Omo zone of SNNP region. *Pastoralism* 13(1), 13. DOI: 10.1186/s13570-023-00274-8.

AU (2008) *Community Services*. Available at: https://www.med.amouduniversity.org/students-life/community-services (accessed 07 July 2025).

Barasa, V. (2024) A one Health approach to tackling AMR and why gender matters: Findings from pastoralist communities in Tanzania. *Frontiers in Global Women's Health* 5, 1429203. DOI: 10.3389/fgwh.2024.1429203.

Berrian, A.M., Smith, M.H., VanRooyen, J., Martínez-López, B., Plank, M.N., Smith, W.A. and Conrad, P.A. (2018) A community-based One Health education program for disease risk mitigation at the human-animal interface. *One Health* 5, 9–20. DOI: 10.1016/j.onehlt.2017.11.002.

Born, P. (2012) *Community Conversations: Mobilizing the Ideas, Skills, and Passion of Community Organizations, Governments, Businesses, and People*. BPS Books, Toronto, Canada. Available at: https://books.google.co.ke/books/about/Community_Conversations.html?id=sA_uCsXmp4AC&redir_esc=y (accessed 14 December 2025).

Boynton, P.M. and Greenhalgh, T. (2004) Selecting, designing, and developing your questionnaire. *BMJ* 328(7451), 1312–1315. DOI: 10.1136/bmj.328.7451.1312.

Bukachi, S.A., Onono, J., Onyango-Ouma, W., Onyango, T., Jeptoo, M. *et al.* (2024) Opportunities, gaps, and challenges in the implementation of the One Health approach in Kenya. *One Health Cases* 2024, ohcs20240019. DOI: 10.1079/onehealthcases.2024.0019.

Campbell, C., Nhamo, M., Scott, K., Madanhire, C., Nyamukapa, C., Skovdal, M. and Gregson, S. (2013) The role of community conversations in facilitating local HIV competence: Case study from rural Zimbabwe. *BMC Public Health* 13(1), 1–15. DOI: 10.1186/1471-2458-13-354.

Catley, A., Burns, J., Abebe, D. and Suji, O. (2013) *Participatory Impact Assessment: A Design Guide*. Feinstein International Center, Tufts University, Somerville, USA, pp. 1–65. Available at: https://fic.tufts.edu/publication-item/participatory-impact-assessment-a-design-guide/ (accessed 10 November 2025).

Cavalerie, L., Wardeh, M., Lebrasseur, O., Nanyingi, M., McIntyre, K.M. *et al.* (2021) One hundred years of zoonoses research in the Horn of Africa: A scoping review. *PLoS Neglected Tropical Diseases* 15(7), e0009607. DOI: 10.1371/journal.pntd.0009607.

Cella, D., Choi, S.W., Condon, D.M., Schalet, B., Hays, R.D. *et al.* (2019) PROMIS® adult health profiles: Efficient short-form measures of seven health domains. *Value in Health* 22(5), 537–544. DOI: 10.1016/j.jval.2019.02.004.

Chalmers, R.P. (2012) mirt: A multidimensional item response theory package for the R environment. *Journal of Statistical Software* 48, 1–29. DOI: 10.18637/jss.v048.i06.

Choe, E.M. and Han, K.T. (2022) Constructing a robust score scale from IRT scores with informed boundaries. *Journal of Educational Measurement* 59(1), 4–21. DOI: 10.1111/jedm.12307.

Christensen, A.P., Golino, H., Abad, F.J. and Garrido, L.E. (2025) Revised network loadings. *Behavior Research Methods* 57(4), 1–18. DOI: 10.3758/s13428-025-02640-3.

FAO (2021) *Boosting Smallholder Resilience for Recovery: Safeguard Vulnerable Pastoralist and Agro-Pastoralist Households in East and West Africa and the Sahel*. FAO COVID-19 Response and Recovery Programme: Africa, Accra. Available at: https://www.fao.org/family-farming/detail/en/c/1382343/ (accessed 18 November 2025).

Fasina, F.O., Bett, B., Dione, M., Mutua, F., Roesel, K. *et al.* (2022) One Health gains momentum in Africa but room exists for improvement. *One Health* 15, 100428. DOI: 10.1016/j.onehlt.2022.100428.

Gizaw, S., Woldehanna, M., Anteneh, H., Ayledo, G., Awol, F. *et al.* (2021) Animal health service delivery in crop-livestock and pastoral systems in Ethiopia. *Frontiers in Veterinary Science* 8, 601878. DOI: 10.3389/fvets.2021.601878.

Golino, H.F. and Epskamp, S. (2017) Exploratory graph analysis: A new approach for estimating the number of dimensions in psychological research. *PloS One* 12(6), e0174035. DOI: 10.1371/journal.pone.0174035.

Greenland, S. (1989) Modeling and variable selection in epidemiologic analysis. *American Journal of Public Health* 79(3), 340–349. DOI: 10.2105/ajph.79.3.340.

Griffith, E.F., Kipkemoi, J.R., Robbins, A.H., Abuom, T.O., Mariner, J.C., Kimani, T. and Amuguni, H. (2020) A One Health framework for integrated service delivery in Turkana county, Kenya. *Pastoralism* 10(1), 7. DOI: 10.1186/s13570-020-00161-6.

Henley, P., Igihozo, G. and Wotton, L. (2021) One Health approaches require community engagement, education, and international collaborations—A lesson from Rwanda. *Nature Medicine* 27(6), 947–948. DOI: 10.1038/s41591-021-01350-5.

ILRI (2018) *Northern Kenya-Southern Ethiopia Dryland Livestock Traders Gathered in Marsabit for Better Livestock Trade and Market Links*. Available at: https://www.ilri.org/news/northern-kenya-southern-ethiopia-dryland-livestock-traders-gathered-marsabit-better-livestock (accessed 14 December, 2025).

ILRI (2022) *One Health Regional Network for the Horn of Africa (HORN)*. Available at: https://www.ilri.org/research/projects/one-health-regional-network-horn-africa (accessed 18 November 2025).

Kahraman, N. and Kamata, A. (2004) Increasing the precision of subscale scores by using out-of-scale information. *Applied Psychological Measurement* 28(6), 407–426. DOI: 10.1177/0146621604268736.

Knifton, L., Gervais, M., Newbigging, K., Mirza, N., Quinn, N., Wilson, N. and Hunkins-Hutchison, E. (2010) Community conversation: Addressing mental health stigma with ethnic minority communities. *Social Psychiatry and Psychiatric Epidemiology* 45, 497–504. DOI: 10.1007/s00127-009-0095-4.

KoBoToolbox (2025) *Data Collection Tools for Challenging Environments*. Available at: https://kobotoolbox.org/ (accessed 03 July 2025).

Launiala, A. (2009) How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology research on malaria in pregnancy in Malawi. *Anthropology Matters* 11(1). DOI: 10.22582/am.v11i1.31.

Lemma, M., Alemu, B., Amenu, K., Wieland, B. and Knight-Jones, T. (2025a) Enhancing community awareness of antimicrobial use and resistance through community conversations in rural Ethiopia. *One Health Outlook* 7(1), 28. DOI: 10.1186/s42522-025-00148-6.

Lemma, M., Gemeda, B.A. and Knight-Jones, T. (2025b) Harnessing community conversations for gender-responsive engagement in livestock management in Ethiopia: A methodological reflection. *Frontiers in Public Health* 13, 1612520. DOI: 10.3389/fpubh.2025.1612520.

Lemma, M., Mekonnen, M. and Tigabie, A. (2021) *Community Conversation: An Approach for Collaborative Learning and Action in Animal Health Management*. ILRI, Nairobi, Kenya. https://hdl.handle.net/10568/113640.

Mettenleiter, T.C., Markotter, W., Charron, D.F., Adisasmito, W.B., Almuhairi, S. *et al.* (2023) The One Health high-level expert panel (OHHLEP). *One Health Outlook* 5(1), 18. DOI: 10.1186/s42522-023-00085-2.

Milazzo, A., Liu, J., Multani, P., Steele, S., Hoon, E. and Chaber, A.L. (2025) One Health implementation: A systematic scoping review using the quadripartite One Health joint plan of action. *One Health* 20, 101008. DOI: 10.1016/j.onehlt.2025.101008.

Mor, S.M., Fascendini, M., Imbach, S., Ayehu, M., Belay, K. and Consortium, H. (2024a) Community-designed One Health units as a model for integrated service delivery in pastoralist areas of Africa. *One Health Cases* 2024, ohcs20240004. DOI: 10.1079/onehealthcases.2024.0004.

Mor, S.M., Lemma, M., Mumin, F., Fascendini, M., Assefa, A. and Kaba, M. (2024b) *Community Conversations: Facilitating Awareness and Behaviour Change Regarding One Health Hazards*. ILRI, Nairobi, Kenya. Available at: https://hdl.handle.net/10568/151543.

Mulema, A.A., Kinati, W., Lemma, M., Mekonnen, M., Alemu, B.G. *et al.* (2020) Clapping with two hands: Transforming gender relations and zoonotic disease risks through community conversations in rural Ethiopia. *Human Ecology* 48(6), 651–663. DOI: 10.1007/s10745-020-00184-y.

Mumin, F.I. and Mor, S.M. (2025) Development and validation of the OH-KAP survey for use with pastoral and other rural communities in Africa. One Health Outlook. DOI: 10.1186/s42522-026-00213-8.

Nikoloski, Z., Mohamoud, M.M. and Mossialos, E. (2025) Universal health coverage in fragile and conflict-affected states: Insights from Somalia. *International Journal for Equity in Health* 24(1), 125. DOI: 10.1186/s12939-025-02486-3.

Odongo, N., Matofari, J.W., Lamuka, P. and Abey, K. (2017) Knowledge and practices of food hygiene and safety among camel milk handlers in the pastoral camel value chain in Kenya. *African Journal of Food, Agriculture, Nutrition and Development* 17(1), 11803–11821. DOI: 10.18697/ajfand.77.16885.

Odongo, R.A., Schrieks, T., Streefkerk, I., deMoel, H., Busker, T. *et al.* (2025) Drought impacts and community adaptation: Perspectives on the 2020–2023 drought in East Africa. *International Journal of Disaster Risk Reduction* 119, 105309. DOI: 10.1016/j.ijdrr.2025.105309.

Omuse, E.R., Machekano, H., Sokame, B.M., Mutyambai, D.M., Dubois, T., Subramanian, S. and Chidawanyika, F. (2025) One Health interventions and challenges under rural African smallholder farmer settings: A scoping review. *One Health* 20, 100959. DOI: 10.1016/j.onehlt.2024.100959.

Osman, A., Guitian, J., Mor, S.M. and Ansumana, R. (2026) *Community Conversations on One Health and Climate Change Adaptation in Sierra Leone: Facilitator Guide*. ILRI, Nairobi, Kenya. Available at: https://hdl.handle.net/10568/181903.

Pavanello, S. (2009) Pastoralists' vulnerability in the Horn of Africa: Exploring political marginalization. *Donors' Policies, and Cross-Border*-Literature review. Humanitarian Policy Group (HPG) Overseas Development Institute London, UK. Available at: https://www.preventionweb.net/files/24285_24285literaturereviewrread1.pdf?startDownload=true.

Prata, J.C., Ribeiro, A.I. and Rocha-Santos, T. (2022) An introduction to the concept of One Health. In: *One Health*. Elsevier, Academic Press. London, United Kingdom. pp. 1–31. DOI: 10.1016/B978-0-12-822794-7.00004-6.

Rettberg, S., Beckmann, G., Minah, M. and Schelchen, A. (2017) *Ethiopia's Arid and Semi-Arid Lowlands: Towards Inclusive and Sustainable Rural Transformation*. Centre for Rural Development (SLE), Humboldt-Universität zu Berlin, Berlin, Germany. DOI: 10.18452/18007.

Richards, S., Knight-Jones, T., Angombe, S., Becker, J., Bukachi, S.A. *et al.* (2024) Towards institutionalization of One Health in Eastern and Southern Africa. *One Health Cases* 2024, ohcs20240007. DOI: 10.1079/onehealthcases.2024.0007.

Riviere-Cinnamond, A. and Eregae, M. (2003) Community-based animal health workers in pastoralist areas of Kenya: A study on selection processes, impact and sustainability. Available at: https://openknowledge.fao.org/handle/20.500.14283/bp230e.

Rosenstock, I.M. (1974) Historical origins of the health belief model. *Health Education Monographs* 2(4), 328–335. DOI: 10.1177/109019817400200403.

Sangong, S., Saah, F.I. and Bain, L.E. (2025) Effective community engagement in One Health research in sub-Saharan Africa: A systematic review. *One Health Outlook* 7(1), 4. DOI: 10.1186/s42522-024-00126-4.

Sindato, C., Mboera, L.E., Katale, B.Z., Frumence, G., Kimera, S. *et al.* (2020) Knowledge, attitudes and practices regarding antimicrobial use and resistance among communities of Ilala, Kilosa and Kibaha districts of Tanzania. *Antimicrobial Resistance & Infection Control* 9(1), 194. DOI: 10.1186/s13756-020-00862-y.

Tang, X., Schalet, B.D., Peipert, J.D. and Cella, D. (2023) Does scoring method impact estimation of significant individual changes assessed by patient-reported outcome measures? Comparing classical test theory versus item response theory. *Value in Health* 26(10), 1518–1524. DOI: 10.1016/j.jval.2023.06.002.

Tofu, D.A., Fana, C., Dilbato, T., Dirbaba, N.B. and Tesso, G. (2023) Pastoralists' and agro-pastoralists' livelihood resilience to climate change-induced risks in the Borana zone, south Ethiopia: Using resilience index measurement approach. *Pastoralism* 13(1), 4. DOI: 10.1186/s13570-022-00263-3.

Tora, A., Kinfe, M., Ali, O., Mengiste, A., Ahimed, A. *et al.* (2022) A qualitative process evaluation of a community conversation intervention to reduce stigma related to lower limb lymphoedema in northern Ethiopia. *BMC Health Services Research* 22(1), 1–14. DOI: 10.1186/s12913-022-08335-1.

Wang, M. and Reeve, B.B. (2021) Evaluations of the sum-score-based and item response theory-based tests of group mean differences under various simulation conditions. *Statistical Methods in Medical Research* 30(12), 2604–2618. DOI: 10.1177/09622802211043263.

Wild, H., Mendonsa, E., Trautwein, M., Edwards, J., Jowell, A. *et al.* (2020) Health interventions among mobile pastoralists: A systematic review to guide health service design. *Tropical Medicine & International Health* 25(11), 1332–1352. DOI: 10.1111/tmi.13481.

Winkler, A.S., Brux, C.M., Carabin, H., dasNeves, C.G., Häsler, B. *et al.* (2025) The Lancet One Health Commission: Harnessing our interconnectedness for equitable, sustainable, and healthy socioecological systems. *The Lancet* 406(10502), 501–570. DOI: 10.1016/S0140-6736(25)00627-0.

World Bank (2025) *Kenya Country Overview*. Available at: www.worldbank.org/en/country/kenya/overview (accessed 22 November 2025).

Zarei, F., Dehghani, A., Ratansiri, A., Ghaffari, M., Raina, S.K. *et al.* (2024) ChecKAP: A checklist for reporting a knowledge, attitude, and practice (KAP) study. *Asian Pacific Journal of Cancer Prevention* 25(7), 2573–2577. DOI: 10.31557/apjcp.2024.25.7.2573.