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Exploring the challenges hindering the effectiveness of pastoral-oriented development in the Hamer district, southern Ethiopia

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Pastoral-oriented development (POD) interventions are widely implemented in Ethiopia's dryland regions to improve pastoral livelihoods, reduce vulnerability, and strengthen adaptation to environmental and socioeconomic challenges. However, the effectiveness of these interventions varies because of environmental uncertainty, institutional constraints, and limited integration of customary governance structures. This study examined factors associated with perceived POD intervention effectiveness in the Hamer district of southern Ethiopia using a convergent parallel mixed-methods design. Quantitative data were collected from 383 pastoral households through structured questionnaires, while qualitative data were obtained through 22 key informant interviews, five focus group discussions, and field observations. Binary logistic regression was employed to identify factors associated with perceived intervention effectiveness, and thematic analysis was used to examine governance, participation, and institutional dimensions influencing implementation outcomes. The regression analysis indicated that overall satisfaction with POD activities was significantly associated with perceived intervention effectiveness, while perceived cultural mismatch significantly reduced the likelihood of households evaluating interventions as effective. Household income, livestock ownership, household dependency ratio, community involvement, and the remaining institutional barrier variables were not statistically significant predictors in the overall model. Although one category of perceived livelihood vulnerability impact differed significantly from the reference category, the overall effect of this variable was not statistically significant. Qualitative findings further indicated that respondents perceived coordination challenges, limited community participation, and limited integration of customary institutions as recurring implementation concerns. The findings suggest that strengthening programme implementation quality, improving cultural compatibility, and enhancing collaboration between formal and customary institutions are important considerations for the local acceptability and perceived effectiveness of POD interventions in southern Ethiopia.

KEYWORDS
cultural alignment, Hamer district, institutional coordination, pastoral governance, pastoral-oriented development

Introduction

Worldwide, drylands cover a vast portion of the terrestrial surface and support millions of people whose livelihoods depend on highly variable ecological systems (FAO, 2018). Within these environments, pastoralism remains a dominant livelihood practice, particularly across Africa's arid and semi-arid regions, where mobile livestock management serves as a critical mechanism to environmental uncertainty, seasonal variability, and recurrent drought (Scoones, 2015). Beyond its economic value, pastoralism contributes substantially to food security, biodiversity conservation, social cohesion, and the maintenance of indigenous knowledge systems and customary institutions adapted to fragile rangeland ecosystems (Catley et al., 2013; Folke et al., 2016). Increasingly, pastoral scholarship recognizes mobility as a central adaptive strategy rather than simply a response to vulnerability. Through mobility, pastoral communities adjust livestock movements to changing patterns of pasture availability, water access, and climatic uncertainty, allowing them to sustain production in highly variable environments (Nori and Scoones, 2019; Turner and Schlecht, 2019).

In Eastern Africa, livestock mobility enables pastoral households to access dispersed and seasonally variable resources under highly fluctuating ecological conditions. Rather than representing an inefficient production system, mobility allows pastoralists' to adjust herd movements according to changing pasture and water availability (Behnke et al., 1995; FAO, 2021). In Ethiopia, pastoral households occupy vast drylands, driving national livestock production and rural livelihoods (Fre et al., 2022). Yet, these rangeland-based pastoral activities face severe operational threats, including climate variability, recurrent droughts, shrinking grazing areas, resource-driven conflicts, and enduring developmental neglect (Beyene et al., 2023).

While evidence from the Borana, Afar, and Somali regions highlights how fragmented governance, limited community participation, and weak institutional coordination frequently undermine the effectiveness of local development initiatives and climate adaptation efforts, these challenges reflect not only implementation limitations but also broader tensions between formal development systems and pastoral institutions responsible for managing mobility, resource access, and collective decision-making (Barrett et al., 2020; Lind et al., 2020; Nori and Scoones, 2019), these practical implementation challenges largely manifest within the distinct socio-ecological context of the Hamer district in Southern Ethiopia.

Compounding these localized pressures, some externally designed development interventions have emphasized fixed infrastructure and standardized service delivery models without sufficiently incorporating customary institutions, mobility patterns, and locally defined livelihood priorities (Fratkin, 2014; Little et al., 2016; Nori and Scoones, 2019). To counter these structural and institutional misalignments, this study operationalizes 'pastoral-oriented development' (POD) as interventions explicitly designed to strengthen the socio-economic wellbeing, adaptive capacity, and multi-level pastoral resource governance systems.

Historically, pastoral development approaches in Ethiopia and other parts of the Horn of Africa have often been associated with modernization-oriented models that emphasized settlement, fixed infrastructure, and administrative integration (Alene et al., 2021; FAO, 2018; Gebeye, 2016). Although such approaches have contributed important services, pastoral scholars argue that they have sometimes underestimated the ecological importance of mobility and the role of customary institutions in managing uncertainty. Recent debates therefore emphasize the need for development approaches that build upon pastoral adaptive strategies rather than attempting to replace them (Akall, 2021; Gabusho et al., 2023; Médecins Sans Frontières-UK, 2012).

Within the Hamer district, these challenges emerge from the interaction between climate variability, land-use change, governance arrangements, and the extent to which development institutions recognize pastoral livelihood realities. Over recent decades, state and non-governmental actors have deployed diverse POD interventions, including water infrastructure, livestock health services, and rangeland rehabilitation, to mitigate livelihood vulnerability and integrate local economies into national development agendas (Kiros, 2015; UNCCD, 2024). However, these conventional frameworks reflect technocratic, sedentary-oriented designs that prioritize fixed capital over mobility-based adaptive practices (Fratkin, 2014; Gebeye, 2016; Scoones, 2009).

In practice, infrastructure-focused development approaches may interact with agricultural expansion, land-use change, and changing resource governance arrangements in ways that affect pastoral mobility and customary grazing systems (Gebeyehu and Abbink, 2022; Lumborg et al., 2021). By overemphasizing territorial control and physical infrastructure expansion, these externally driven approaches inherently overlook the indigenous governance systems, customary grazing arrangements, and local ecological knowledge that underpin sustainable pastoral rangeland management (Flintan and Eba, 2023; Reed, 2008).

Consequently, while conventional evaluations acknowledge shifting rangeland dynamics, a critical empirical gap remains. Existing studies and development assessments frequently emphasize measurable livelihood indicators, including household assets, income, livestock ownership, and access to services, particularly within Sustainable Livelihoods Framework applications (Alkire and Foster, 2016; DFID, 1999; Scoones, 1998). However, resilience research increasingly demonstrates that livelihood outcomes in uncertain environments are also associated with institutional trust, governance quality, stakeholder coordination, and community perceptions of intervention relevance (Barrett and Constas, 2014; Béné et al., 2016; Folke et al., 2016). Limited empirical attention has been given to how local pastoral households themselves evaluate these programs. This omission limits understanding of important qualitative dimensions like reported cultural mismatch, institutional trust, and community satisfaction, which ultimately dictate the local acceptance, relevance, and long-term viability of development practices within mobile systems (Catley et al., 2013; Lumborg et al., 2021; UNCCD, 2024).

To address these gaps, this study integrates the Sustainable Livelihoods Framework (SLF) and the Stakeholder Analysis Framework (SAF) into a single, unified conceptual model (Figure 1). This combination is useful because neither framework alone fully captures the interaction between household livelihood conditions, institutional relationships, nor governance processes

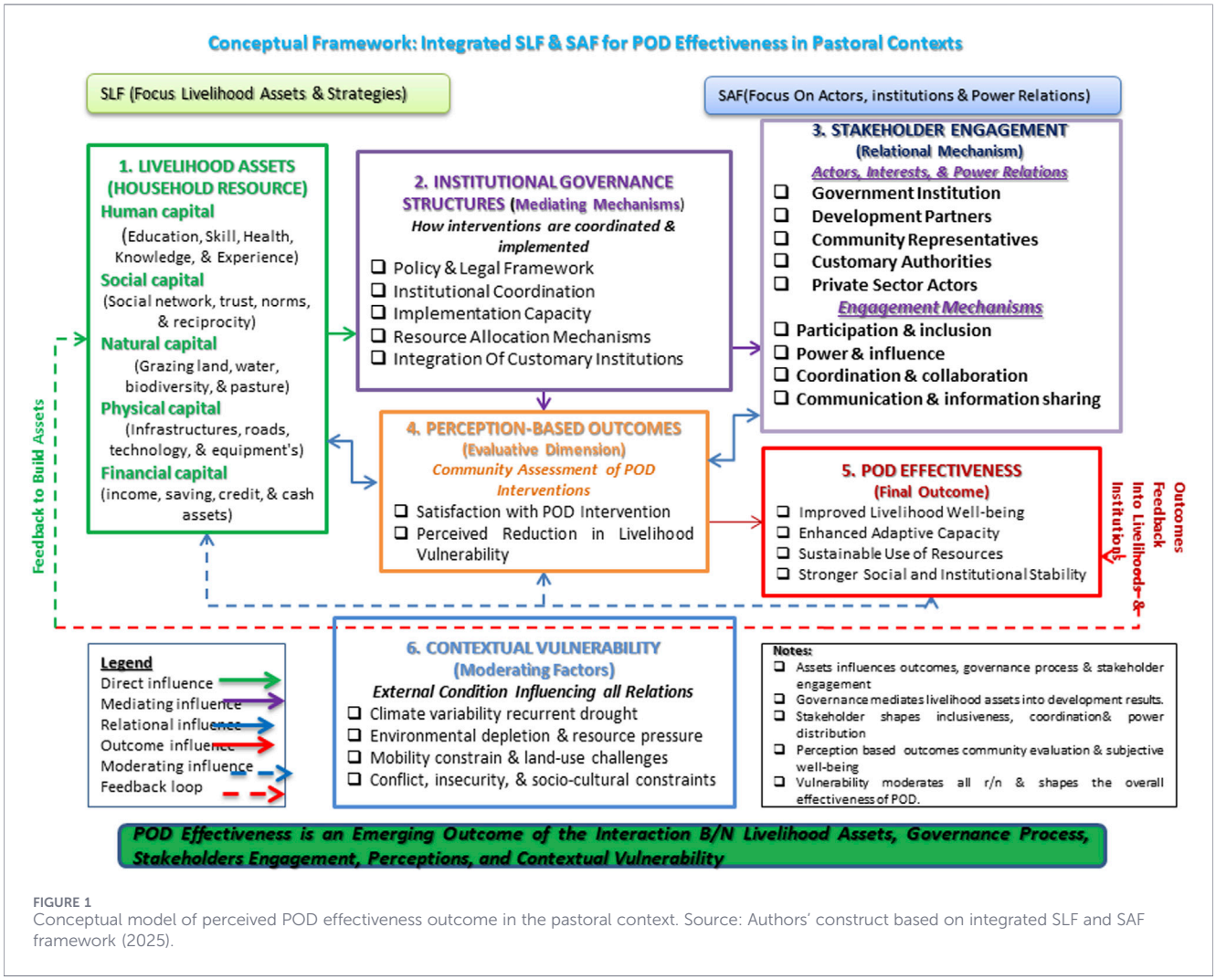


FIGURE 1
Conceptual model of perceived POD effectiveness outcome in the pastoral context. Source: Authors' construct based on integrated SLF and SAF framework (2025).

shaping pastoral development outcomes. While the SLF operates at the micro-level to track localized household assets and environmental vulnerabilities (DFID, 1999), it lacks the structural parameters required to analyze broader administrative power imbalances. Conversely, the SAF maps institutional relationships and stakeholder interactions across governance tiers (Grimble and Wellard, 1997) but overlooks the ground-level asset dynamics that dictate daily pastoral survival. By synthesizing these frameworks, our model conceptualizes development perceived effectiveness as the result of interactions among household vulnerability, governance conditions, stakeholder coordination, and pastoral community perceptions. Therefore, this study was guided by this integrated framework, and a convergent parallel mixed-methods design to assess the perceived effectiveness of pastoral-oriented development interventions in Hamer district.

Specifically, the study aimed to: identify the primary socio-economic, institutional, and livelihood barriers restricting the perceived effectiveness of local interventions; examine how governance conditions, stakeholder interactions, and multi-level coordination shape implementation processes and outcomes; and explore pastoral communities' perception-based insights regarding the approaches required for effective, culturally appropriate, and locally accepted pastoral development. Hence, this study is significant to empirically contribute to the ongoing debates on pastoral development policy, governance, and perceived intervention effectiveness in the Ethiopian drylands.

Materials and methods

Research paradigm and design

This study adopts a pragmatic research paradigm to examine complex, real-world development problems using multiple forms of evidence (Creswell and Creswell, 2018; Morgan, 2014). A pragmatic approach was considered appropriate because the study sought to examine both measurable household livelihood characteristics and institutional processes influencing perceptions of pastoral-oriented development (POD) effectiveness. Accordingly, the study combined quantitative and qualitative approaches to provide complementary perspectives on household livelihood conditions and institutional processes. Methodologically, used a convergent parallel mixed-methods design (Creswell and Creswell, 2018).

Quantitative and qualitative data are collected concurrently, analyzed independently, and integrated during the final interpretation. Quantitative analysis is operationalized through

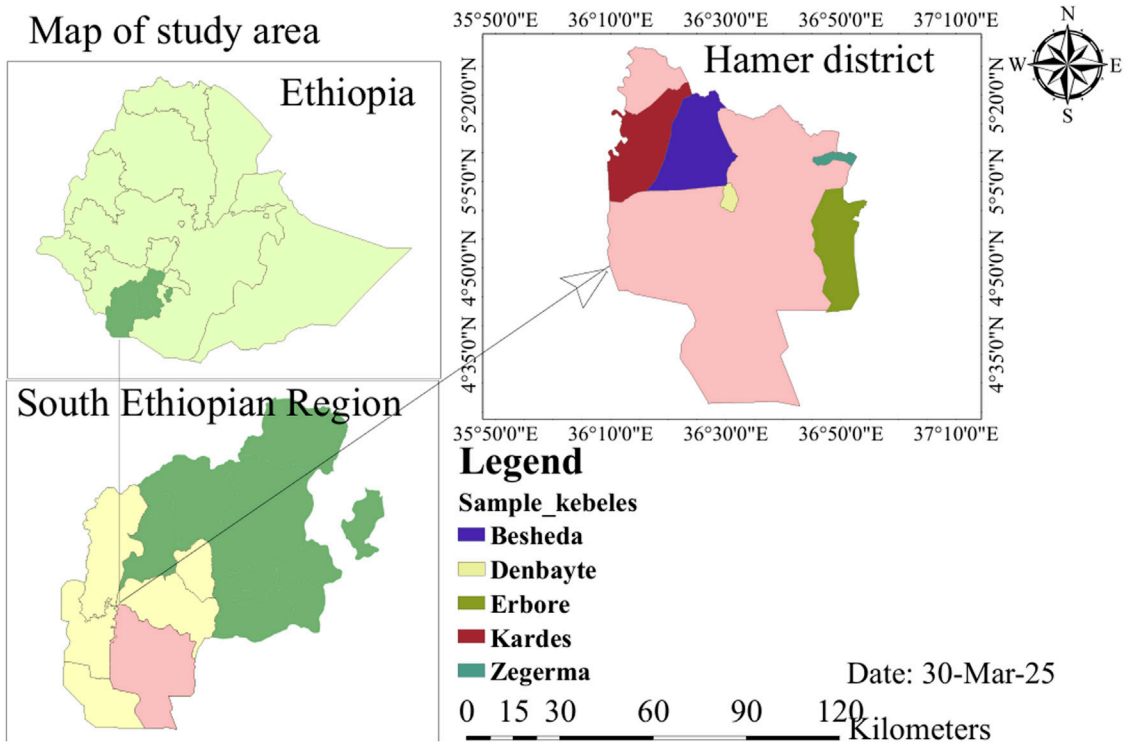


FIGURE 2
Map of the study area showing the district and sampled pastoral kebeles. The label "Erbore" is reproduced from the GIS shapefile used to prepare the map. Gondoroba, identified in the study records as one of the five sampled kebeles, was not identified as a separate mapped feature in the available shapefile. The map label is retained as supplied by the source data and does not independently establish the geographic relationship between Erbore and Gondoroba.

the Sustainable Livelihoods Framework (DFID, 1999), to identify factors associated with perceived POD effectiveness. Concurrently, qualitative inquiry is supported by the Stakeholder Analysis Framework (Grimble and Wellard, 1997) to evaluate institutional coordination and local implementation challenges. This mixed-methods approach supported triangulation of quantitative and qualitative evidence and provided in detail understanding of pastoral-oriented development within the Hamer district.

Description of the study area

Geographical location and topography

The study was conducted in Hamer district, located in the South Omo Zone of Southern Ethiopia. Five pastoral *kebeles* were sampled across three pastoral groups: Zagarma, Besheda, and Denbayte (Hamer); Gondoroba (Arbore); and Kara Dus (Kara). The spatial location of the district, administrative boundaries, and sampled pastoral *kebeles* are presented in Figure 2. The map displays the label "Erbore," as provided in the GIS shapefile used to prepare the figure; the available shapefile did not identify Gondoroba as a separate mapped feature. Therefore, Gondoroba is retained as the sampled *kebele* name according to the study records, while "Erbore" is identified as the label supplied by the source mapping data.

The district is characterized mainly by lowland plains and arid rangeland ecosystems extending toward the lower Omo Valley and Lake Chew Bahir. Elevation ranges from approximately 380 to 2,100 m above sea level, with Buska Mountain representing the highest point in the area (Melese et al., 2025). The predominantly lowland terrain influences pastoral mobility patterns and seasonal access to grazing and water resources in the Hamer district.

Climate and ecological conditions

Hamer district experiences a semi-arid climate characterized by high temperatures and annual rainfall ranging from 250 mm to 750 mm (Lumborg et al., 2021). Rainfall distribution is bimodal and highly variable, with long rains occurring between March and May and short rains between September and October (NDRMC, 2020). The district frequently experiences drought and seasonal variability in pasture and water availability.

These climatic conditions contribute to environmental variability and place significant pressure on local pastoralist's livelihood practices. Pastoralism in the district depends largely on seasonal water availability and natural pasture regeneration.

Socioeconomic and livelihood practice

Livestock production is the dominant livelihood activity in the district. Cattle, goats, and sheep constitute the primary pastoral assets and serve important economic, social, and food security functions for local households. Pastoral livelihoods rely heavily on communal grazing areas and seasonal access to water resources.

TABLE 1 Socioeconomic characteristics of respondents.

Indicator	Classification	Frequency (f)	Proportion (%)	Mean (μ)	Std. dev. (σ)
Age (Years)	Continuous scale	—	—	39.58	8.78
Sex	Male	247	64.5	—	—
	Female	136	35.5	—	—
Education Level	Cannot Read/Write	210	54.8	—	—
	Non-Formal	104	27.2	—	—
	Primary	57	14.9	—	—
	Secondary	12	3.1	—	—
Household size	Count (Individuals)	—	—	6.15	2.54
Dependency Ratio	Continuous index	—	—	2.19	1.44
Monthly Income	<500 ETB	96	25.1	—	—
	501–1,000 ETB	97	25.3	—	—
	1,001–5,000 ETB	110	28.7	—	—
	>5,001 ETB	36	9.4	—	—
	Variable streams	44	11.5	—	—
Livestock Wealth (TLU)	Continuous scale	—	—	27.67	20.51

Source: Field survey data (2025).

Mobility remains a key adaptive strategy that enables pastoral households to respond to climatic variability and fluctuating rangeland conditions (Catley et al., 2013; Lumborg et al., 2021). However, livelihoods in the district are constrained by recurrent drought, limited infrastructure, weak veterinary services, and poor market access. Baseline socio-economic and infrastructural characteristics of the target sites are presented in Table 1.

Administrative and demographic profile

Administratively, Hamer district consists of 34 *kebeles* (the lower administrative tiers). Although the district is administratively identified as "Hamer," it comprises three major pastoral groups: Hamer, Arbore, and Kara. The Hamer group predominantly occupies 26 *kebeles*, while the Arbore and Kara communities are distributed across five and three *kebeles*, respectively (Central Statistical Service, 2024; Hamer Woreda Office of Agriculture, 2024).

Customary institutions within these pastoral groups play important roles in regulating grazing access, mobility routes, water resource use, and local conflict resolution (Tofu et al., 2023b). The coexistence of multiple pastoral groups and customary governance systems within a single administrative district provides an important context for examining POD interventions. The demographic characteristics and administrative distribution of the target population are summarized in Table 2.

Hamer district represents a pastoral context characterized by climatic variability, livestock-based livelihoods, and dependence on customary resource management systems. These characteristics make the district an important setting for examining how pastoral-oriented development interventions interact with local livelihood strategies and institutional arrangements.

Data types and sources

This study employed both primary and secondary data sources to examine factors influencing perceived POD effectiveness and to enhance the completeness and credibility of the findings through methodological triangulation (Johnson and Onwuegbuzie, 2004; Tashakkori and Teddlie, 2010).

Primary data included both quantitative and qualitative information collected concurrently during fieldwork. Quantitative data consisted of household socio-economic characteristics, livelihood asset indicators, access to basic services, and Likert scale responses measuring perceptions of POD effectiveness. Qualitative data were obtained through key informant interviews and focus group discussions and focused on community perceptions of institutional coordination, participation, governance arrangements, and local development challenges.

Secondary data were obtained from government reports, policy documents, NGO programme reports, district administrative records, and relevant scientific literature (Carter et al., 2014; Creswell and Plano Clark, 2018). These sources were used to support contextual understanding of pastoral development conditions and governance processes within the study area.

Study population, sampling procedures, and sample size determination

Study population

The study population comprised pastoral households residing in Hamer district, South Omo Zone, Southern Ethiopia. The district is predominantly pastoral and is inhabited mainly by the Hamer, Arbore, and Kara pastoral groups, whose livelihoods are strongly dependent on livestock production, seasonal mobility, communal

TABLE 2 Operational definitions and measurements of study variables.

Variable	Operational definition	Measurement scale	Coding and reference category	Expected association
Dependent variable				
Perceived POD effectiveness	Household perception of whether POD interventions effectively improved livelihoods, access to services, and vulnerability reduction	Binary	1 = Effective; 0 = Not effective	—
Independent variables				
Monthly household income	Reported household monthly income level reflecting relative economic capacity	Five-category factor	1 = 500 ETB (Ref); 2 = 501–1,000 ETB; 3 = 1,001–5,000 ETB; 4 = >5,001 ETB; 5 = Variable income streams	Positive (+)
Livestock ownership	Household livestock asset ownership standardized using Tropical Livestock Units (TLU)	Continuous	Continuous TLU value based on livestock holdings	Positive (+)
Household dependency ratio	Ratio of dependent household members to working-age household members	Continuous	(<15 and >64 years)/(15–64 years)(<15 \text{ and } >64 \text{ years})/(15–64 \text{ years})	Negative (−)
Satisfaction with POD activities	Household satisfaction with POD implementation processes, activities, and perceived outcomes	Five-category factor	1 = Very dissatisfied (Ref); 2 = Dissatisfied; 3 = Neutral; 4 = Satisfied; 5 = Very satisfied	Positive (+)
Community involvement	Degree of household participation in POD planning, implementation, and related activities	Three-category recoded factor	Regression coding: 2 = Reference category; 3 and 4 = comparison categories (recoded from original responses)	Positive (+)
Perceived vulnerability reduction impact	Household perception of POD contribution to reducing livelihood vulnerability arising from climate, drought, and resource constraints	Five-category factor	1 = No impact (Ref); 2–5 = Increasing levels of perceived impact	Positive (+)
Cultural mismatch	Perceived incompatibility between POD interventions and local pastoral values, practices, and livelihood systems	Binary indicator	1 = Yes; 0 = No (Ref)	Negative (−)
Poor institutional coordination	Perceived lack of coordination among institutions involved in POD implementation	Binary indicator	1 = Yes; 0 = No (Ref)	Negative (−)
Grazing conflict	Perceived influence of grazing-related conflicts on POD implementation and outcomes	Binary indicator	1 = Yes; 0 = No (Ref)	Negative (−)
Drought constraint	Perceived effect of drought-related challenges on POD effectiveness	Binary indicator	1 = Yes; 0 = No (Ref)	Negative (−)
Limited funding	Perceived influence of inadequate financial resources on POD implementation	Binary indicator	1 = Yes; 0 = No (Ref)	Negative (−)

Expected relationships are conceptual; interpretation depends on reference-category coding used in the regression model.
Source: Author's construct (2025).

natural-resource use, and locally established social and customary institutions.

According to projected demographic estimates, Hamer district has an estimated population of 83,533 persons living in 15,997 households distributed across 34 kebeles (Central Statistical Service, 2024; Hamer Woreda Office of Agriculture, 2024; Hamer Woreda Office of Health, 2024). Pastoral-oriented development (POD) interventions have been implemented in the district to support pastoral livelihoods, improve access to services and productive resources, reduce livelihood vulnerability, and strengthen households' capacity to respond to environmental and socioeconomic challenges.

Because perceptions of POD interventions and their outcomes are experienced and assessed largely at the household and community levels, the household constituted the primary unit of observation for the quantitative component. Household heads, or another knowledgeable adult household member where the household head was unavailable, served as respondents to provide information on household characteristics, exposure to POD interventions, perceptions of intervention effectiveness, and related livelihood conditions.

For the qualitative component, the study population comprised individuals with direct knowledge of pastoral development interventions, their implementation processes, and local governance arrangements. This included local government

officials, development practitioners, extension personnel, customary leaders, pastoral representatives, and other community members with relevant experience. Their participation was intended to provide contextual explanations of institutional coordination, community participation, reported cultural mismatch, customary governance, and other factors influencing the implementation and perceived effectiveness of POD interventions.

Quantitative sampling procedures

A multistage sampling approach combining purposive and probability sampling techniques was employed for the household survey. The combination of sampling procedures was appropriate because the study required the purposive selection of information-rich pastoral settings while maintaining probability-based selection of households within the selected study sites.

First, Hamer district was purposively selected because of its predominantly pastoral livelihood system, the long-standing relevance of pastoral-oriented development interventions, and the environmental and socioeconomic conditions that make pastoral development and intervention effectiveness important areas of inquiry.

Second, five *kebeles* were purposively selected from the district's 34 administrative units to capture variation among the major pastoral groups and livelihood contexts represented in the study area. The selected kebeles were Zagarma, Besheda, and Denbayte, predominantly representing Hamer communities; Gondoroba, representing the Arbore community; and Kara Dus, representing the Kara community.

The selection of these *kebeles* was intended to capture variation in pastoral livelihood conditions, institutional contexts, community experiences, and exposure to POD interventions. The first two stages therefore constituted purposive selection stages rather than probability sampling stages.

Third, probability-based household sampling was conducted within the five selected *kebeles*. Updated household registration lists obtained from the respective local administrative offices constituted the operational sampling frame. The five selected *kebeles* contained a combined total of 2,607 households. The required household sample was proportionally allocated across the selected *kebeles* according to their respective household populations. Individual households were subsequently selected through simple random sampling from the updated household lists, thereby providing eligible households within the selected study sites with a defined probability of selection.

Household sample size determination and proportional allocation

The household survey sample size was determined using Cochran's (1977) formula for estimating a population proportion:

Equation 1: Cochran's (1977) sample size formula

$$n_0 = \frac{Z^2 \cdot p \cdot (1-p)}{e^2} \quad (1)$$

Where n_0 is the initial required sample size, Z is the standard normal value corresponding to the selected confidence level, p is the estimated population proportion, q = 1 − p, and e is the acceptable margin of error.

A 95% confidence level (Z = 1.96), a 5% margin of error (e = 0.05), and p = 0.50 and q = 0.50 were used. The value of p = 0.50 was adopted because no prior reliable estimate of the relevant population proportion was available and provides the maximum variability for sample-size determination. Under these assumptions, Cochran's formula yielded an initial sample-size estimate of approximately 384 households.

The target population comprised 15,997 pastoral households residing in Hamer District. However, because the study employed a multistage sampling design, five purposively selected kebeles served as the primary sampling units. The 2,607 households in those five kebeles constituted the operational sampling frame, from which 383 households were selected. Consistent with multistage sampling procedures, the overall sample size was determined before household selection and subsequently distributed across the selected kebeles through proportional allocation according to the number of registered households in each kebele (Cochran, 1977; Lohr, 2019).

The use of Cochran's large-population estimate provided a conservative sample size, while proportional allocation ensured that the relative distribution of households across the selected kebeles was maintained (Tora, 2024). After data collection and quality verification, one questionnaire was excluded because of incomplete information, resulting in a final analytical sample of 383 households, representing approximately 2.4% of all households in Hamer district and 14.69% of households within the operational sampling frame. The resulting distribution of the household population and survey sample across the five selected kebeles is presented in Table 3.

Because the district and selected kebeles were purposively selected, the resulting sample does not constitute a statistically representative sample of all households in Hamer district. Probability-based selection was applied at the household level within the selected kebeles; however, the purposive selection of the study sites limits statistical generalization beyond the sampled communities.

Qualitative study population and sampling procedures

The qualitative component complemented the quantitative assessment of perceived pastoral-oriented development (POD) effectiveness by examining institutional, social, cultural, and community-level factors influencing intervention implementation and outcomes. Participants were purposively selected based on their knowledge, experience, institutional responsibilities, customary authority, or direct involvement in pastoral development and community affairs, with attention to variation in institutional roles, gender, pastoral-group representation, and customary governance.

The qualitative sample comprised five focus group discussions (FGDs) and 22 key informant interviews (KIIs). One FGD was conducted in each selected kebele (Zagarma, Besheda, Denbayte, Gondoroba, and Kara Dus), with six participants per group (30 participants in total). The FGDs explored community experiences and perceptions of POD interventions, participation,

TABLE 3 Household distribution and proportional allocation of the survey sample among selected *kebeles*.

District	Pastoral groups	Total pastoral *Kebeles*	Name of sample pastoral *Kebeles*	Total HHs of sample *Kebeles*			PP (%)	Sampled HHs size		
				Male	Female	Total		Male	Female	Total
Hamer	Hamer	26	Zagarma	254	155	409	14.69%	37	23	60
	Hamer	-	Besheda	594	255	849		87	38	125
	Hamer	-	Denbayte	217	144	361		32	21	53
	Arbore	5	Gondoroba	449	252	701		66	37	103
	Kara	3	Kara Dus	172	115	287		25	17	42
	Total	34	5 *Kebeles*	1,686	921	2,607		247	136	383

Source: Adapted from Tora (2024).

institutional relationships, cultural compatibility, livelihood changes, and perceived benefits and limitations. The 22 KIIs involved local government officials, NGO and development practitioners, agricultural and health extension personnel, customary pastoral leaders, and other knowledgeable community representatives. Interviews examined institutional coordination, implementation processes, community engagement, customary governance, service provision, cultural considerations, and factors influencing perceived intervention effectiveness. Qualitative recruitment and data collection continued until thematic saturation, when additional interviews and discussions generated limited or no substantially new information (Guest et al., 2006; Hennink and Kaiser, 2022).

Data collection methods

Consistent with the convergent parallel mixed-methods design, quantitative and qualitative data were collected concurrently during the same fieldwork period using complementary methods: a structured household questionnaire, KIIs, FGDs, and structured field observations. The quantitative and qualitative data were analyzed separately and integrated during interpretation to provide complementary evidence on perceived POD effectiveness and its institutional, participatory, cultural, and contextual dimensions.

Quantitative data collection

Quantitative data were collected through face-to-face interviews with selected household respondents using a structured questionnaire developed in line with the study objectives. The questionnaire covered household socio-demographic and socioeconomic characteristics, livelihood conditions, exposure to and experience with POD interventions, institutional and service-related conditions, and perceptions of intervention effectiveness. Perceived POD effectiveness was measured using structured five-point Likert-scale items, supplemented by questions on perceived changes in livelihood vulnerability and the contribution of interventions to household and community livelihood conditions.

The questionnaire was initially prepared in English and translated into Amharic to facilitate field administration. Because Hamer does not have a standardized written form used for questionnaire administration, trained bilingual enumerators verbally interpreted the questions into Hamer where necessary. Enumerators were trained in questionnaire administration, interpretation procedures, ethical requirements, and quality control. The instrument was pre-tested with 38 households in a non-sampled kebele, and minor revisions were made to improve clarity, sequencing, and contextual terminology. The principal investigator supervised the survey, including field-level review of completed questionnaires for missing or inconsistent responses. Participation was voluntary, confidentiality was maintained, and oral informed consent was obtained before each interview.

Qualitative data collection

Qualitative data were collected using semi-structured FGD and KII guides. The FGDs addressed community experiences of POD interventions, participation, institutional trust and coordination, cultural compatibility, customary governance, livelihood changes, and perceived intervention benefits and limitations. KIIs focused on institutional coordination, implementation processes, community engagement, customary institutions, cultural considerations, service delivery, and challenges associated with perceived intervention effectiveness.

The principal investigator conducted the interviews and discussions at locations convenient to participants and conducive to privacy and open discussion. With participants' consent, KIIs were audio-recorded and transcribed, while field notes were maintained throughout the data-collection process. Personal identifiers were removed during transcription and reporting to protect confidentiality.

Field observation

Structured observations were conducted throughout the fieldwork using a standardized checklist covering physical, environmental, infrastructural, and institutional conditions relevant to POD implementation and effectiveness. Particular attention was given to pasture conditions, water infrastructure and access, veterinary facilities, livestock markets, transport and community infrastructure, settlement conditions, and other pastoral

development facilities. Observations were used to contextualize and triangulate evidence from the household survey, FGDs, and KIIs.

Measurement of variables and model specification

The dependent variable was perceived effectiveness of pastoral-oriented development (POD) interventions. It captured household-level perceptions of intervention outcomes related to livelihood improvement, service access, and vulnerability reduction. Consistent with established approaches for perception-based outcome variables in rural development research, the dependent variable was operationalized as a binary outcome. Households with composite perception scores above the mean value were categorized as perceiving POD interventions as effective (Y = 1), while those below the mean were categorized as perceiving interventions as less effective (Y = 0) (Hosmer et al., 2013).

The explanatory variables represented household livelihood characteristics, perceptions of POD implementation, and institutional barriers. Household income was operationalized as a five-category variable: <500 ETB (reference category), 501–1,000 ETB, 1,001–5,000 ETB, >5,001 ETB, and variable income streams. Livestock ownership was measured continuously using Tropical Livestock Units (TLU), and the household dependency ratio was treated as a continuous variable. Satisfaction with POD activities was measured on a five-point scale and entered as a categorical factor, with category 1 (very dissatisfied) as the reference category. For regression analysis, the original community involvement variable was recoded to produce the final three-category analysis variable with values 2, 3, and 4, with category 2 specified as the reference category. Community involvement was then entered into the logistic regression as a three-category factor using these recoded analysis values. Perceived livelihood vulnerability impact was entered as a five-category factor, with category 1 as the reference category. Five binary institutional-barrier indicators were included: cultural mismatch, poor coordination, grazing conflict, drought, and limited funding, coded 1 = yes and 0 = no.

The regression model was specified as a binary logistic model with dummy variables for categorical predictors. The final model contained 21 degrees of freedom: four for income, one for livestock ownership, one for dependency ratio, four for satisfaction, two for community involvement, four for vulnerability impact, and five for institutional barriers. Odds ratios (ORs), 95% confidence intervals (CIs), Wald statistics, and p-values were used to interpret the estimated associations (Hosmer et al., 2013).

Descriptive statistics included frequencies, percentages, means, and standard deviations. Model adequacy was assessed using multicollinearity diagnostics (O'Brien, 2007), the Hosmer–Lemeshow goodness-of-fit test, pseudo-R^2 statistics, and classification accuracy. Quantitative analyses were conducted using IBM SPSS Statistics Version 25.

Qualitative data were analyzed thematically (Braun and Clarke, 2006), and quantitative and qualitative findings were integrated during interpretation to identify convergence, complementarity, and divergence between the two strands of evidence (Creswell and Plano Clark, 2018; Fetters et al., 2013). The study does not interpret the regression coefficients as causal effects because the data are cross-sectional and the outcome represents perceived intervention effectiveness (Setia, 2016). The operational definitions, coding procedures, measurement scales, and expected relationships of all study variables are presented in Table 2.

Analytical models and procedures

In this study, descriptive statistics, binary logistic regression, and thematic qualitative analysis were used to assess factors associated with perceived effectiveness of POD interventions. Frequencies, percentages, means, and standard deviations were used to summarize household socio-economic characteristics and key study variables. Binary logistic regression was selected because the dependent variable was dichotomous and the method is appropriate for estimating associations between a binary outcome and multiple explanatory variables (Hosmer et al., 2013). Categorical explanatory variables containing more than two response categories were entered into the model using dummy-variable coding, with one category serving as the reference group. The model is specified as follows:

Equation 2: Regression Formula

$$\begin{aligned}\text{logit}(Pi) &= \ln(1 - PiPi) = \beta 0 + j \\ &= 2\sum 5\beta IjIncomeij + \beta LLivestocki + \beta DDependencyi + j \\ &= 2\sum 5\beta SjSatisfactionij + j = 3\sum 4\beta CjCommunityij + j \\ &= 2\sum 5\beta VjVulnerabilityij + \beta CMCulturalMismatchi \\ &\quad + \beta PCPoorCoordinationi + \beta GCGrazingConflicti \\ &\quad + \beta DRDroughti + \beta LFLimitedFundingi.\end{aligned} \tag{2}$$

Where: Pi = probability that household ii perceived pastoral-oriented development (POD) interventions as effective (Y = 1Y = 1); β0 = intercept; βIj,βSj,βCj,βVj = regression coefficients for the dummy variables representing income, satisfaction, community involvement, and perceived livelihood vulnerability, respectively; βL and βD = coefficients for livestock ownership (measured in Tropical Livestock Units) and household dependency ratio, both treated as continuous variables; βCM,βPC,βGC,βDR, and βLF = coefficients for the binary institutional-barrier indicators (1 = yes, 0 = no); Income category 1, satisfaction category 1, community category 2, and vulnerability category 1 served as the reference categories.

Model robustness was assessed using multicollinearity diagnostics through Variance Inflation Factors (VIF), the Hosmer–Lemeshow goodness-of-fit test, and pseudo-(R2) statistics. Regression outputs were interpreted using coefficients, Wald statistics, significance levels, odds ratios, and corresponding 95% confidence intervals. Quantitative data analysis was conducted using IBM SPSS Statistics Version 25.

Qualitative data analysis involved thematically following Braun and Clarke (2006), through familiarization with the transcripts, systematic coding, theme development, and iterative refinement of themes, and identification of recurring themes (Braun and Clarke, 2006). A hybrid coding approach combining deductive and inductive techniques was employed (Fereday and Muir-Cochrane, 2006). Deductive codes were informed by the SLF and SAF, while inductive codes emerged from participants' narratives (Fereday and

Muir-Cochrane, 2006). The coded data were subsequently organized into broader themes related to governance coordination, participation, livelihood vulnerability, and customary institutional systems. NVivo software was used to facilitate data organization, coding, and retrieval. Finally, quantitative and qualitative findings were integrated during interpretation to identify areas of convergence, complementarity, and divergence, consistent with the convergent parallel mixed-methods design (Fetters et al., 2013).

Ethical considerations

The study protocol was reviewed and approved through the official PhD dissertation proposal evaluation process of the Department of Geography and Environmental Studies, College of Social Sciences and Humanities, Arba Minch University, Ethiopia, prior to field data collection. Institutional authorization to conduct the research was provided through the approved dissertation proposal review process and an official support letter issued by the Department of Geography and Environmental Studies. Under the institutional research approval procedures applicable at the time of the study, approval was documented through the dissertation proposal evaluation and departmental authorization process, and no separate Institutional Review Board (IRB) reference number was issued.

Before participation, all respondents were informed about the objectives of the study, the voluntary nature of participation, confidentiality procedures, and their right to decline participation or withdraw at any stage without consequence. Oral informed consent was obtained from all participants before data collection commenced. To protect participants' privacy, personal identifiers were not recorded in the research database, and all survey responses and interview transcripts were anonymized during data processing, analysis, and reporting. The collected information was securely stored and used exclusively for academic research purposes.

Results

Socioeconomic characteristics of respondents

This section presents the demographic and socioeconomic characteristics of the sampled pastoral households, including household composition, educational attainment, livestock ownership, and livelihood activities. These characteristics provide important contextual information for interpreting households' perceptions of pastoral-oriented development (POD) interventions.

The survey findings indicate that most sampled households were male-headed, reflecting the dominant household structure within the pastoral communities of Hamer district. Most household heads were within the economically active age group, although dependency ratios remained relatively high, indicating that working-age household members commonly supported several dependents.

Educational attainment among respondents was generally low. A substantial proportion of household heads reported either no formal education or only primary-level schooling. These data indicate relatively low levels of formal educational attainment among the surveyed household heads.

Livestock ownership remained the principal livelihood asset across the sampled households. Cattle, goats, and sheep were the most commonly owned livestock species, highlighting local livelihoods' sustained reliance on pastoralism. However, variation in herd size was observed among households.

The descriptive statistics show that some households engaged in diversified livelihood activities, including petty trade, casual labour, and limited crop cultivation, in addition to livestock production. Household dependency ratios were relatively high, indicating that economically active household members commonly supported several dependents.

Institutional and participation related characteristics

Respondents evaluated several institutional and participation-related dimensions affecting POD intervention implementation, including coordination, participation, accountability, and integration of customary institutions.

Descriptive statistics for the principal perception and institutional variables are presented in Table 4. The mean perceived POD effectiveness score on the binary outcome was 0.42 (SD = 0.49), indicating that 161 of the 383 households were classified in the effective-outcome category. Satisfaction with POD activities had a mean score of 3.08 (SD = 1.28), while community involvement had a mean score of 3.26 (SD = 1.32). Perceived livelihood vulnerability impact had a mean score of 2.83 (SD = 1.10). Among the binary institutional barriers, cultural mismatch was reported by 52.0% of households, poor coordination by 45%, grazing conflict by 60%, drought by 61%, and limited funding by 46%.

These descriptive findings indicate that institutional and contextual challenges were present across the study population. The binary barrier indicators are descriptive measures of reported challenges and should not be interpreted as evidence that each barrier was statistically associated with perceived POD effectiveness.

Logistic regression results

A binary logistic regression model was estimated to identify factors associated with pastoral households' perceived effectiveness of pastoral-oriented development (POD) interventions among pastoral households presented in Table 5.

The overall model was statistically significant (Omnibus likelihood-ratio test: $\chi^2(21) = 36.129$, $p = 0.021$), indicating that the included explanatory variables collectively improved prediction of perceived intervention effectiveness. The model demonstrated acceptable goodness-of-fit according to the Hosmer–Lemeshow test ($\chi^2(8) = 9.596$, $p = 0.295$), explained a modest proportion of the variation in the outcome (Cox–Snell $R^2 = 0.090$; Nagelkerke $R^2 = 0.121$), and correctly classified 65.8% of the sampled households.

Among the explanatory variables, satisfaction with POD activities was significantly associated with perceived intervention effectiveness overall ($p = 0.043$). However, the individual category

TABLE 4 Descriptive statistics of key perception and institutional variables.

Predictor	Minimum	Maximum	Mean	SD
Perceived POD effectiveness (binary)	0	1	0.42	0.49
Satisfaction with POD activities	1	5	3.08	1.28
Community involvement	1	5	3.26	1.32
Perceived livelihood vulnerability impact	1	5	2.83	1.10
Cultural mismatch barrier	0	1	0.52	0.50
Poor coordination barrier	0	1	0.45	0.50
Grazing conflict barrier	0	1	0.60	0.49
Drought barrier	0	1	0.61	0.49
Limited funding barrier	0	1	0.46	0.50

Satisfaction with POD, activities and perceived livelihood vulnerability impact were measured using five-point response scales. Community involvement was originally measured using a five-point response scale and was recoded into a three-category factor (analysis codes 2, 3, and 4) for binary logistic regression, with category 2 specified as the reference category. Binary barrier variables are coded 1 = Yes and 0 = No.
Source: Computed from field survey data (2025).

TABLE 5 Binary logistic regression results for perceived POD effectiveness.

Predictor	B	Adjusted OR	95% CI for OR	p-value
Monthly household income (overall)	—	—	—	0.917
Livestock ownership (TLU)	0.002	1.002	0.991–1.013	0.686
Household dependency ratio	−0.054	0.947	0.813–1.103	0.483
Satisfaction with POD activities (overall)	—	—	—	0.043
Community involvement (overall)	—	—	—	0.374
Perceived vulnerability impact (overall)	—	—	—	0.107
Cultural mismatch	−0.600	0.225	0.353–0.853	0.008
Poor coordination	0.169	1.185	0.762–1.842	0.451
Grazing conflict	0.331	1.393	0.885–2.192	0.153
Drought	0.233	1.262	0.797–1.999	0.321
Limited resource funding	0.076	1.079	0.696–1.673	0.733

Statistic	Value
Model statistics	
Omnibus likelihood-ratio test	$\chi^2(21) = 36.129$
Model significance	0.021
−2 Log likelihood	485.065
Cox–Snell pseudo-\(R2\)	0.090
Nagelkerke pseudo-\(R2\)	0.121
Hosmer–Lemeshow test	$\chi^2(8) = 9.596$, p = 0.295
Overall classification accuracy	65.8%

Outcome coded 1 = effective and 0 = not effective. The model includes income, livestock ownership, dependency ratio, satisfaction, vulnerability impact, five institutional barriers, and community involvement. Overall p-values are reported for categorical predictors; category-specific contrasts are provided in Supplementary Appendix A1. TLU, Tropical Livestock Units; OR, odds ratio; CI, confidence interval. Bold p-values indicate statistical significance at the .05 level.
Source: Computed from field survey data (2025).

TABLE 6 Major qualitative themes and representative narratives.

Theme	Main issue	Illustrative respondent narrative
Institutional and cultural mismatch	Limited alignment between formal development planning and customary pastoral governance systems	*"The government officials come with maps drawn in town offices. They mark lines for projects without knowing where our clan boundaries end or how we share pasture during droughts. When they implement these projects, they sometimes create conflict between neighboring groups."* (Hamer Pastoral Elder, FGD, July 2025)
Limited genuine participation	Local pastoralists' have limited influence over project planning and implementation decisions	*"They call us to meetings under the trees, but most decisions are already made before we arrive."* (Arbore Pastoral Youth, KII-08, July 2025)
Limited local ownership of POD initiatives	Low community commitment to maintaining externally introduced infrastructure	*"Why should we repair the pumps and fences after the project teams leave? These projects were planned without considering how we move with our animals."*(Kara Pastoralist Woman, FGD, June 2025)

Source: Qualitative themes from field survey data (2025).

comparisons are presented in Supplementary Table SA1 and should be interpreted relative to the designated reference category.

Perceived cultural mismatch was also significantly associated with perceived POD intervention effectiveness (B = −0.600, OR = 0.549, 95% CI: 0.353–0.853, p = 0.008). The negative regression coefficient indicates that households reporting the presence of cultural mismatch were less likely to perceive POD interventions as effective as households reporting no cultural mismatch.

In contrast, monthly household income (overall p = 0.917), livestock ownership measured as Tropical Livestock Units (p = 0.686), household dependency ratio (p = 0.483), community involvement (overall p = 0.374), perceived livelihood vulnerability impact (overall p = 0.107), poor coordination (p = 0.451), grazing conflict (p = 0.153), drought (p = 0.321), and limited resource funding (p = 0.733) were not statistically significant predictors in the overall regression model.

Although one category of perceived livelihood vulnerability impact differed significantly from the reference category in the category-specific comparisons presented in Supplementary Table SA1, the overall effect of this variable was not statistically significant. Therefore, the findings do not provide sufficient evidence to conclude that perceived livelihood vulnerability impact was independently associated with perceived POD intervention effectiveness across all response categories.

The regression model identified several governance- and perception-related variables as statistically significant predictors of perceived POD effectiveness. These included institutional coordination, satisfaction with interventions, perceived livelihood vulnerability reduction, and cultural alignment after accounting for household socioeconomic characteristics. Household income, livestock ownership, and dependency ratio were not statistically significant.

Qualitative findings

The qualitative analysis identified three recurring themes: institutional and cultural mismatch, limited genuine participation, and limited local ownership of POD initiatives. Participants described concerns about interventions that were insufficiently aligned with customary pastoral governance systems, seasonal mobility patterns, and locally defined resource-sharing arrangements. Participants also described involvement in some development activities as primarily consultative, with limited influence over project design, resource allocation, and implementation decisions.

The qualitative findings therefore provide contextual explanations for implementation challenges that were not uniformly reflected as statistically significant predictors in the regression model. In particular, weak coordination and limited participation were recurring qualitative themes, although their corresponding quantitative predictors were not statistically significant in the regression analysis (Table 6).

Theme 1: institutional and cultural mismatch

Across the study sites, participants associated ineffective interventions with limited consideration of customary pastoral governance systems and seasonal mobility patterns. Respondents noted that some development projects overlooked clan boundaries, traditional grazing arrangements, and local resource-sharing mechanisms, which are central to pastoral land management.

A community elder explained: *"The government officials come with maps drawn in town offices. They mark lines for projects without knowing where our clan boundaries end or how we share pasture during droughts."*(Hamer Pastoral Elder, FGD, July 2025).

Similar views were expressed across all territories, particularly regarding interventions perceived as poorly aligned with local institutional arrangements. Participants indicated that such misalignment occasionally contributed to tensions over resource access and project implementation.

Theme 2: limited genuine participation

Participants frequently described their involvement in development interventions as consultative rather than decision-making oriented. Although meetings were conducted during project implementation, respondents reported limited influence over key decisions such as project design, resource allocation, and infrastructure placement.

A participant from Arbore territory stated: *"They call us to meetings under the trees, but most decisions are already made before we arrive."* (Arbore Pastoral Youth, KII-08, July 2025).

Across focus group discussions, limited participation was consistently associated with reduced trust in externally implemented interventions and weaker engagement in project processes.

Theme 3: limited local ownership of pod initiatives

Another recurring theme was the limited local ownership of externally introduced development projects. Participants reported that some interventions were insufficiently aligned with pastoral mobility systems and livelihood practices, particularly fixed infrastructure related to water access and grazing support.

A participant from Kara territory noted: *"Why should we repair the pumps and fences after the project teams leave? These projects were planned without considering how we move with our animals."*(Kara Pastoral Woman, FGD, June 2025).

Within the study targets, participants commonly reported that limited involvement in planning and implementation processes reduced their willingness to maintain project infrastructure after external support ended. Respondents frequently associated stronger local ownership with interventions that better reflected pastoral livelihood practices and mobility patterns.

Overall, the qualitative findings indicate that participants' perceptions of POD effectiveness were closely associated with the extent to which interventions aligned with customary pastoral institutions, encouraged meaningful community participation, and reflected local livelihood practices and mobility patterns.

Integrated findings

Integration of the quantitative and qualitative evidence demonstrated substantial convergence regarding the factors associated with perceived POD intervention effectiveness across the Hamer, Arbore, and Kara pastoral areas. The quantitative model identified selected perception-related factors and the reported cultural-mismatch barrier as statistically associated with the perceived effectiveness outcome, while qualitative findings highlighted broader governance and participation concerns. Both strands of evidence consistently highlight the importance of institutional coordination, meaningful participation, and alignment with customary pastoral practical realities.

The qualitative findings therefore should not be treated as statistical confirmation of predictors that were not significant in the regression model. Instead, they help explain the institutional and social context in which households formed their perceptions of POD effectiveness. Across the study sites, participants described interventions as more problematic when local priorities, customary institutions, mobility patterns, and community decision-making processes were insufficiently incorporated. Household assets and infrastructure remain important components of pastoral livelihoods; however, their perceived contribution is associated with the broader institutional and socio-cultural context in which interventions are implemented.

Discussion

Governance and institutional coordination

The qualitative evidence highlights institutional coordination as an important implementation concern, particularly in relationships among government offices, development organizations, customary authorities, and pastoral communities. Participants repeatedly described weak communication and fragmented implementation, suggesting that coordination may influence how interventions are experienced even though a separate statistical effect of coordination was not demonstrated in this model. Accordingly, the qualitative evidence should be interpreted as providing contextual explanations for implementation experiences rather than statistical evidence of an independent association within the adjusted regression model. The discussion should therefore distinguish between the qualitative evidence concerning coordination and the quantitative evidence from the institutional-barrier variables.

Evidence from this study contributes to understanding broader debates on pastoral development, where intervention outcomes are increasingly understood as reflecting not only technical programme design but also the compatibility between development institutions and existing pastoral governance frameworks. Pastoral development scholarship has highlighted that many interventions have historically been challenged by modernization approaches emphasizing fixed infrastructure, settlement, and administrative integration (Gabusho, 2023; Houzer et al., 2021; Kiros, 2015). Although such approaches may improve access to selected services, they may insufficiently recognize the ecological importance of mobility and the role of customary institutions in managing uncertainty within dry land environments (Fratkin, 2014; Gebeye, 2016; Médecins Sans Frontières-UK, 2012; Nori and Scoones, 2019).

From the perspective of the Sustainable Livelihoods Framework (SLF), these findings reinforce the importance of transforming structures and processes that influence households' ability to access resources and respond to vulnerability (Dart, 2007; Scoones, 2015). In pastoral contexts, such structures include both formal institutions and customary governance arrangements responsible for regulating mobility, resource sharing, conflict management, and collective decision-making. Therefore, perceived intervention effectiveness depends not only on the availability of services but also on whether institutional arrangements support pastoral livelihood strategies.

This interpretation also reinforces the relevance of the Stakeholder Analysis Framework (SAF) by demonstrating that development outcomes emerge through interactions among actors with different responsibilities, interests, and levels of influence (Christinck and Kaufmann, 2014; Reed, 2008; Sentamu et al., 2024). In Hamer, government agencies, NGOs, customary leaders, and pastoral communities do not participate under equal conditions; therefore, perceived effectiveness of interventions depends partly on how these relationships are coordinated and whether local institutions are meaningfully incorporated into planning and implementation processes.

Qualitative evidence indicates that some interventions were perceived as externally designed and insufficiently connected to customary governance structures. Limited involvement of

customary authorities and clan-based institutions may reduce local legitimacy and weaken alignment between intervention objectives and pastoral livelihood realities. Similar challenges have been reported in other Ethiopian pastoral contexts, where interactions between formal administrative systems and customary institutions influence rangeland governance, resource management, and conflict resolution (Flintan et al., 2019; Hagmann and Mulugeta, 2008).

These findings also relate to political ecology perspectives (Robbins, 2020), which emphasize that pastoral development outcomes are associated with not only by technical interventions (Catley et al., 2013; Catley and Ayele, 2021; Scoones, 1995) but also by broader institutional arrangements regarding whose knowledge, priorities, and governance practices are recognized within development processes (Flintan et al., 2019; Nori and Scoones, 2019). Although this study did not directly examine policy formation or political processes, the findings suggest that institutional alignment remains a critical condition for improving the relevance and legitimacy of pastoral development interventions.

The qualitative findings suggest that strengthening coordination among implementing actors and creating arrangements that recognize customary governance may improve the contextual relevance of POD interventions; these implications should be evaluated further in longitudinal or comparative research.

Household livelihood assets and POD effectiveness

Household income, livestock ownership, and dependency ratio were not statistically significant predictors of perceived POD effectiveness. Income was not significant as an overall categorical factor ($p = 0.917$), while livestock ownership ($p = 0.686$) and dependency ratio ($p = 0.483$) also showed no statistically significant associations. These results suggest that differences in conventional household asset indicators did not account for substantial variation in the binary perceived effectiveness outcome after adjustment for the other predictors included in the model.

This evidence contributes to livelihood vulnerability debates by reflecting that asset ownership alone does not fully capture pastoral wellbeing. Within the SLF, livelihood outcomes depend not only on the availability of assets but also on the institutional, environmental, and social conditions that determine how households transform resources into viable livelihood strategies (DFID, 1999; Scoones, 2015).

In dry land pastoral contexts, livestock represents more than economic capital; it is also a flexible adaptation mechanism that depends on mobility opportunities, grazing access, market conditions, veterinary support, and governance arrangements (Barrett and Constas, 2014; Nori and Scoones, 2019; Turner and Schlecht, 2019). Therefore, households with similar asset levels may experience different livelihood outcomes depending on the institutional and ecological environment in which those assets are managed.

This interpretation aligns with broader scholarship emphasizing that adaptive capacity depends on institutional flexibility, access to appropriate services, and the ability of households to respond to changing conditions rather than asset accumulation alone (Béné et al., 2016; Folke et al., 2016).

Qualitative evidence further indicates that communities assessed interventions based on their contribution to reducing vulnerability, supporting pastoral strategies, and improving access to essential services. Similar studies from pastoral areas of East Africa have demonstrated that livelihood resilience depends strongly on adaptive capacity (Turner and Schlecht, 2019), institutional support, and access to appropriate services rather than asset accumulation alone (Catley et al., 2013; Lind et al., 2020).

This highlights an important distinction between livelihood assets and livelihood security. In pastoral environments, livestock ownership or income does not automatically translate into resilience when households face constraints related to grazing access, water availability, market connectivity, or institutional support. Therefore, assessments of pastoral development effectiveness should incorporate both material outcomes and the broader social, ecological, and institutional conditions that enable households to use their resources effectively.

Satisfaction and perceived vulnerability impact

Satisfaction with POD activities was statistically significant at the omnibus factor level. However, none of the individual category contrasts was statistically significant at $p < 0.05$. The result should therefore be interpreted as evidence that the categorical satisfaction variable contributed to the model as a whole rather than as evidence that a particular satisfaction category independently increased perceived effectiveness.

Although one category of perceived livelihood vulnerability impact differed significantly from the reference category, the overall effect of the variable was not statistically significant. Consequently, the isolated category-specific contrast should be interpreted cautiously and does not support a general conclusion regarding the independent effect of perceived livelihood vulnerability impact on perceived POD effectiveness.

Cultural mismatch and participation

The findings provide complementary evidence concerning reported cultural mismatch and participation. The regression model identified cultural mismatch as a statistically significant negative association, whereas community involvement was not statistically significant ($p = 0.374$). Qualitative evidence nevertheless identified limited participation as a recurring implementation concern.

This pattern reinforces a central argument in pastoral scholarship that mobility represents an adaptive strategy rather than a developmental limitation. In dryland environments characterized by ecological variability, mobility enables pastoral households to access dispersed resources, manage climatic uncertainty, and sustain livestock production (Catley et al., 2013; Turner and Schlecht, 2019). Consequently, development approaches that overlook mobility patterns may unintentionally weaken existing adaptive capacities.

In southern Ethiopia, pastoral livelihoods are closely connected with seasonal movement, flexible resource access, and customary arrangements for managing shared resources (Berhanu and Beyene, 2015; Tache, 2013; Tofu et al., 2023a). Qualitative participants

generally described greater acceptance when interventions reflected pastoral institutions, livelihood priorities, and local knowledge systems.

Similar experiences from pastoral regions of East Africa indicate that development programmes achieve stronger outcomes when they incorporate indigenous institutions, mobility patterns, and locally negotiated resource management practices (Lind et al., 2020; Nori and Scoones, 2019).

The study also highlights that participation quality remains an important challenge. While communities may participate through meetings and consultation processes, their influence over intervention priorities and implementation decisions may remain limited. This reflects broader critiques of participatory development, where participation can become symbolic if decision-making authority remains concentrated among external actors (Mikulewicz, 2018; Reed, 2008).

Therefore, effective pastoral development requires moving beyond consultation toward institutional arrangements where pastoral communities actively contribute to priority setting, implementation, monitoring, and evaluation. Participation should be understood not only as involvement in activities but also as the ability of communities to influence decisions affecting their livelihoods.

The evidence from Hamer district contributes to wider debates concerning the challenges of implementing development interventions in pastoral environments. While many programmes aim to reduce vulnerability through improved services and infrastructure, their effectiveness depends on whether they recognize pastoral contexts as adaptive social-ecological systems rather than simply vulnerable populations requiring transformation. The Hamer case illustrates that intervention outcomes are shaped by the interaction between material support, governance arrangements, cultural compatibility, and local participation. Therefore, pastoral development effectiveness should be understood as an institutional and social process, not only as the delivery of technical interventions.

Mixed-methods interpretation

Taken together, the findings illustrate the value of integrating quantitative and qualitative evidence. The regression model identifies a limited number of statistically distinguishable associations, while the qualitative evidence provides contextual information about how households experience institutional coordination, participation, cultural compatibility, and local ownership. The two strands therefore should not be expected to produce identical statistical conclusions.

The convergence between the negative quantitative association for cultural mismatch and the qualitative accounts of institutional and cultural misalignment provides one area of complementary evidence. In contrast, the qualitative prominence of coordination and participation alongside their non-significant regression estimates demonstrates divergence between implementation experiences and the adjusted quantitative model. Such divergence is informative because qualitative accounts may capture dimensions of implementation that are not fully represented by the categorical variables included in the regression.

Policy implications

The findings indicate that improving the effectiveness of pastoral-oriented development requires greater attention to the quality of programme implementation alongside continued recognition of the socioeconomic realities of pastoral households. The quantitative analysis showed that respondents' overall satisfaction with POD activities and the absence of perceived cultural mismatch were significantly associated with perceived intervention effectiveness, while most household socioeconomic characteristics and the remaining institutional variables were not independently associated with the outcome after adjustment for other factors. These findings suggest that implementation processes and the cultural appropriateness of interventions influence how development initiatives are evaluated by beneficiary communities.

The qualitative evidence complements these findings by highlighting recurring concerns related to coordination among implementing institutions, community participation, and the integration of customary governance systems. Although these factors were not statistically significant predictors in the multivariable regression model, participants consistently described them as important contextual influences affecting programme implementation and local acceptance. Consequently, strengthening coordination mechanisms, promoting meaningful community engagement, and working more closely with customary institutions may improve the relevance and acceptability of future interventions.

Future pastoral development programmes should therefore adopt context-sensitive implementation approaches that recognize indigenous governance structures, pastoral livelihood strategies, and local cultural practices. Continuous beneficiary feedback, adaptive programme management, and stronger collaboration between government institutions, development partners, and customary authorities may further enhance implementation quality and improve community confidence in pastoral-oriented development initiatives. Accordingly, these findings should be interpreted as observed associations rather than evidence of causal effects.

Conclusion

This study employed a convergent parallel mixed-methods approach to examine factors associated with the perceived effectiveness of pastoral-oriented development interventions in the Hamer district of southern Ethiopia. The findings demonstrate that respondents' overall satisfaction with programme activities and perceived cultural compatibility were significantly associated with perceived intervention effectiveness, whereas household income, livestock ownership, household dependency ratio, community involvement, perceived livelihood vulnerability impact, and the remaining institutional barrier variables were not statistically significant predictors in the overall regression model. Qualitative evidence nevertheless revealed that respondents regarded institutional coordination, community participation, and the integration of customary governance structures as important considerations for successful programme implementation.

Taken together, the quantitative and qualitative evidence suggests that improving pastoral-oriented development requires not only technically sound interventions but also implementation approaches that are culturally compatible, responsive to beneficiary experiences, and grounded in local institutional contexts. These mixed method evidence suggest that strengthening collaboration between formal institutions and customary governance systems may enhance the local relevance, legitimacy, and sustainability of pastoral-oriented development initiatives in Hamer district and other comparable dryland pastoral settings.

Future research may build on these findings by examining changes in intervention effectiveness over time and by evaluating implementation processes across different pastoral settings to better understand the conditions that support sustainable and locally accepted development outcomes.

Limitations

The strength of the study is its convergent parallel mixed-methods design, which combines household-level quantitative evidence with qualitative accounts from focus group discussions, key informant interviews, and field observations. This design permits statistical associations to be considered alongside locally grounded explanations of institutional, cultural, and participatory processes. The study also contributes evidence from an under-researched pastoral setting in southern Ethiopia.

Several limitations should be considered when interpreting the findings. First, the cross-sectional design permits assessment of associations and perceptions but does not establish temporal or causal relationships between POD characteristics and perceived effectiveness. Second, the study purposively selected Hamer district and five *kebeles* to capture variation in pastoral contexts; consequently, the findings should not be assumed to represent all pastoral areas of Ethiopia. Third, the dependent outcome was based on household perceptions rather than an independently verified measure of programme impact.

Fourth, several explanatory variables were entered as categorical factors, making estimates dependent on the selected coding and reference categories. Fifth, although pastoral mobility and livelihood diversification were considered in the broader study context, adaptive strategies were not comprehensively represented as quantitative predictors in the regression model.

Finally, qualitative and quantitative measures captured different dimensions of household experience and implementation processes, which may account for some divergence between the two strands of evidence. Longitudinal and comparative studies could examine how institutional arrangements, adaptive strategies, and intervention experiences change over time.

Practical recommendations

The findings suggest that pastoral development planning could place greater emphasis on contextual adaptation, meaningful participation, and coordination among formal and customary institutions. Development actors may consider joint planning and information-sharing mechanisms among relevant government offices and implementing organizations, while ensuring that coordination arrangements remain responsive to locally identified priorities. Project planning and monitoring could also provide pastoral communities with meaningful opportunities to influence decisions rather than limiting participation to consultation. Engagement with customary authorities and locally recognized representatives may be useful where this is consistent with inclusive and accountable planning processes.

Given the observed negative association between reported cultural mismatch and perceived effectiveness, POD interventions could pay greater attention to pastoral mobility, customary resource governance, local ecological knowledge, and locally defined livelihood priorities. Such measures should be treated as context-sensitive implementation considerations rather than as interventions whose causal effectiveness has been established by this study. Future programmes and evaluations could incorporate longitudinal outcome measurement and comparative designs to determine whether improvements in coordination, participation, reported cultural mismatch, and institutional integration are followed by measurable changes in perceived and independently assessed development outcomes.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

This study was conducted as part of a PhD dissertation at the Department of Geography and Environmental Studies, College of Social Sciences and Humanities, Arba Minch University, Ethiopia. Prior to data collection, the research proposal underwent formal academic and ethical evaluation and received approval through the University's official PhD dissertation proposal evaluation process. Following this approval, the Department of Geography and Environmental Studies issued an official letter authorizing field data collection in the study area. No separate Institutional Review Board (IRB) reference number was issued for this study. All procedures involving human participants were conducted in accordance with the ethical standards of Arba Minch University and internationally accepted ethical principles for social science research involving human participants, including the principles of respect for persons, voluntary participation, confidentiality, and informed consent. Where applicable, the study adhered to the ethical principles embodied in the Declaration of Helsinki and its subsequent amendments.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontierspartnerships.org/articles/10.3389/past.2026.17044/full#supplementary-material

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