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Promoting Nutrition Resilience in Pastoral and Agro-pastoral areas through Nutrition-sensitive Interventions: Exploring Contextually Viable Approaches: The Case of the Somali Region, Ethiopia

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Abstract

Background: Child and maternal malnutrition persist as significant public health issues in pastoralist areas of Ethiopia.

Objectives: This study aims to explore interventions for promoting nutrition resilience and identify facilitators and barriers among pastoralist and agro-pastoralist communities in the Somali region.

Methods: A mixed cross-sectional study design, incorporating qualitative and quantitative methods, engaged nutrition bureau staff and community members. Qualitative data collection included focus group discussions (FGDs), key informant interviews, and in-depth interviews. Quantitative data involved a sample of 293 individuals, analyzed using descriptive statistics.

Results: Participants demonstrated good knowledge of nutrition interventions, favoring multi-sectoral approaches for promoting nutrition resilience. However, existing development programs were perceived as not nutrition sensitive. Nutrition literacy and community influencers were highlighted as pivotal, while infrastructure, program implementation, and skilled professionals were facilitators. Recurrent drought, climate change, limited access to information, and nutritional challenges posed barriers.

Conclusion: Nutrition resilience in pastoral and agro-pastoral settings can be enhanced through multi-sectoral approaches, with community involvement central to program success. Key stakeholders should prioritize community-centered interventions in their strategies.

Keywords

Nutrition resilience, Nutrition interventions, Pastoralists, Agro-pastoralists

Introduction

Malnutrition arises from a complex interplay of various underlying factors. According to the findings of the 2018 global nutrition report, malnutrition continues to posture a significant challenge worldwide, with the world falling short of the nutrition targets set by the World Health Assembly in 2012. Across all regions, malnutrition persists at alarming levels, with high prevalence rates observed in various forms of overweight and underweight. Despite some progress in reducing stunting, millions of children under the age of five still suffer from stunting, wasting, low birth weight, and overweight conditions [1]. Pastoralists, characterized as groups whose primary economic pursuit is animal husbandry and who often engage in seasonal migration, reside in some of the most rugged and isolated landscapes worldwide. These communities move alongside their livestock herds to access seasonal grazing areas and water supplies. Frequently overlooked in standard population surveys, the exact count of pastoralists remains

uncertain, with estimates varying from 50 to over 300 million individuals globally. The African Union has estimated that there are approximately 268 million pastoralists exclusively on the African continent [2]. Despite this significant population, there has been limited research conducted in pastoralist regions of Ethiopia. However, the research that has been undertaken has revealed the ongoing challenge of child and maternal malnutrition. This issue encompasses deficiencies in both macronutrients and micronutrients, presenting significant public health challenges for these communities. Recent data from the Ethiopian demographic and health survey highlights that pastoral communities in Ethiopia not only exhibit the highest rates of child micronutrient deficiencies, such as anemia but also experience the highest prevalence of wasting, indicating acute malnutrition [3]. In the regions of Afar, Somali, Oromia, and SNNPR, the prevalence of anemia in children was notably higher compared to the national average, standing at 74.8%, 82.9%, 65.5%, and 50%, respectively. Similarly, the rates of anemia among women in these regions were also elevated, with percentages of 44.7%, 59.5%, 27.3%, and 22.5%, respectively, surpassing the national average. Additionally, the duration for which women in these regions took iron and folic acid tablets during pregnancy varied, with percentages of 5.1%, 2.3%, 2.8%, and 4.2%, respectively, contrasting with the national average of 23.6% [4]. The pastoral and agro-pastoral communities bear a heavier burden of malnutrition due to various challenges, including climate variability and change [5]. Pastoralists primarily rely on livestock production and sales for their livelihood, whereas agro-pastoralists engage in both crop production and sales alongside livestock activities. Across sub-Saharan Africa, these communities confront significant hurdles, with widespread poverty and inadequate food security prevailing throughout the region. Consequently, they have been marginalized from national economies and political systems. A study indicates that the escalation in climate variability could lead to a substantial increase in severe child stunting, with projections suggesting a 62% rise in South Asia and a 55% increase in East and Southern Africa by the year 2050. However, it's important to note that numerous other factors may also contribute to under-nutrition [6]. Another study found that heightened variability in rainfall patterns is expected to elevate the prevalence of underweight children in the future, particularly in regions characterized by extensive range lands [7]. Given that pastoralist areas often find themselves on the fringes of power centers, their needs tend to be overlooked in national planning processes. However, there are gradual shifts occurring, such as the decentralization of climate adaptation funds in Senegal and Mali, as well as the devolution of planning responsibilities to lower levels of governance in Kenya [8]. Kenya's ending drought emergencies framework aims to incorporate multi-sectoral planning focusing on addressing the root causes of vulnerability in arid regions, including factors such as conflict, climate change, and demographic shifts [9]. In the African region, countries within the Horn of Africa stand out as particularly susceptible yet inadequately prepared for adverse global environmental changes. Among these nations, Ethiopia stands out as one of the most impoverished and environmentally delicate, with its expanding population and fragile economy significantly affected by climatic occurrences [10]. Moreover, livelihood systems based on pastoralism and agro-pastoralism in the lowlands of Ethiopia face heightened vulnerability to the impacts of climate change and variability [11]. Over the past few decades, the livelihood systems of these communities have been significantly disrupted by recurring droughts, famines, and epidemics, all of which are closely linked to shifting climatic conditions. Consequently, the loss of productive assets and the escalation of household food insecurity have emerged as defining characteristics of poverty in Ethiopia's lowlands [12, 13]. Addressing nutrition-related health issues ranks among the top priorities for the Ethiopian government, particularly in alignment with sustainable development goal 2, which aims to eradicate hunger, ensure food security, and tackle all forms of malnutrition [14]. Ethiopia allocates approximately 16.5% of its annual gross domestic product towards addressing malnutrition [15]. While the country has made significant strides in improving nutritional indicators on a national level, progress within the pastoral and agro-pastoral communities lags the national averages [16, 17]. The Somali regional state, one of the areas heavily affected by malnutrition in Ethiopia, predominantly comprises rural dwellers belonging to pastoral or agro-pastoral communities. Malnutrition rates in this region surpass national averages, with child wasting at 23%, child anemia at 87%, maternal anemia at 59.5%, and minimum dietary diversity among children aged 6 - 23 months standing below the national level at 3.8%. One contributing factor to the slow progress in addressing malnutrition could be the inadequacy of food and nutritional interventions, which remains poorly understood. Moreover, changing food preferences, which significantly influence the nutritional well-being of the population, are rapidly evolving due to recent shifts in livelihoods and cultural norms within pastoral and agro-pastoral communities. These changes are driven by various factors such as climate change, recurrent droughts, sedentarization, urbanization, and other related influences. Hence, the objective of this study is to investigate potential interventions aimed at enhancing nutrition resilience and to identify the factors that facilitate or hinder these interventions within the pastoral and agro-pastoral community in the Somali regional state of Ethiopia. The study aims to provide contextually specific and environmentally relevant information to enable the implementation of appropriate interventions.

Methodology

Study design and setting

The study employed a community-based mixed cross-sectional design, combining quantitative and qualitative methods for data collection. It was conducted between December 2022 and January 2023 in selected districts within the Jarar Zone and Fafan Zone of the Somali region. Situated in Eastern Ethiopia, the Somali region ranks as the country's second-largest regional state, following the Oromia region. Geographically, it shares borders with the Ethiopian states of Afar and Oromia, as well as the chartered city Dire Dawa to the west. Moreover, it is bordered by Djibouti and Somaliland (Somalia) to the north, Somalia to the east and south, and Kenya to the Southwest.

Study populations

The study incorporated various sectors of the population, comprising officials and staff members affiliated with the regional/woreda nutrition implementing bureaus within the designated study locales. Additionally, pastoralist and agro-pastoralist community members, along with pertinent stakeholders, were included in the research cohort. However, individuals newly engaged in employment rolls and community members with a residency duration in the woreda of less than six months at the time of data collection were excluded from participation in the study.

Sample size and sampling procedure

Qualitative component

Key informants and participants for FGDs were selected purposefully until saturation of ideas was achieved. The purposive sampling method was employed for the selection of both key informants and FGD participants.

Quantitative component

The sample size for the quantitative study was determined using the formula for estimating sample size for a single population:

$$n = \frac{(z_{\alpha/2})^2 p(1-P)}{d^2}$$

Where: n = Minimum possible sample size. $Z_{\alpha/2}$ = Standard normal variable at 95% confidence level (1.96). p = Prevalence of dietary practices (0.50). d = Margin of error (5%).

This yielded a sample size of 384. To correct for the finite population (< 10,000 workers in the three zones), with an estimated total of 400 workers, the correction formula was applied:

$$nf = \frac{n}{1+\frac{n}{N}} = 196$$

293 lying the final sample size by a design effect of 1.5 for cluster sampling, a total of 293 workers from different sectors were involved in the quantitative study.

Data collection tools and process

Qualitative data were acquired through a combination of FGDs, key informant interviews, and in-depth interviews. Each FGDs convened 6 - 12 participants from either institutional or community settings. On the other hand, quantitative data collection employed structured questionnaires, which were initially derived from diverse sources and subsequently tailored to align with the specific objectives of the study.

Data quality control

The questionnaires underwent a multistep translation process, starting with drafting in English, followed by translation into the local language "Af-Somali," and ultimately back-translation into English to verify coherence. Pre-testing of the questionnaires occurred with a 5% sample size drawn from non-selected districts before their implementation. Furthermore, data collectors underwent a comprehensive two-day training session on the research methodology and data collection protocols, facilitated by the principal investigator, before embarking on the data collection phase.

Data analysis

For qualitative data analysis, an iterative approach was adopted, initially involving the identification of pertinent questions for analyzing responses, followed by the application of a thematic framework. Subsequently, data underwent translation and transcription processes, ensuring fidelity to the original content. Salient themes were discerned through meticulous examination of the transcribed text, with similar responses color-coded for grouping, thereby attributing them to their respective sources. The resultant findings were presented coherently in narrative form, employing appropriate verb tenses to illustrate key points, and complemented by triangulation with quantitative outcomes. Quantitative data analysis involved coding and entry of data into SPSS version 20 for systematic analysis. Descriptive statistics were employed to succinctly summarize the dataset, with results presented using proportions delineated by sector or research objective.

Ethical consideration

The study adhered to ethical guidelines by obtaining clearance from the research and ethical committee of Jigjiga University. Subsequently, an official communication from the research directorate was dispatched to sector bureaus, soliciting permission and requisite support letters for each respective kebeles. Prior to engaging in interviews, participants were fully informed about the study's objectives, and their voluntary consent was sought and obtained. Confidentiality of participants' responses was rigorously upheld throughout all stages of the research endeavor.

Results

Possible interventions to promote nutrition resilience in the pastoralist and agro-pastoralist settings

Table 1 The study adhered to ethical guidelines by obtaining clearance from the research and ethical committee of Jigjiga University. Subsequently, an official communication from the research directorate was dispatched to sector bureaus, soliciting permission and requisite support letters for each respective kebeles. Prior to engaging in interviews, participants were fully informed about the study's objectives, and their voluntary consent was sought and obtained. Confidentiality of participants' responses was rigorously upheld throughout all stages of the research endeavor.

Facilitators and barriers of nutrition resilience

Facilitators

Infrastructure and awareness: Most of the FGD respondents reported that relative infrastructure and increased awareness are considered as the major facilitators of nutrition resilience promotion in the pastoral and agro-pastoral settings. “Availability of transportation easing pastoral and agro-pastoral communities have access to nearby towns and cities to buy their products and purchase necessary materials for household consumption and communication facilities (mainly telephone) to monitor the movement of our livestock are the major is-

Table 1: Possible interventions to promote nutrition resilience in the pastoralist and agro-pastoralist settings.

No.	Variables	Responses	N (%)
1	Do you know what intervention is?	Yes	293 (100)
2	Do you think nutrition resilience can be real in your district?	Yes	293 (100)
3	If yes, how do you think nutrition resilience can be promoted?	Community mobilization	114 (38.9)
		Through awareness creation	64 (21.8)
		Viable policies and strategies	76 (25.9)
		All	39 (13.3)
4	Are the current development programs in your district nutrition sensitive?	Yes	39 (13.3)
		No	254 (86.7)
5	Which nutrition activity do you think is viable in pastoral settings?	Multi-sectoral activities	178 (60.8)
		Nutrition sensitive activities	76 (25.9)
		Nutrition specific activities	39 (13.3)
6	Do you think the intervention you mentioned will work for pastoralists and agro-pastoralists?	Yes	293 (100)
7	Which program do you think can promote nutrition resilience?	Multi-sectoral approach	217 (74.1)
		NGO's and development partners program	26 (8.9)
		Government developmental programs	26 (8.9)
		Community level program	25 (8.5)
8	What about the issue of nutrition literacy and its role in promoting nutrition resilience?	Very important	216 (73.7)
		Important	64 (21.8)
		Less important	13 (4.4)
9	What about communication for development and its relevance in promoting nutrition resilience?	Very important	216 (73.7)
		Important	64 (21.8)
		Less important	13 (4.4)
10	What communication method do you think nutrition resilience can be promoted in pastoral settings?	Community influential members	154 (52.6)
		Radio	51 (17.4)
		Government officials	37 (12.6)
		All	25 (8.5)

sues we are taking advantage of to make our nutrition and food security resilient" FGD1. Similarly, one agriculture expert expressed "Increased literacy of the different food items pastoralists and agro-pastoralists need to consume to remain food and nutrition secure, availability of media for awareness creation and because of the accessibility, intra and inter-community experience sharing are some of the facilitators in making this community become resilient of the different shocks and stresses".

Nutrition programs and projects: The introduction of different humanitarian and development projects/programs which enabled local people to have the necessary service and exposure of nutrition is recognized as part of facilitators for achieving pastoral and agro-pastoral communities' food and nutrition resilience. "Seqota declaration program enabled us access sufficient amount of nutritious food in the past six months, this in turn improved the health and livelihood of our family" FGD3. "For the first time in the history of our lives, our children are getting eggs and milk for breakfast after seqota declaration program provided us six chickens and the nutritional status of our children is getting better day by day" FGD4.

Availability of both livestock and agricultural production: Milk industries during milk surplus production and enabling them to secure their food and nutrition.

Quality of foods: Some study participants expressed a preference for locally produced foods over imported ones, citing reasons such as considering them to be organic, fresh, safe, and good sources of nutrients. One participant stated, "If available, we prefer food items that we get from our farmlands because they are fresh, organic, and safe. Additionally, they are rich in proteins and vitamins" (FGD5). This preference may be attributed to factors such as high-level government commitment and the availability of food and nutrition human resources.

Barriers of nutrition resilience in the pastoral/agro-pastoral settings

Drought: One of the primary barriers to achieving nutrition resilience, as reported by most respondents, is drought. Drought leads to water shortages, reduced livestock productivity, and lower production of local food items. Additionally, it results in the death of livestock, leaving households without domestic animals. The onset of the rainy season, which is relied upon for agricultural production, is often unpredictable due to climate change. Moreover, traditional farming methods coupled with limited access to climatic information further hinder food production during this period. As one participant expressed, "our farmlands are dry, and our domestic animals are dying because of recurrent droughts. Currently, most of us have lost our livestock" (FGD6). Participants emphasized that access to water would enable them to cultivate various food crops and raise livestock. This, in turn, would enhance their

consumption of nutritious foods and increase their income, thus enabling them to become more resilient to food and nutrition challenges.

Cost and availability of nutritious diet: In pastoral and agro-pastoral settings, another challenge to nutrition resilience is the high cost of nutritious diets. Despite having some purchasing power, communities often find it difficult to afford nutritious foods due to their high prices. Additionally, the geographical accessibility of nutritious foods poses a significant obstacle. Poor infrastructure, such as inaccessible roads, hampers the transportation of goods and prevents communities from accessing larger markets where nutritious food items may be available. As one key informant mentioned, "The price of fruit and vegetables is expensive due to transportation costs, and these people do not buy these food items because they cannot afford; they always look for what is economical" key informant interview 1 (KII1). Similarly, another participant highlighted, "One of our biggest challenges to consuming nutritious diets is physical inaccessibility" (FGD7). This sentiment was echoed by another key informant who stated, "If I want to bring food items like fruit, vegetables, and other nutrient-dense foods, I have to go too far markets because they are not available or produced locally" (KII2).

Nutrition literacy: Study participants expressed difficulties in ensuring food and nutrition resilience due to their limited knowledge of the production, preparation, and consumption of nutritious foods. They emphasized that they could improve their food choices with nutrition education and technical assistance from agriculture and nutrition experts. As one participant stated, "we are finding it difficult to make nutritious/healthy food selections because we have low awareness of how to produce, prepare, and consume these foods" (FGD8). Another participant highlighted the shortage of qualified agricultural experts who could advise communities on selecting nutritious food items suitable for their farmlands, leading to a lack of production of fruits and vegetables. They said, "there is a shortage of qualified agricultural experts who can advise these communities on how to select the nutritious food items suitable for their farmlands, and therefore, they are not producing nutritious foods such as fruits and vegetables" (KII3).

Discussion

The findings of this study shed light on potential interventions for promoting nutrition resilience among pastoralist and agro-pastoralist communities in the Somali region of Ethiopia. Additionally, the study identifies facilitators and barriers that influence the effectiveness of these interventions. One of the key findings of this study is the recognition among participants of the importance of multi-sectoral approaches for promoting nutrition resilience. Most participants acknowledged the need for interventions that encompass nutrition-sensitive, nutrition-specific, and enabling environment activities. This aligns with existing literature emphasizing the importance of addressing the underlying determinants of malnutrition through integrated approaches [17]. Multi-sectoral interventions have been shown to be effective in improving nutritional outcomes by addressing various factors such as food security, access to healthcare, education, and livelihood opportunities [18]. However, despite the recognition of the importance of multi-sectoral approaches, participants expressed concerns about the lack of nutrition-sensitive programs in their districts. This highlights a gap in the current development programs, indicating a need for greater integration of nutrition considerations into existing initiatives. Such integration can help ensure that programs and projects are designed to address the specific nutritional needs of pastoralist and agro-pastoralist communities, ultimately contributing to improved nutrition resilience. In addition to programmatic considerations, the study identified several facilitators and barriers that influence nutrition resilience in pastoral and agro-pastoral settings. Infrastructure development and increased awareness emerged as significant facilitators, enabling communities to access essential services and information related to nutrition and food security. These findings underscore the importance of investing in infrastructure development and awareness-raising initiatives to support nutrition resilience efforts [5]. Furthermore, the availability of nutrition programs and projects was recognized as a facilitator of nutrition resilience, providing communities with access to essential services and resources. Programs such as the Seqota declaration initiative, which aims to improve food security and nutritional outcomes, have been instrumental in addressing the immediate needs of vulnerable populations [19]. However, sustaining the impact of such programs requires ongoing support and investment in nutrition-sensitive interventions that address the underlying causes of malnutrition. Despite these facilitators, the study also identified several barriers that hinder nutrition resilience in pastoral and agro-pastoral settings. Recurrent drought emerged as a primary barrier, exacerbating water shortages, reducing livestock productivity, and disrupting agricultural production. Climate variability and change pose significant challenges to food and nutrition security in these areas, underscoring the need for climate-resilient strategies and adaptive measures [20]. Additionally, the high cost and limited availability of nutritious diets were identified as barriers to nutrition resilience, reflecting broader challenges related to food access and affordability. Limited nutrition literacy further compounds these challenges, inhibiting communities' ability to make informed food choices and adopt healthy behaviors. Addressing these barriers requires a comprehensive approach that encompasses not only access to nutritious foods but also education and awareness-raising initiatives to promote healthy eating practices [21]. In conclusion, promoting nutrition resilience in pastoral and agro-pastoral settings requires a multi-faceted approach that addresses the underlying determinants of malnutrition. Integrated, multi-sectoral interventions that prioritize community involvement, infrastructure development, and awareness-raising efforts are essential for improving nutrition outcomes in these vulnerable populations. However, addressing obstacles such as recurrent drought, limited access to nutritious foods, and low nutrition literacy will require sustained investment and collaboration across sectors. Through adopting contextually appropriate strategies and leveraging existing resources, stakeholders can work together to build more resilient food and nutrition systems in pastoral and agro-pastoral areas.

Conclusion

All of participants possessed a good knowledge of what intervention is (particularly nutrition intervention). Majority of the study participants believed that nutrition resilience can be better promoted in the pastoral/agro-pastoral settings through multi-sectoral activities and the current development programs/projects in their districts are not nutrition sensitive. Nutrition literacy and communication for development have very important roles in promoting nutrition resilience and community influential members have much impact in this regard. Improved infrastructure and awareness, implementation of nutrition programs and projects, accessibility to both livestock and agricultural production for food and nutrition security, and the presence of skilled nutrition professionals were identified as factors facilitating nutrition resilience in pastoral and agro-pastoral settings. Conversely, challenges such as recurrent droughts, climate change with s climatic information, affordability and availability of nutritious diets, and low levels of nutrition literacy were perceived as barriers to achieving nutrition resilience in these areas.

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Conflict of Interest

None.

Funding and Ethical Approval

The study received funding from Jigjiga University, with no involvement in design or analysis. Ethical approval was granted by the Institutional Review Board. Data collection permission was obtained from bureaus, with participants providing oral and written consent after understanding the study's purpose. Participants had the right to withdraw. The authors declare no conflicts of interest.

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