

**ADAPTATION STRATEGIES OF FULANI WOMEN’S MILK
BUSINESS IN THE FACE OF FARMERS-HERDERS CONFLICT IN
KADUNA STATE, NIGERIA**

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DOI: [12.13140/RG.2.2.21646.33605](https://doi.org/10.13140/RG.2.2.21646.33605)

Abstract

Nigeria has not given adequate attention to the inadequate adaptive and coping strategies in the face of a resource-induced farmers-herders conflict which impedes dairy business and the backward integration policy on domestic sourcing of dairy raw materials in the country. This necessitates the inquiry to assess the coping strategies by Fulani women in Kaduna State and the influence of the strategies on the sustainable livelihood of Fulani women in the milk business. The study employed the content analysis approach to infer into existing coping strategies and observation in the study area to deduce adequate information for a robust empirical inquiry. It was observed that the coping strategies employed by Fulani women in the face of farmers-herders conflict are symmetric in nature which is a recipe for the perennial conflict that claimed 1,188 lives in 160 attacks between 2005 to mid-2021 in the state. These frameworks are short-termed and revolve around the negative peace that aims to maim and neutralize the opposing party rather than employing innovative techniques capable of fostering peace and the sustainable milk business needed to actualize the backward integration policy of the Central Bank of Nigeria (CBN). The study concludes in line with the foregoing that, existing coping strategies by dairy farmers in Kaduna State are inadequate to reduce vulnerability in the face of the increasing farmers-herders conflict in the state. Being that land tenure policies such as the Open Grazing Prohibition and Ranching Establishment Law and the proposed RUGA policies are beyond the coping strategies of and are discriminatory to herders and farmers respectively, there is a need for the formulation and implementation of sustainable livestock production policy such as the Sustainable Smart Agro-Climate Module (MAIS) that encompasses low-cost technologies and production practices, along with market integration strategies, and four phases of interrelated mechanisms of innovative production practices, technical training, financial enlightenment, and monitoring and evaluation by the Federal Government to enhance food security (dairy production) and assuage farmers-herders conflict and the environmental impact of pastoralism.

Keywords: Adaptation Strategy, Dairy Business, Farmers-Herders Conflict, Fulani Women, Pastoralism

Introduction

Farmers-herders conflict is a resource-induced conflict influenced mainly by climate change, population pressure, inadequate conflict resolution framework, and economic factor (Adeniran, 2020; Effevottu & Ihuoma, 2019; Owolabi, Oladimeji, Ojeleye & Omakore, 2016; Okwor, 2016; Stark, Terasawa, & Ejigu 2011). In Nigeria, it resulted in casualties of an estimated 1,868 lives in 2018 and displaced 300,000 people across four states with a property loss of an estimated ₦400 billion in the country (Agency Report, 2021; Armed Conflict Location and Event Data [ACLED], 2019). The conflict is exacerbated by the tragedy of the common, which results from undue intensification of livestock holdings on shared arable land and extension of cultivated areas on grazing routes and untilled forested lands (Shettima & Tar, 2008). The economic benefits arising from the tragedy of the common accrue to herders and farmers, respectively, but the environmental impact is borne by all (Hardin, 1968).

In Kaduna State, farmers-herders conflict claimed 1,188 lives in 160 attacks between 2005 to mid-2021, and in ripple effect culminated in banditry, cattle rustling, and kidnapping with an adverse effect on food security and dairy business of Fulani women in the State (Onuh, 2023; Owolabiet al., 2016). The growth in farmers-herders conflict impacts the livelihood of Fulani women, which calls for innovative and adaptive strategies to mitigate shocks and vulnerabilities in the dairy business of Fulani women in Kaduna State, Nigeria. These adverse impacts include; a decline in the dairy value chain and means of livelihood, internal mass displacement of an estimated 300,000 across four states in Nigeria, and property loss of ₦400 billion in the country (Agency Report, 2021).

Kaduna State population increased from 6, 113,503 in 2006 to a projected 8,977,858 in 2020 (Kaduna State Bureau Statistics, [KSBS], 2018) while land resources, on the other hand, are on the decline owing to anthropogenic activities of man and physical occurrence on the environment. The population pressure with increasing inflation in staple food prices to 24.32% in January 2022 (Adegbesan, 2023) necessitates the quest to encroach further into previously uncultivated areas, grazing routes, and farming adaptation strategies such as dry season farming, fencing of arable land, the use of guns for protection which impedes herders belief of sovereign importance of movement

and the well-being of cattle head (Samuel & Bamigboye, 2022). In herders' belief of the sovereign importance of movement, grasslands and forest frontiers across the country are seen as natural endowments bestowed on them with free entry and exit to enhance their sustainable livelihood in pastoralism. The perceived sovereign importance of the movement of herd size engenders contentions and conflict between sedentary farmers and nomadic herders in Kaduna State, which resulted in the death of 1,188 lives in 160 attacks spanning 2005 to mid-2021 and a decline in food security in the state (Oluwole, 2021; Owolabi et al., 2016).

Farmers-herders conflict is attributed mainly to climate variability, population pressure, and economic, social, and political factors (Ducrotoy, Majekodunmi, Shaw, Bagulo, Bertu, Gusi, ... Welburn, 2018; Dickson, Danjuma & Joel, 2020; Turner, Ayantunde, Patterson & Patterson, ND) but the inability of resource users (farmers and herders) to develop an adaptive capacity to absorb the adverse effect of farmers-herders conflict contributes far worse than the conflict itself. The inabilities bring us to the concepts of disaster and disaster risk, where the former depicts a specific point in time where harm, loss, and casualties manifest in a geographical area, and the latter shows continuous series of events or invisible hands that propel losses and casualties. Disaster and risk are also seen as a complex interaction and variance of physical phenomena (flood, drought, heat wave, and desertification) with the susceptibility of society, the economy and infrastructure, and political will to variations and changes in the environment (Birkmann, 2013; International Panel on Climate Change [IPCC], 2012a). This is seen entirely from climate variations, but the study's emphasis is on the susceptibility of herders to conflict and the inability of the government, relevant stakeholders, and resource users (Fulani women) to detect the invisible hands propelling the farmers-herders conflict and inadequate adaptation strategies to mitigate the latent effect of farmers-herders conflict in Kaduna State, Nigeria.

Pastoralism contributes immensely to the growth of economies in Africa through the dairy value chain and as the primary source of meat protein in Sub-Saharan Africa (SSA), but the relevance over time is relegated to the back through unfavorable land policies by the colonial administration and discriminatory land policies such as the Open Grazing Prohibition and Ranching Establishment Law (2017) implemented in Benue and Ekiti States, Nigeria which herders perceive as detrimental to their major source of livelihood in livestock holdings

(Leshan & Standslause, 2013; Keiwua, 2002). Pastoralism accounts for an estimated US\$69.3 million off-take in Kenya and 3.2% of Nigeria's Gross Domestic Product (GDP) (IIED & SOS Sahel, 2009). The Fulani Herders account for 97% of livestock holdings and provide a significant portion of the dairy value chain which is germane to the backward integration policy of the Central Bank of Nigeria (CBN) on domestic sourcing of dairy raw materials (CBN Update, 2020).

Globally, pastoralism accounts for an estimated 120 million pastoralists and agro-pastoralists lands, 50 million in Sub-Saharan Africa (SSA) (Rass, 2006), and accounts for the most sustainable livelihood activities in the rangeland (Africa Union, 2010). In addition, pastoralism is found in difficult geographical locations such as deserts, dry plains, savannahs, and altitude mountains covering an estimated 26 million km² of the world biomes that are difficult for other agricultural activities (Krätli, Huelsebusch, Brooks, & Kaufman, 2013; Behnke, Fernandez-Gimenez, Turner & Stammler, 2011; Asner, Elmore, Olander, Martin & Harris, 2004). Empirical inquiries providing support for pastoralism are seen in a report by Food and Agricultural Organization (FAO), where the protein input/output ratios 1:4 and 1:2 in India, Sudan, New Zealand, Mongolia, Ethiopia, and Kenya under the free range dominated livestock holdings outweighs the ratio of around 1:1 in Saudi Arabia, US, Germany, China, the Netherland, and Brazil that are intensive oriented (Stenfield, 2012). Similarly, Scoones (1995) reports that 26 independent empirical inquiries carried out between 1974 and 1993 in nine (9) East, West, and Southern African countries avail higher per hectare returns on pastoralism than ranching.

Despite the enormous contributions of pastoralism, which makes it a viable source of livelihood in semi-arid and arid regions, pastoralism impacts adversely on the environment through eco-system dis-functioning and land degradation. Incessant bush burning by pastoralists to have fresh shoots for their cattle negatively impacts the environment through loss of soil nutrients and susceptibility to wind erosion. Pastoralism is a livestock production system that depends on open grazing of grassland, vegetation cover, and forest frontiers for the wellbeing of livestock and revenue yield. Free grazing is the movement of livestock to feed on fresh foliage, dry grass, tree leaves, crops, and other fauna in open grassland without adequate control by the authority. The increasing grazing of livestock on grassland, vegetation cover, and forest frontiers around the globe is seen as a leading factor influencing deforestation and land degradation (Chakravarty, Ghosh,

Suresh, Dey & Shukla, 2012). Presenting a comprehensive deterring effect of grazing on the environment, an empirical inquiry by Abril, Barttfeld and Bucher (2005) avail that grazing impacts adversely on soil carbon balance than bush burning when the effect of the two acts separately. The study avails further that burnt but un-grazed areas appear to show a tendency to recover the initial carbon balance, whereas, in chronically overgrazed sites, there is a permanent tendency to carbon loss. In addition, in Lebanon, the adverse impact of grazing on the environment is seen in the two months of overgrazing of an estimated 80,000 sheep and goats in woodlands and degraded highlands that impeded the regeneration of slow-growing conifers with a resultant increase in deforestation in the area (MoE/UNDP/GEF, 2014). In view of the foregoing, pastoralism impacts adversely on the environment. It engenders conflict with sedentary farmers, which claimed an estimated 2, 000 lives in Nigeria in 2008, resulting in adverse effect on food security and the dairy value chain (Erunke & Aku, 2022; Brottem, 2021; Owolabi et al., 2016; Apenda, 2016).

Despite the shortfall, it is pertinent that rather than jettisoning pastoralism which is the most economically viable agricultural practice in the semi-arid and arid regions (Kratli et al., 2013), efforts should be geared towards global best practices to mitigate resource-induced conflict and environmental degradation and on the other hand stimulate dairy production among the Fulani women in Kaduna State, Nigeria. Global best practices abound in Brazil, Denmark, and Australia, through which national and regional governments have developed mechanisms to enhance dairy production in the face of increasing climate variability and resource-induced contestations. In Brazil, the Sustainable Smart Agro-Climate Module (MAIS) was created in 2014 by Adapta Sertão and implemented between 2016 and 2018 with 100 family farmers in dairy and meat production to enhance the productivity and efficiency of smallholder livestock and dairy family farmers, using climate change adaptative strategies through the adoption of low-cost technologies and production practices, along with market integration strategies (Maia, de Silveira, Fonseca, Burney & Cesano, 2021). The program strives to achieve a win-win food security situation and aims to mitigate the increasing impact of agricultural activities and intensification on the environment. Four phases of interrelated mechanisms of innovative production practices, technical training, financial enlightenment, and monitoring and evaluation, were outlined in the production module, which encompasses a minimum

land area of 20 hectares with 20 traditional practices and technologies. The study avails further that

The minimum area of production was established to guarantee: (i) a sustainable provision of pastures, area for Livestock-Forest-Pasture integration, area for hay production and forage, mainly *Opuntia-Ficus Indica* (a cactus); (ii) a maximum number of heads per module to guarantee a sustainable production in the long run without the depletion of natural resources; (iii) best animal management practices; (iv) construction of wells, water cisterns, and earth dams to ensure family and animal water needs during prolonged droughts; recommendation of small-scale and low-cost machinery.P.2.

The finding from the empirical inquiry based on dairy farmers sampled from MAIS revealed that the smallholder farmers assisted by the program improved their average milk production during the 2016–2018 period by nearly 10% per quarter, while the frontier of production increased by nearly 7% per quarter (Maia et al., 2021).

In Australia, a transdisciplinary model titled Dairy Businesses for Future Climates [DBFC] was carried out in the Australian dairy industry in collaboration with social science dairy farmers experts, farm advisors, and dairy industry professionals to develop actionable, realistic, and industry-validated change adaptation strategies for dairy farmers (Cullen, Ayre, Reichelt, Nettle, Hayman, Armstrong, Beilin & Harrison, 2021). The result showed that dairy farmsteads depending on rainfed with fewer adaptation strategies in Gippsland and South Australia will experience adverse impacts of the warmer and drier climates in 2040 than the adaptation-inclined irrigated farmstead in Tasmania.

Israel, a leading country with an average per cow milk yield per annum of 11,600k, which outweighs the global average range of 500-9000k per cow milk yield per annum, was constrained by limited land, water, and unfavorable weather condition (Triky & Kissinger, 2022; FAO, 2014). In addition, Israel and world-leading dairy producers face the challenge of increasing production with minimal environmental impact, as dairy cows alone account for 20% of livestock GHG emissions globally (FAO, 2013; FAO,2010). The State of Israel, in a move to enhance sustainable production and efficiency in the dairy sector, developed a comprehensive dairy policy that included inter-agency collaboration, efficient sewage system and manure treatment facilities (including composting), and agricultural sludge treatment facilities that impacted

positively on the economy and the environment (Israel Ministry of Agriculture and Rural Development [MOAG], 2013).

The dairy production system in the US is a synergy of farms, cooperatives, and companies embedded in family-owned 40,000 farms across the country with livestock experiences that work closely with veterinary services and modern technology to produce 101.3 million metric tons of dairy products. The growth in dairy production is attributed to innovative and sustainable policies such as the 2050 goals and the Dairy Net Zone Initiative (NZI), which include the objectives of; Green House Gas (GHG) emissions neutrality, optimizing water use while maximizing recycling; and improving water quality by optimizing utilization of manure and nutrients; feed production, manure handling and nutrient management, enteric emission reduction and efficiency, and on-farm energy efficiency and renewable energy use, respectively (Dairy Management, 2023). Consequently, improved dairy production techniques in the US led to a decline in GHG emissions to 2% against the 80% forest decline rate in the Amazon due to livestock production in Brazil (Mendy, 2022).

The inability of the Federal and State governments, farmers, herders, academia, and relevant stakeholders in Nigeria to engage in global best practices to forecast the adverse effect of climate change (a latent factor) on the continuum (the ever-raging farmers-herders conflict), and to formulate sustainable dairy measures depict the disaster risk that has metamorphosed into food insecurity and a decline in the dairy value chain in Kaduna State, Nigeria. This calls for the interplay of adaptive and coping capacities by the Fulani women in Kaduna State, Nigeria, in line with global best practices to curtail the incidence and latent impact of farmers-herders conflict on their primary source of livelihood in dairy production. Adaptive capacity entails the available resources (information, wealth, technology, among others) to manage harm and disaster, while, coping capacity is the ability to harness the available resources to curtail the adverse effect of risk and disaster (Birkmann, 2013). The relevance of coping strategy is evident in the Horn of Africa (HoA), notably in Kenya, Ethiopia, and Uganda, where the growing use of adaptation frameworks by dairy farmers is impacting positively on the economy and environment with a resultant decline in casualties from farmers-herders conflict (Abazinab, Danjuma & Muleta, 2022; Guo, Brhane, Genet & Gebremedhin, 2018; De-Vries, 2018). Despite being the region worst hit with drought in Africa, the increasing adaptation strategies by dairy farmers in the region (notably Kenya and Ethiopia)

have enhanced sustainability in the dairy business in the face of increasing climate change-induced farmers-herders conflict than their counterparts in Kaduna State, Nigeria.

Despite the foregoing inadequate adaptation strategies in the dairy business in Kaduna State, Nigeria, changing demographic strategies such as staple food production, notably vegetable production, is employed as coping strategies by Fulani women in the face of increasing resource-induced contestation with sedentary farmers. Staple food production tends toward sedentary living, which is a leading platform in curtailing farmers-herders conflict. It is observed that during a conflicting situation, it is easier to migrate with livestock than staple food products, most especially during the farming period. Therefore, engaging in staple food production will compel herders to coexist peacefully with sedentary farmers. Other measures, such as the use of arms and ammunition, sourcing of warlords from neighboring countries, and reprisals attacks which are symmetric in nature, have been employed but largely unsuccessful in fostering peace building as they are skewed towards curtailing conflict from the surface level.

Empirical investigation (content analysis) and observation in the study showed that the aforementioned coping strategies are inadequate in mitigating the adverse effect of farmers-herders conflict on the dairy production of Fulani women in Kaduna State, Nigeria. Existing works of literature (Montcho, Padonou, Montcho, Mutua & Sinsin, 2021; Inman, Hobbs & Tsvuura, 2020; Idrissou, Assani, Baco, Yabi, Traore, 2020) examined climate change adaptation strategies employed by dairy farmers in Africa without taking a holistic approach to assess the strategies employed by dairy farmers in the face of resource-induced contestations with sedentary farmers. In Nigeria, existing works of literature (Olagbemiro, Ojediran, Oladipupo, & Ezekiel, 2022; Yikwab & Tade, 2021) concentrated on adaptation strategies employed by sedentary farmers in the face of increasing conflict with nomadic herders without taking a cursory look at the plight and adaptation strategies of Fulani women in dairy production in the face of increasing contestation with sedentary farmers over shrinking land resources. The foregoing lacuna necessitates the study, which is poised to bridge the gap in existing studies by assessing the following research objectives; to ascertain adaptation strategies employed by Fulani women in the face of farmers-herders conflict in Kaduna State and to examine the influence of the strategies on Fulani women's milk business in the state.

Frequency of Farmers-Herders Conflict in Kaduna State

Farmers-herders conflict, which in recent times surpassed the casualties from the Boko Haram onslaught in the country and displaced an estimated 300,000 people across four states in the country, has been a recurrent issue that traces its origin to the biblical story of Cain and Abel and the pre-modern historical event of contestations between the marauding hordes and Emperor Qin Shi Huang of China (Premium Times, 2021; History, 2019). The conflict, which was prevalent in the country's Middle Belt region, permeates into Southern Kaduna and currently across the state with an adverse ripple effect in banditry, kidnapping, food insecurity, and a decline in dairy production.

Between January 2016 and October 2018, an estimated 3,641 casualties were recorded in Nigeria, with 2018 accounting for 57 percent of the death toll arising from farmers-herders conflict in the country (Amnesty International, 2018) while a report by Folorunsho-Francis (2023) pegged the death toll in the seven years at an estimated 4,000 lives. Between January 2020 and June 2020, farmers-herders conflict with related armed conflict resulted in the loss of 1,126 lives with an estimated 388 cases of kidnap for ransom across Kaduna, Niger, Katsina, Nasarawa, and Zamfara States (Amnesty International, 2020).

In Kaduna State, an estimated 366 people were killed across villages in the Southern part of the state between January and June 2020, 22 casualties were reported in a suspected herders' invasion in Zangon-Kataf on August 6, 2020, and 100 deaths were reported on 11 coordinated attacks across Chikun, Kaura, and Zangon-Kataf Local Government Areas (LGAs) in July 2020 (Amnesty International, 2020). In 2022, a reprisals attack following the death of 34 persons and the destruction of 230 houses, two herders' settlements (Zauru and Kuran) were razed in Zangon-Kataf in March, while in the same month in 2023, death of a herder by suspected hoodlums in Ungwan Juju led to a confrontation with security unit and a reprisal attack at Ungwan Wakili village of Atyap Chiefdom in Zaangon-Kataf that led to casualties of 17 lives (Dalhatu & Bello, 2022; The Sun, 2023; Benjamin, 2023). Between 2005 to mid-2021, 1,188 casualties were recorded in 160 attacks in the state (Oluwole, 2021).

Given this frequency of attacks, it is pertinent to provide a lasting solution that calls for innovative and resilient strategies within the coping capacity of herders (Fulani women) to enhance the sustainable use of land resources and means of livelihood in the dairy value chain

in the state. The resilient strategy here is the skills necessary to absorb and adapt to challenging situations, risks, and shocks and the combination of available resources to mitigate harm and post-conflict adverse impact. Defining resilience from a crisis perspective, Olagbemi et al. (2022) opined that agricultural resilience denotes salient and skilled strategies to mitigate the adverse impact of crisis and disaster. They further stressed that agricultural resilience primarily enhances the functionality and food sufficiency. In the views of the World Bank (2012), resilience is the ability to withstand, recover from, and reorganize in response to a crisis so that all members of society may develop or maintain the ability to thrive.

Adaptation strategies employed by pastoralists in Kaduna State are skewed toward the kinetic method that involves warfare and security measures needed to mitigate a short-term conflict and reprisal attack. These methods are at variance with the positive peace ideology that seeks to tackle the root causes of conflict, such as the sustainable use of the environment, modern ranching, peace advocacies, and population control. The positive peace concept and coping strategy lessen undue pressure on land resources, which is the leading factor influencing farmers-herders conflict and impedes the proposed 10% growth rate in the agricultural sector by the Federal Government's Vision 2012 (Olagbemi et al., 2022).

Adaptation Strategies by Fulani Women in Kaduna State

Owing to inadequate empirical inquiries on adaptation strategies by Fulani women in the face of farmers-herders conflict in Kaduna State, observation was employed to augment the content approach to infer adequate information on adaptation strategies by Fulani dairy farmers in the state. Existing works of literature (Olagbemi et al., 2022; Yikwab & Tade, 2021) that focused on adaptation strategies by sedentary farmers in the face of farmers-herders conflict are inadequate to infer complete and holistic information on adaptation strategies by resource users (dairy farmers) in resourced-induced contestations. The observation was carried out in Ruga settlements in Southern Kaduna, where farmers-herders conflict is prevalent, with a resultant adverse effect on social harmony, food security, and the dairy value chain in the state.

Inman et al. (2020) opined that the perception of vulnerability (latent effect of conflict and climate variability) is pertinent to seeking adaptation strategies in mitigating shocks and enhancing a sustainable

means of livelihood in facing disaster risk. To mitigate the vulnerability, dairy farmers need to be aware of farmers-herders conflict and its adverse impact on means of livelihood. This will energize resource users (Fulani women) to seek adequate strategies to reduce susceptibility to the risk and post-disaster adverse effects.

Adaptation strategies by herders in the face of farmers-herders conflict are symmetric and involve using arms, ammunition, and the sourcing of militiamen from neighboring African countries to safeguard their livelihood in livestock holdings. The symmetric coping strategy is skewed towards the negative peace that seeks to tackle conflict from the surface level without adequate measures to address the root cause of conflict. While this might be effective in the short run, it is a recipe for perennial conflicting situations and reprisal attacks.

Mixed farming is a notable coping strategy by the Fulani women in the face of the increasing farmers-herders conflict. It is a coping strategy towards sedentary livelihood that promotes trade, trust, and coexistence between crop farmers and herders. Mixed farming in livestock holdings and crop production (usually vegetables and fruits) by pastoralists reduces the frequency of conflict owing to impaired mobility of farm produce in a crisis period. Herders are compelled to sue for peace with sedentary crop farmers to protect their growing and diversified means of readily immobile livelihoods unlike livestock that are easily conveyed from one region to another.

Other adaptation strategies include dialogue and headcount of herders within a settlement to check against the infiltration of conflict entrepreneurs and criminal elements inciting violence in the name of herders. While these measures may influence peace in the short-term, sustainable coping strategies to foster peace building and sustainable livelihoods are relatively unavailable across the settlements.

Influence of Adaptation Frameworks on the Dairy Business of Fulani Women in the state

Olagbemiro et al. (2022) assert that agricultural resilience centers on using effective alternative strategies to reduce threats and vulnerability in the agricultural value chain. Going further, they opined that these alternative strategies are yet to be implemented adequately in poor rural communities in the global south owing to inefficient use of a participatory bottom-top approach that involves the vulnerable and poor farmers (herders-sedentary farmers) in policy formulation. The

bottom-top approach that is participatory and inclusive will take into cognizance the adaptive and coping capacities of vulnerable groups rather than superimposing ready-made policies beyond the coping capacity of vulnerable groups.

As highlighted earlier, adaptation strategies employed by dairy farmers (Fulani women) in Kaduna State denote the negative conflict resolution concept that seeks to mitigate conflict from the surface level. Emphasis is placed on short-term methods, which have been the reason for the recurrent spate of casualties from farmers-herders conflict, as evident in the recent fiasco in Zangon-Kataf that claimed an estimated 17 lives between 12th to 16th March 2023 (Dalhatu & Bello, 2022; The Sun, 2023; Benjamin, 2023). Herders often engage in short-term coping strategies such as temporal resettlement, the use of charms, employing the services of warlords from neighboring African countries, and reprisals attacks, which are recipes for recurrent conflict with sedentary farmers that have yielded no significant positive effect on peace and milk business of Fulani women in the state.

Examination of Existing Adaptation Strategies in the Face of Farmers-Herders Conflict

Existing studies attribute farmers-herders conflict to climate variability (Owolabi et al., 2016; Odoh & Chigozie, 2012; Abbass, 2012), which necessitates an empirical inquiry into adaptive and coping strategies by dairy farmers in the face of increasing climate variability (Ranasinghe, Korale-Gedara, & Weerasooriya, 2023; Montcho et al., 2021; Idrissou et al., 2020). This study goes beyond dairy farmers' adaptation strategies resulting from climate change to encompass dairy farmers' adaptation strategies in the face of farmers-herders conflict. The study harnessed inquiries on both adaptation strategies employed by dairy farmers (Fulani women) in the face of farmers-herders conflict and climate change since climate variability is a proximate driver of farmers-herders conflict and has been the leading factor influencing disasters such as flood, drought, and desertification, among others. While works of literature in the HoA dwelt on coping strategies to militate climate change's impact on dairy farming (Abazinab et al., 2022; Guo et al., 2018), studies in Nigeria (Samuel & Bamigboye, 2022; Olagbemi et al., 2022) are streamlined towards adaptation strategies by crop farmers in the face of farmers-herders conflict.

Samuel and Bamigboye (2022) investigated farming households' adaptation strategies to herders' attacks in Nigeria to reveal the

dominant strategies employed by farmers in mitigating farmers-herders conflict as; building gates and fences to seclude pastoralists from encroaching farmsteads, spraying of chemicals at farm boundaries to wade-off cattle, the use of community vigilante, the use of 'no trespassing' sign to signify private ownership, and the use of local guns for self-defense. Yikwabs and Tade (2021) assessed how farming communities cope with displacement arising from the farmer-herder conflict in North Central Nigeria with the aid of exploratory research design and qualitative research instruments to show the coping strategies employed by displaced farmers as; relying on aid, job switching, relocation to safe areas, the use of community vigilantes, and reliance on God. The study recommends that displaced farmers be adequately equipped to cope with the adverse effect of conflict.

Olagbemiro et al. (2022) examined farmers-herders conflicts: Effects of resilience strategy on arable crop productivity in the Ogbomosho Agricultural Zone of Oyo with the study objective which was to examine the effect of resilience on arable crop productivity after the farmers-herders conflict in Ogbomosho Agricultural Zone. A structured questionnaire was used to elicit responses from 270 crop farmers from the population of 919 registered arable crop farmers. The responses were subjected to Ordinary Least Square (OLS) technique to show a significant effect of transformative, absorptive, and adaptive resilience strategies on arable crop production in the Ogbomosho Agricultural Zone. The six major coping strategies employed by dairy farmers in the study include; keeping the farm area clean always, adherence to community rules and regulations, the intervention of community leaders and traditional leaders with the local government, personal intervention, police/court, and fencing farm area. The study recommends that appropriate authorities should implement the strategies employed in the study to enhance the productivity of arable crops and curtail farmers-herders conflict among resource users.

An empirical investigation by Abazinab et al. (2022) on livestock farmers' perception of climate change and adaptation strategies in the Gera District, Jimma Zone, Oromia Regional State, Southwest Ethiopia, focused on the vulnerability of dairy farmers in the face of increasing climate variability in the region. The objective was to assess livestock farmers' perception of climate change variability and adaptation strategies in the Gera district in Southern Ethiopia. The study employs primary and secondary data with questionnaires and Focus Group Discussions (FGD) from January to November 2021. The secondary data

on rainfall and temperature spanned 2001 to 2020. Statistical Package for Social Sciences (SPSS) version 20 was used to analyze the data from which the result of Chi-Square and one-way Analysis of Variance (ANOVA) showed diversification of mixed crop-livestock, diversification of livestock species, feed conservation, reducing herd sizes, water harvesting, provision of supplementary feeds, and forage production as the prevailing adaptation strategies employed by livestock holders in the face of climate change-induced farmers-herders conflict in the Gera district in Southwest Ethiopia. Also, the study showed inadequate technical know-how on water harvesting, shortage of land for forage production, lack of improved forage seeds, lack of supplementary feed, poor livestock management skill, lack of feed conservation practices, and inadequate access to market as the factors militating effective climate change adaptation strategies among livestock producers in the Gera district in Southwest Ethiopia. The study recommends adequate formulation and implementation of climate change adaptation strategies by policymakers and development stakeholders to enhance livestock production in the Gera district in Southwest Ethiopia.

Theoretical Framework

The theoretical framework employed for the study is the sustainable livelihood model advanced initially by Chambers and Conway (1992), which viewed livelihood as a way of earning a living through livelihood capabilities in tangible and intangible assets and sustainability as the ability to adapt and recover from risk, shocks, and harm, and to maintain a livelihood needed to enhance well-being (Chambers & Conway, 1992; DFID, 1999; Birkmann, 2013).

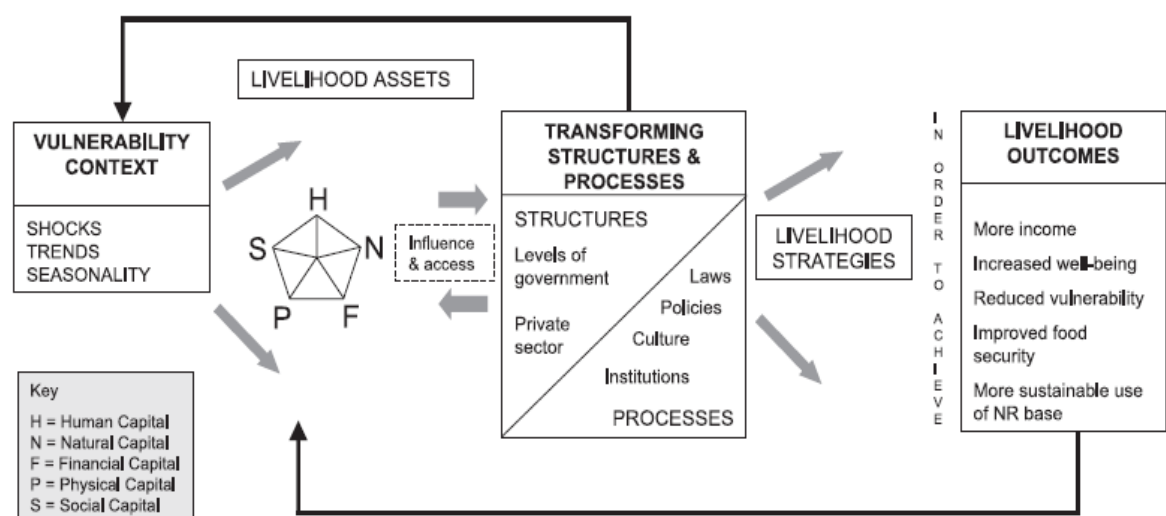


Figure 2.1: The Sustainable Livelihood Framework

Adapted from DFID (1999)

The framework centers on five critical livelihood assets (human, financial, social, and physical). It seeks to enhance the well-being of vulnerable groups in society with sustainable livelihoods rather than superimposing ready-made policies beyond the capacity of the poor masses and vulnerable groups (DFID, 1999; de Haan & Zoomers, 2005). Herders who have been secluded with unfavorable land policies right from the colonial era (Keiwua, 2002) are faced in recent times with challenging land laws such as the Open Grazing Prohibition and Ranching Establishment Law (2017) in Benue State and sedentarization which, according to Recaniger (2009) is 20% less productive than pastoralism (Olagbemi et al., 2022). The superimposition of ready-made Western policies into African land tenure laws to shift land rent in favor of arable crop production was seen as the bane to social harmony and peaceful coexistence between sedentary farmers and pastoralists (David-Heiser & Luna, 2008 cited in Olagbemi et al., 2022). This calls for an inclusive agricultural policy that takes into cognizance the various resource users' productive and coping capacities. Buttressing the point, Inman et al. (2020) posit that harms, shocks, and conflicts are location specific, which requires evaluating the prevailing vulnerabilities in line with the adaptive capacity of vulnerable communities, in this case, Fulani women, to maximize resilience and productivity.

The framework emphasizes the interplay of the human environment through sustainable use of the environment by varying resource users (farmers and herders) to mitigate resource-induced conflict. Farmers-herders conflict results from climate variability necessitated by anthropogenic activities of man and population pressure in the forest frontiers (Effevottu & Ihuoma, 2019; Okwor, 2016). The inability to sustainably use the environment and adapt to changes brought about by climate change-induced-farmers conflict adversely impacts the major source of livelihood of Fulani women in the dairy value chain.

The model is relevant to the study as it shows the framework needed to enhance Fulani women's coping capacity in the face of farmers-herders conflict. It has shown that rather than imposing anti-open grazing laws on pastoralists beyond herders' adaptive capacity, efforts should be made to engage herders in relevant policy formulation to ascertain their adaptive capacity to cope with vulnerable situations such as climate risk, which leads to farmers-herders conflict.

Conclusion

From the thematic investigation and observation, it is pertinent to deduce that Kaduna State, Nigeria, with the lesser impact of climate change, experiences a more significant burden of farmers-herders conflict than her counterparts in the Horn of Africa (HoA) (notably Ethiopia and Kenya) as evidence showed Nigeria to have the highest casualties (an estimated 2,000 deaths) resulting from farmers-herders conflict in 2018 (Brottem, 2021). This is enshrined in the disaster and post-disaster management framework employed by relevant stakeholders; the government and resource users (farmers and herders) in Kaduna State, Nigeria, and countries in the HoA. While contemporaries in the HoA are involved in epoch-making adaptation strategies, relevant stakeholders in Kaduna State (pastoralists) are primarily unable to predict disaster and disaster risk, with the latter denoting invisible hands that propel harm and vulnerabilities (Birkmann, 2013). The inability to detect disaster and disaster risk is evident in inadequate frameworks employed by the government and pastoralists to curtail and manage conflict signals, as seen in the cradle of the recent spate of farmers-herders conflict in the Middle Belt Region of the country (notably in Benue State). This escalates the conflict beyond the region to virtually all crannies in the country, resulting in casualties of an estimated 4,000 lives in seven years and loss of properties worth ₦400 billion (Folorunsho, 2023; Agency Report, 2021). The government's inability to forecast the adverse effect of climate change (a latent factor) on the continuum (the ever-raging farmers-herders conflict) culminated in the menace that claimed more lives (1,868) in 2018 than the Jama'atu Ahlis Sunna Lidda'awatiWal Jihad (JAS) insurgency with 1,536 casualties in 2018 in Nigeria (ALCED, 2018). This necessitates a shift in paradigm to coping strategies in the farmers-herders conflict that entails effective dialogue, innovative techniques, and technical support to enhance post-conflict reconciliation and mitigation of vulnerabilities in conflicting situations. This also goes into taking pragmatic steps through an inclusive traditional peace-building framework involving farmers and herders with the traditional Stool as the conciliator to enhance a wave of sustainable peace and livelihood among competing resource users (farmers and herders).

Unlike the methods employed by dairy farmers in Africa (Idrissou et al., 2020; De Vries, 2018) and sedentary crop farmers in Nigeria (Olagbemiro et al., 2022; Yikwab & Tade, 2021), pastoralists (Fulani women) in Kaduna State employ short-term and security-oriented coping and adaptation strategies to mitigate shocks, losses, and

vulnerabilities in the face of farmers-herders conflict. Major coping strategies employed by pastoralists in Kaduna State include the use of arms, ammunition, and sourcing of warlords from neighboring African countries to engage in reprisal attacks and safeguard their ruga (Fulani settlement). The foregoing strategies are injurious and connote the negative concept of conflict that aims to eliminate the opposing party over entitlements, which has resulted in the recurrent farmers-herders conflict that led to 17 casualties in less than a week in Zangon-Kataf LGA of the State in March 2023 (The Sun, 2023; Coser, 2010). Other coping strategy among the Fulani women in Kaduna State is mixed farming which tends toward a sedentary livelihood. Increasing sedentary livelihood (vegetable production) among the Fulani women reduces the likelihood of conflict due to unease in migration of farmsteads after attacks, unlike cattle herds that are easy to move from one area to another after attacks on farming communities. This method also enhances trust and peace building between pastoralists and the host communities where the Fulani women often go to sell their farm produce (usually onions, pepper, tomatoes, okra, and fruits, among others).

Based on the aforementioned, the study concluded that adaptation measures employed by the Fulani women had yielded no significant influence on the mitigation of disaster risk and conflict, which has resulted in the increasing frequencies of attacks with a resultant decline in food security and dairy value chain. This provides the basis to advance the following recommendations.

Recommendations

As highlighted in the study, land tenure policies such as the Open Grazing Prohibition and Ranching Establishment Law and the proposed RUGA policies are beyond the coping strategies of and are discriminatory to herders and farmers, respectively. This calls for the formulation and implementation of sustainable livestock production policy such as MAIS that encompasses low-cost technologies and production practices, along with market integration strategies, and four phases of interrelated mechanisms of innovative production practices, technical training, financial enlightenment, and monitoring and evaluation by the Federal Government to enhance food security (dairy production) and assuage the environmental impact of pastoralism. Adequate implementation of sustainable policies such as MAIS, the comprehensive dairy plan by MOAG (2013), the 2050 goals in the US, and the Dairy Businesses for Future Climates in Australia will foster

peaceful coexistence between farmers and herders, mitigate the environmental impact of pastoralism, and facilitate the backward integration policy of the CBN.

Perception of risk, shock, and conflict is pertinent in adapting adequate strategies to mitigate vulnerabilities arising from disasters and conflicts by competing resource users (Inman et al., 2020). To mitigate disaster, it is essential to acknowledge the presence and adverse effects of disasters which energizes vulnerable groups to deduce the needed strategies to reduce susceptibility to disasters and disaster risk. Therefore, there is a need for vulnerable groups to understand the concept of vulnerability, which is the degree to which a system is susceptible to and unable to cope with the adverse effect of disaster and conflict, including its character, magnitude, and rate of occurrence (IPCC, 2007). This will enable the Fulani women to employ adequate coping strategies to enhance milk production and sustainable livelihoods.

Relevant multinational environmental organizations should increase advocacies on multiple adaption mixes such as disaster risk management, political ecology, and climate adaptation frameworks in line with the Hyogo Framework for Action that emphasizes the need to understand vulnerabilities from the society's physical, social, economic, and environmental factors.

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