

Human Journals

Research Article

March 2021 Vol.:18, Issue:1

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Impact of the Security Crisis on the Transhumant Pastoral System in the Province of Lac, Department of Mamdi (Chad)



**Djalal Ardjoun Khalil^{1*}, Sing-yabe Sahoulba²,
Mahamat Ibrahim Souleymane³, Issa Yousouf¹**

1. Higher National Institute of Sciences and Techniques of Abeche (INSTA); Department of Breeding Sciences and Techniques, BP 130 Abeche, CHAD 2. Ministry of Livestock and Animal Productions. Division of Development of Animal Production and Sectors. BP: 750 3. Moussoro National Higher Institute of Livestock (INSEM), Department of Animal Productions, BP 950 N'Djamena, CHAD

Submitted: 01 February 2021

Revised: 20 February 2021

Accepted: 10 March 2021



HUMAN JOURNALS

www.ijssrm.humanjournals.com

Keywords: Vulnerability, Transhumants, Adaptation, Security Crisis, Lake Chad.

ABSTRACT

The study addresses the issue of the recurrent vulnerability of the transhumant pastoral system in Lake Province (Chad). This study aims to assess the impact of the security crisis on this system and to record the local adaptation strategies developed by the pastoralists. A survey was carried out using an individual questionnaire and in the focus group. Results show that polygamous Mamdi pastors and illiterate, manage large households (17.27±8.62 peoples) with a low monthly average income (54,223±37,339 CFA francs). The components of the transhumant pastoral system are affected as a whole by the security crisis, including pastoralists and animals. The size and income of the household have a very negative influence on the number of meals earned per day by farmers ($p<0.001$). Unfavorable terms of trade, high mortality of adult animals and females, market inaccessibility, old transhumance, and pastoral resources, and declining animal productivity (99%) are all impacts of this security crisis on this system. Resilience and adaptation strategies implemented (intensive sale of cattle, agriculture, mobility, mutual aid) have enabled pastoralists to face this crisis. On the other hand, this breeding of socio-economic and social integration of animal origin remains vulnerable in this climate of insecurity.

INTRODUCTION

Transhumant pastoral farming is the only economically profitable method of animal production in the Sahel. This method of production and/or live savings is par excellence well adapted to the agro-climatic context of the Sahelian region [12, 21, 22]. In recent years, the security crisis in Lake Chad (preferred areas of transhumant pastoral farming) has been at the center of international concerns. In addition to the recurrent effects of climatic hazards, insecurity is increasingly characterizing this Sahelian pastoral space and is a vulnerability factor specific to the transhumant pastoral system, as are droughts.

Before this security crisis, transhumant pastoral farming showed remarkable vitality on the African continent. The regional economy was buoyant from the cross-border movements of people, livestock, and food products, based on agroecological and demographic differentials [20]. In Chad, this system plays a key role in the national economy through the development of livestock products from the Sahelian area and offers the bulk of livestock and livestock products marketed in local and sub-regional markets. Pastoralism is the backbone of the national rural economy. Livestock production generates an annual cash-flow of nearly 140 billion CFA francs [18] and it is estimated that 80% of the pastoral herd. According to the World Bank (2016), pastoralism is also linked to poverty, but a lesser degree than agriculture, because greater livestock ownership corresponds to a lower incidence of poverty, suggesting that livestock can bring resilience to poverty.

Since 2012, a growing security crisis has been set up due to the presence in the province of Lac of irregular armed groups that make mobility and inaccessibility of pastoral infrastructure increasingly complex. Insecurity is a major obstacle to development and directly compromises the role that pastoralism can play in maintaining natural capital in arid areas [10] and thus destabilizes the pastoral economy of the Province of the Lake or sub-region. It contributes to reduced livestock productivity and disrupts the social life of already vulnerable pastoralist communities. The aim of this study is to assess the impact of the security crisis on the transhumant pastoral system in Mamdi Department (Lake Province).

MATERIALS AND METHODS

Study area

The study is being conducted in Lake Province, Mamdi Department. This Department of Mamdi is the transhumant breeding center of Lake Province. Indeed, the massive presence of transhumant pastoralists shows a strategic position of this area of choice rich in pasture and water resources (Lake arm) that stays there throughout the year. For this reason, the study focused on this area to assess the vulnerability of the transhumant pastoral system to the security crisis and the resilience strategies put in place. The department of Mamdi has as its capital Bol. It is considered an area breeding pastore by excellence. It is between 13 degrees north latitude and 14 degrees East longitude (Figure 1). The climate of the department of Mamdi is Sahel-Saharan. It comes in a long dry season of more than 7 months and a vegetation cover marked by the shrub-steppe. The landscape consists of bright dunes, polders, and scattered islands. Agriculture is the main economic activity for nearly 80% of the population (232,242 inhabitants) of whom 97.5% live in rural areas [17].

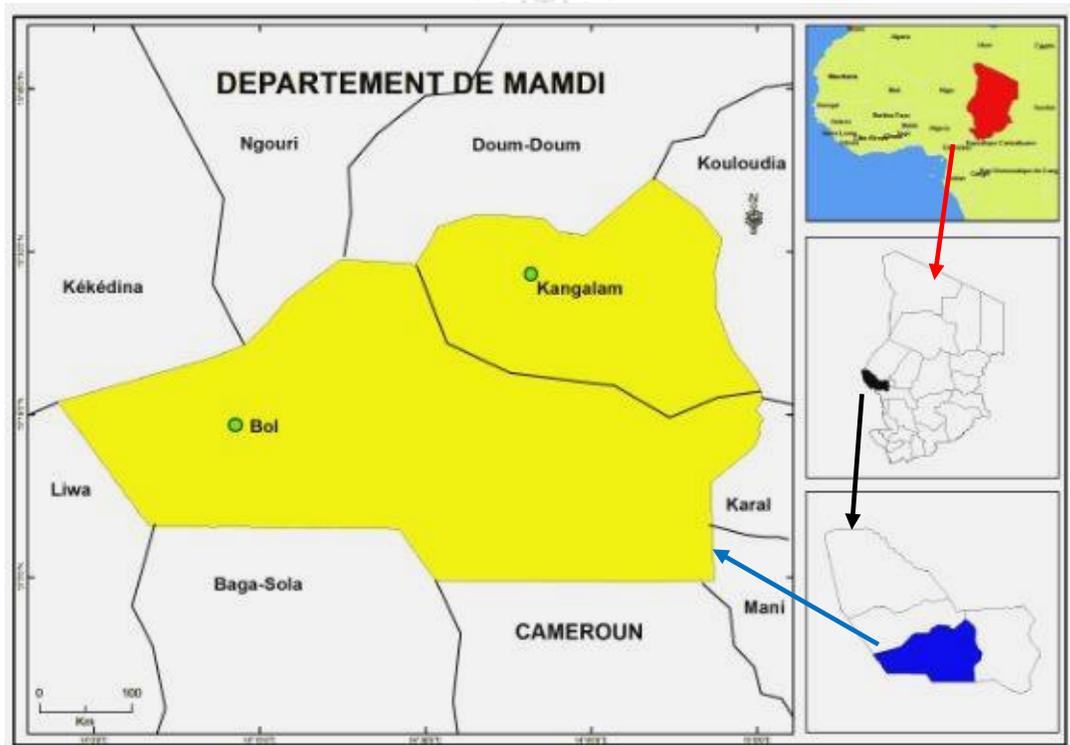


Figure No. 1: Map of the study area.

How the study unfolded

The survey was carried out from August 20 to September 21, 2017. It was conducted by interviews using an individual questionnaire with 103 transhumant households in 55 villages (individual), in groups (200 transhumant pastores divided into 10 focus groups), and 10 resource people from NGOs and state institutions operating in the Department of Mamdi (Lake Province). The aspects discussed included the analysis of pastoralists' perceptions of the security crisis (daily life, transhumance management, livestock, and pastoral resources), the observation made by transhumant pastoralists since the crisis was set up, cohabitation around pasture management, management of infrastructure (cattle markets, transhumance corridors, water points) as well as household income sources. Assessing the impacts of the security crisis on the transhumant pastoral system, households, animals, and pastoral resources. To facilitate the interviews, we also made the call to the resource people (interpreter, township chiefs, village leaders, notables, transhumant pastores, heads of households, women, agents of the decentralized services of the state in charge of rural development, representatives of NGOs intervening in our study area).

Sampling

A total of 55 out of 178 villages are surveyed, representing a survey rate of 30.9%. The choice of villages to investigate is based on the presence of transhumant households and the main transhumance axes in the villages, as well as the community aspects of transhumant (Ethnic of transhumant) and the distance between villages. The number of 103 households surveyed was divided over the 55 selected villages, or about 2 households/village (1.87 households). The distribution of transhumant in the commune on the Bol side, both urban and rural, is taken into account.

Statistical Analysis

The collected data is entered into Excel and the various parameters are calculated using the Statistical Package for the Social Science 20.0 software (SPSS, 2011). The information collected is synthesized as a percentage and on average with standard deviations. Variables selected after flat sorting were subjected to variance analysis (ANOVA). The threshold of meaning chosen on the differences of average was 5%.

RESULTS AND DISCUSSION:

RESULTS

Transhumant pastors are settled in the Commune of Rural Bol (69.90%) and Bol Urban (30.10%). These transhumant pastors are from the Boudouma ethnic group (72.82%) followed by Kouri (16.50%) and Kanembou (10.68%). They are mostly polygamous (89.32%) illiterate (97.09%). The average household size of pastors is 17.27 ± 8.62 people and can range from 5 to 50 people. The average monthly income is $54,223 \pm 37,339$ CFA francs with extremes ranging from 10,000 to 250,000 CFA francs. There is no significant difference between the pastors of the Commune de Bol Urban ($55,322 \pm 44,961$ CFA francs) and those of Bol Rural ($53,750 \pm 33,898$ CFA francs) (0.5). Most pastors (65.5%) earn less than 50,000 CFA francs. The secondary activity of transhumant pastoralists is dominated by agriculture (82.02%), Trade (16.42%) (1.49%). The Chiefs of pastoral cleaning made up mainly of men (97.10%) have an average age of 45.86 ± 11.27 years (24 à 69 years). Widows are also registered (1.94%).

Impacts of the security crisis on the transhumant pastoral system

The components of the pastoral system most affected by the security crisis are animals (45.14%) pastors (37.38%). Indeed, transhumant pastoralists (99%) claim that the security crisis has significantly reduced their income, the number of animals and destroyed the structure of the herd.

All transhumant pastors confirm that the security crisis began in 2012. About 12.60% of pastoralists consider that the security crisis has seriously affected the area. More than half of pastors (55.34%) report being severely affected by the security crisis, compared to 22.33% who are affected moderately and weakly by the crisis (Figure 2).

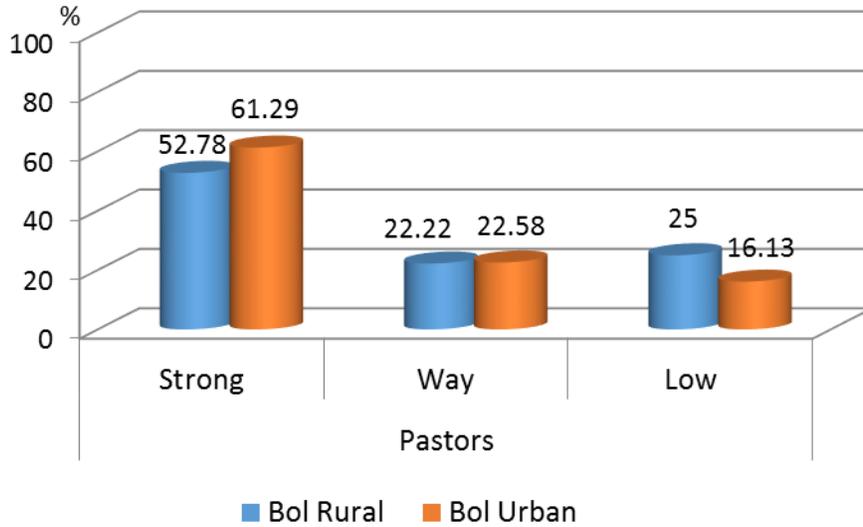


Figure No. 2: Effect of the security crisis on rural and urban pastoralists

Famine, disease, and animal mortality were the serious consequences of this crisis (53.85%). The size of the household and their income negatively influenced the number of meals spent/day/person ($p < 0.001$). The number of meals moved per pastor/day before and after the security crisis is recorded in Figure 3. The security crisis severely affected the number of meals spent per pastor/day ($p < 0.001$). The size and income of the household have a very negative influence on the number of meals earned per day ($p < 0.001$).

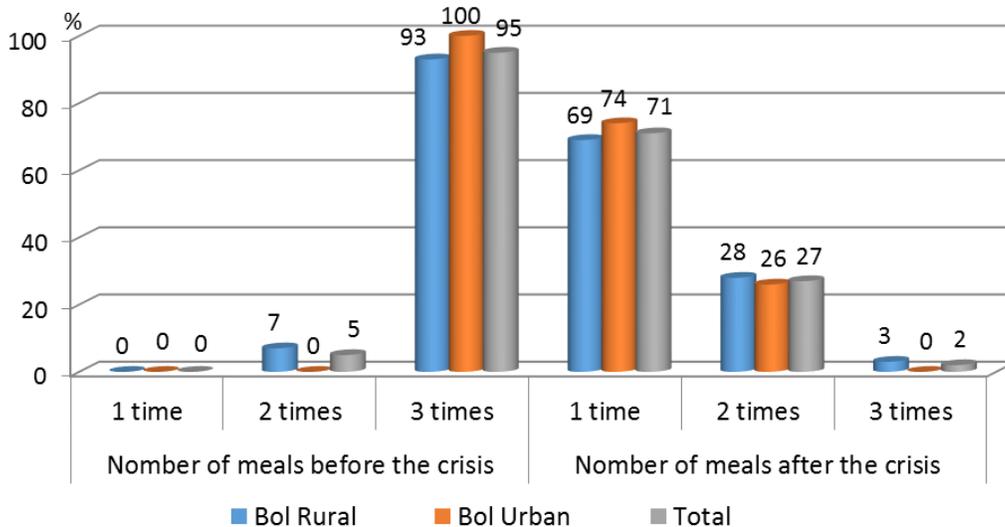


Figure No. 3: The number of meals eaten by a pastor/day before and during the security crisis

All pastors confirmed that the reduction of their income during the crisis. During the crisis, the collapse in the prices of livestock products put 96.10% of pastoralists at a disadvantage. Indeed, respondents (99.10%) said their incomes were better before the crisis. Markets are accessible only for 39.80% of pastors. Of these pastors, 73.2% use new routes and 26.8% of them take risks by using the old transhumance axes. According to 86.4% of respondents, the security crisis has not intensified conflicts between herders and farmers. In contrast, some pastors (23.30%) confirm the existence of these conflicts after the crisis. Farmers who have carried out the rural exodus to improve their income and meet the needs of their household account for 38.83%.

The herds of Mamdi's transhuman pastoralists are made up of cattle, camels, and small ruminants. Young animals (62.50%) are less affected during the crisis compared to adults. The mortality rate of adult animals and females is very high (Figure 4). All pastors confirmed the drop in their production (milk, meat, and calving of females) and the value of their products.

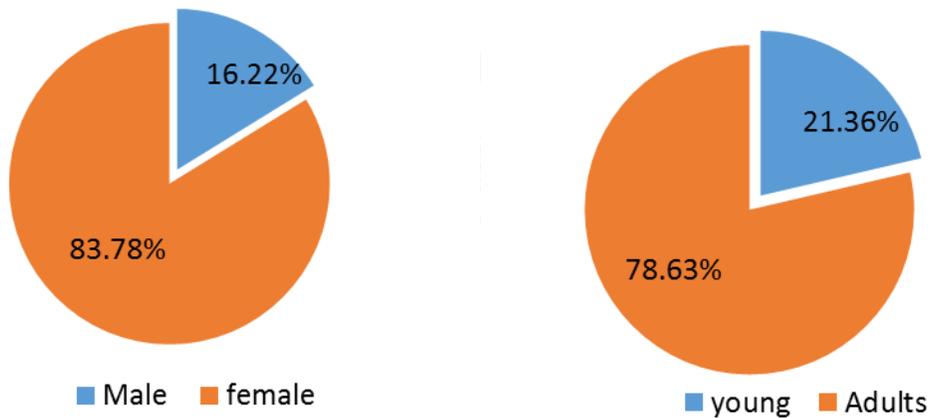


Figure No. 4: Mortality rates by gender and age during the security crisis

Impact of the crisis on pastoral resources

The old transhumance routes have become dangerous and inaccessible because of the security crisis for 74.80% of respondents.

The most used water sources during the security crisis are the Lake Arm (51.72%), followed by wells (21.05%). More than half of respondents say (54%) that water infrastructure is affected during the security crisis, as 46.60% of the water points are in the transhumance route. Water

sources are also negatively impacted by the lack of rain. Animals drink more at the lake arm during the dry season and ponds during the rainy season (Table 1).

Table No. 1: Water sources in the dry season and during the rainy season during the security crisis.

Seasons	Water sources	Percentage (%)
Dry season	Lake arm	58.3
	Well	15.5
	River	10.7
	Mare and wells	4.9
	Mare	4.9
	Mare and river	3.9
	Mare, Wells, and Drilling	1.9
Rainy season	Mare	48.5
	Mare and well	25.2
	Well	11.7
	Mare and river	10.7
	Mare, Wells, and Drilling	1.9
	River	1.0

Natural grazing along the route is inaccessible for 79.6% of the pastoralists surveyed. Only 25.20% of pastoralists confirm that they have access to natural pasture all year round. During the security crisis, there is no food supplementation for livestock due to the unavailability and inaccessibility of livestock feed. However, a party of pastors surveyed (30.1%) confirmed that they had prepared additional food rations for their livestock despite the crisis of its cereals; peanut cake and maize (Table 2).

Table No. 2: Rates of rations used by pastors during the security crisis

	Rations	Percentage (%)
1	Bran of cereals	40.00
2	Bran of cereals + peanut cake	33.33
3	Bran of cereals + Peanut cake + corn	23.33
4	Bran of cereals + Corn	3.33

Resilience Strategies for the Security Crisis

The resilience strategies listed in individual and focus group surveys are no different. Indeed, pastoralists have adopted socio-economic strategies to provide for the family and herd and adaptation measures to preserve their way of life.

The socio-economic resilience strategy adopted by most respondents (97%) is the intensive sale of animals for destocking. Thus, the best-selling animals by pastoralists are adult animals (60.20%) and other pastors (39.80%) sell in addition to adult animals, young people. The best-selling species during the crisis were cattle (84.87%), small ruminants (16.83%), and camels (0.84%). More than 97.10% of pastoralists lamented the decline in the selling prices of animals in the markets. To support the need for their household, transhumant pastoralists adopt other strategies by engaging in secondary activities such as subsistence farming (58.33%) followed by livestock trade (13.88%) income-generating activities (12.50%).

The measures of adaptation during the crisis period in the Lake are mobility followed by agropastoralism and the system of mutual aid (Figure 5). The various mutual aid developed by pastors is support for livestock, food, money, and donations, which account for 49.06% respectively, 46.54%, 3.77%, and 0.63%.

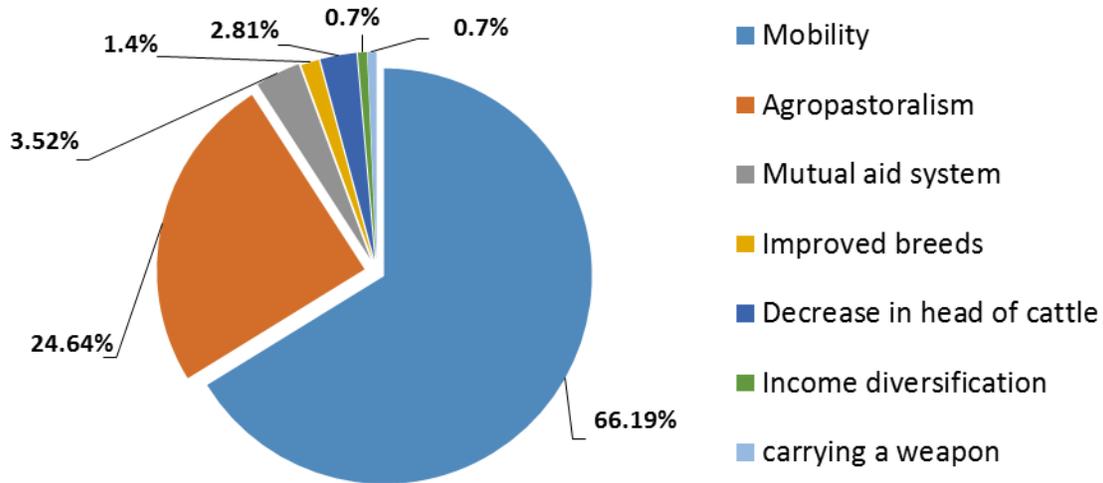


Figure No. 5: Accommodations for Transhumant Pastors to Deal with the Crisis

DISCUSSION

Transhumant pastoralists are polygamous and have a low literacy rate confirmed by the results of the General Population and Habitat Census (RGPH2) analysis. It shows that 99.3% of nomadic household heads and transhumant pastors have no level and 0.7% have a level of education [17]. The average household size, average age and average annual income of pastors are lower than those recorded by Laouali (2014) in Diffa respectively, 11.3 persons, 44 years, 570,821 FCFA. In contrast, 20% of pastoralists in the Diffa region are literate. The secondary activity of transhumant pastoralists is dominated by agriculture [11, 15]. Part of the pastoral care of the pastors and the herd go in transhumance and the second part stays on-site with some elderly people to keep the rest of the cattle and farm. The diversification of activities through agriculture allows pastoralists not only to meet their food needs but also to dispose of crop residues for animals [19]. Many peoples of pastoral tradition can combine pastoralism structurally, or in a complementary and secondary way, with other activities that sometimes occupy a significant place in their cultural organization as well as in their way of life [4]. Agriculture is so often associated with pastoralism that it is difficult to differentiate between different types of agro-pastoralists.

Impacts of the crisis on the transhumant pastoral system

The impact of the security crisis, according to the respondents, is real. Breeders are often the first victims of abuse and pastoral production is greatly disrupted by this insecurity on transhumance routes [16]. This confirms the severity of this crisis on pastoralists by reducing their income and animals by destroying the structure of the herd cattle and their activities.

The income of pastoralists is dependent on the sale of livestock products and live animals that are a food source for their household. Everywhere, pastoralists are victims of the degradation of the terms of trade (cattle/cereals) [7]. The lack of means to meet market prices, in addition to the fear of going there, are therefore factors directly influencing the lack of food and the rural exodus that the affected population is experiencing. Declining livestock productivity and deteriorating terms of trade have a significant and negative impact on the food and nutritional balance of pastoral households [15]. Indeed, the size and income of households have significantly reduced the number of meals during the crisis. Most people are forced to borrow money to get food.

Also, the uncertainties faced by pastoralists are economic, related to market dynamics for the flow of pastoral products [2, 12]. The main sources of food for the inhabitants are markets, through trade and personal production (products of livestock, agriculture, artisanat and fishing). According to ICG (2016), the impact of insecurity on the flow of trade leads to sharp increases in food prices in the most affected markets such as Bol, the capital of the Department of Mamdi. The security crisis limits the movement of people and goods and often causes markets to close. The old axes of transhumances have become a favorite place of bandits, who attack the pastors and seize their animals and their recipe. As a result, revenue streams are declining due to the absence of customers, traffic, and supply difficulties. The situation is compounded by the closure of the Chad-Nigerian border, which prevents traditional live animal trade flows and pushes herders to use longer routes to Nigeria through Niger, resulting in animal losses (adult animals and females are the most affected) and a sharp decline in the purchasing power of herders. Border crossings are also used as a regular adaptation strategy in the face of forage shortages. This closure of borders and the disruption of transhumance flows (e.g., in Diffa, 30% of animals have been affected) and livestock markets have an impact on food security and livelihoods in the

four countries in the Lake Chad basin (Cameroon, Niger, Nigeria and Chad), which are highly integrated and interdependent [6]. With this decline in livestock exports, pastoral households are selling more animals in Chad, leading to lower prices and a sharp drop in income. Livestock prices have halved, forcing herders to sell more animals to support their families [7]. In mamdi Department, the inaccessible to markets, natural resources and veterinary inputs for animal care explain the loss of animal weight, the fall in milk production, abortions, and the high mortality rate. In addition, in conflict-affected areas, livestock is deliberately slaughtered by insurgents or abandoned by herders fleeing violence [6, 11].

The impact of the crisis on pastoral resources is also noticeable. Access routes to pastoral resources have become dangerous and inaccessible. The hydraulic works developed by the Government of Chad (more than thirty pastoral hydraulic projects carried out between 1983 and the present day) on transhumance roads are now inaccessible due to insecurity. Breeders mostly deported to the more westerly routes, use the river arm as their main source of water during the dry season and ponds during the rainy season. IUCN/UNEP (2014) reports that this breeding system has a small freshwater footprint compared to the sedentary breeding system, which competes directly with humans on freshwater resources. Pastoralists who move according to the accessibility of water and pastures to secure their animals prefer new routes with less risk and sometimes poor pasture [12, 14].

Natural pastures are also under pressure from animal concentration and the low rate of supplementation recorded in this study is just the way to maintain the animals. Laouali (2014) reports that in the Diffa region, supplementation is selective in favour of cows in production and rations are made up of crop by-products, cotton cakes, and cereal bran. During this, too "ridiculous" routes are abandoned, in favor of other routes, less known and on which the social relations of transhumant pastoralists with agricultural communities can be less strong sometimes leading to bloody and deadly conflicts between herders on the one hand, and farmers-farmers on the other [7, 11, 14, 15]. In this study, 23.30% of pastoralists confirmed the existence of conflicts between herders-Farmers after the crisis.

Resilience Strategies to the Security Crisis

Pastoral societies appear vulnerable through their exposure to security uncertainties, but they have good resilience and remarkable adaptability [3]. The resilience strategies developed by pastors are based on two requirements. That of ensuring their daily survival and social reproduction in their community on the one hand and on the other hand, to guarantee the sustainability and prosperity of their main means of production.

On the socio-economic level, intensive sale of animals or decapitalization of the herd is adopted by pastoralists [11, 15]. This intensive sale of the family herd is dominated by that of adult cattle followed by small ruminants and camels. These family herds are usually composed of different species consisting of zebu's cattle or camels associating small ruminants [5, 10, 11, 15]. The results are like those reported by Laouali (2014) in the Diffa region. They show that the sale of small ruminants has fallen sharply in the markets in favor of cattle. Small ruminants played an important role in the pastoral system before the crisis. They enable farmers to meet their spontaneous socio-economic needs. On the other hand, these animals constitute a monetary available accessible at any time to replenish the herd of large ruminants after the security crisis. They are hardy and gregarious, use the poorest vegetation and better value areas at risk that can degrade rapidly. Also, young animals less affected by the sale can contribute to the reconstruction of the breeding nucleus of the herd after the crisis.

To reduce livestock sales and support household needs, pastoralists develop subsistence agriculture (58.33%), cattle trade (13.88%), Income Generating Activities (12.50%). The combination of transhumant farming with cereal farming and investment in new areas helps to secure their capital and, on the other hand, minimize the economic risks inherent in reducing the number of cattle herds. Indeed, agricultural activity allows households to have a certain amount of cereal for their self-consumption. However, the self-supply of cereals, although insufficient to meet household food needs, nevertheless contributes to a reduction in the sale of livestock. In doing so, this food risk mitigation strategy contributes to improving the capacity to renew and rebuild livestock [12, 15]. According to Korbéogo (2016), the respective gradients of socio-economic resilience of pastoral societies in rural Gourma are the emergence and development of agro-pastoralism.

A functional and dynamic practice, pastoral mobility remains the most frequent adaptation measure during this security crisis according to the transhumant pastors of the Department of Mamdi, followed by agropastoralism and the system of mutual aid. According to Bonnet *et al.*, 2010, pastoral society in Chad and Niger has adapted to preserve their way of life and their mobility system in the face of increasing constraints.

During recurrent crises, Mobility is recognized by many observers as the first resilience and adaptation strategy for pastoral production in the Sahel [2, 3, 5, 12, 13, 15]. It is a socio-economic and environmental asset for pastoral systems to enable pastoralists to develop socio-land and inter-communal alliances with a well-defined social structure, to be a factor in the adjustment and sustainable management of natural resources while maintaining optimal livestock productivity and to avoid its collapse. Veron (2013) and Bonnet (2013) claim that the growing insecurity in recent years in the Sahel makes mobility increasingly complex, which is accompanied by a very difficult social isolation for the families of pastors and thus compromises the pastoral economy. For example, highly mobile WoDaaBe herders had an average of 44 cattle per family two years after the drought, compared to only 2 to 7 cattle per family for less mobile groups [5].

Analyses collected from pastoralists in Chad and Niger by some authors, underline in a very concrete way how the rehabilitation of pastoral infrastructures essential to mobility (pastoral water points, an extension of temporary wells and ponds, marking of transhumance corridors) contribute to social cohesion and sustainable management of natural resources by securing pastoral mobility [3]. There is a positive correlation between livestock mobility and productivity [13]. Beyond the direct benefits of pastoral mobility, pastoral systems remain more efficient in milk, meat, and drought-resistant production compared to sedentary production systems [8]. Ced *et al.* (2013) confirm that successful mobile livestock production not only supports the livelihoods of millions of rural producers but also provides income to a growing urban population and generates very large international trade boosted by an explosion in demand for meat and dairy products. Pastoral production has begun to gain the trust and esteem not only of the scientific community but also of politics and developers [15]. In addition to mobility and agropastoralism, Mamdi's pastors have adopted the self-help system through support for

livestock and food. The most applied mutual aid by pastoralists in the Diffa region is the loan of lactation females [15].

CONCLUSION

As economic activity and way of life, transhumant pastoral farming plays an essential role in the socio-economic life of herders, their household, and their community in general. It is a source of food security, income but also savings for the household. The results of the surveys confirmed the fragility of the transhumant pastoral system to the security crisis. Pastoral resources are little affected by this crisis. According to this study, transhumant pastoralists and their livestock are most affected by market disruption due to reduced mobility of men, livestock, and merchandise. However, these pastors have a good perception of the security crisis and have been able to develop social, technical, and financial coping strategies (new transhumance routes, intensive sale of animals, agriculture, mobility, diversification of activities, self-help system) to deal with this crisis. Despite these different strategies developed, Mamdi's transhumant pastors are still vulnerable, if security is not established in this Sahelian area. Also, securing transhumance routes, markets, and accessibility of natural pastures and water resources, as well as literacy and the creation of a framework for consultation, are all assets to strengthen the effective resilience of transhumant pastoral households. The sustainable development of the transhumant pastoral system will be more effective where its security is guaranteed and the adaptability of pastoralists is sustained(resilience).

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	<p><i>Dr. Djalal Ardjoun Khalil – Corresponding Author</i> <i>Department of Breeding Sciences and Techniques, Higher National Institute of Sciences and Techniques of Abeche (INSTA). Abeche, CHAD</i></p>
	<p><i>Sing-yabe Sahoulba</i> <i>Division of Development of Animal Production and Sectors, Ministry of Livestock and Animal Productions. N'Djamena, CHAD</i></p>
	<p><i>Mahamat Ibrahim Souleymane</i> <i>Department of Animal Productions, Moussoro National Higher Institute of Livestock (INSEM). N'Djamena, CHAD</i></p>
	<p><i>Prof. Issa Youssouf</i> <i>Department of Breeding Sciences and Techniques, Higher National Institute of Sciences and Techniques of Abeche (INSTA). Abeche, CHAD</i></p>