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Adaptation Strategies and the Resilience of Internally Displaced Persons to Climate-Related Conflicts in the Sikasso Region of Mali in 2025

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Abstract **Original Research Article**

Conflict-related displacement and climate change have contributed to increasing vulnerability factors in recent years. This cross-sectional study aimed to determine the resilience of internally displaced persons (IDPs) to conflict-related displacement associated with climate change in the Sikasso region. Conducted from January 1 to April 30, 2025, our study involved 70 people aged 40 and over who provided their free and informed consent. The study population included internally displaced persons (IDPs) in the Bougoula hamlet and Sirakoro neighborhoods. Data were collected using a questionnaire, which was entered and analyzed using Epi Info, SPSS 25, and Excel software. The adaptation strategies of internally displaced populations were dominated by market gardening activities (56.88%). The highest proportion of internally displaced persons (IDPs) was highly vulnerable at 64.29%, followed by vulnerable at 28.57%, and fairly vulnerable at 7.14%. Climate change exacerbates crises and disasters, with its attendant conflicts and forced displacement of populations, thus increasing their vulnerability. Based on our findings, internally displaced persons (IDPs) are highly vulnerable to the effects of forced displacement caused by conflicts and climate change.

Keywords: Resilience, adaptation strategies, climate change, population displacement, Sikasso.

1. INTRODUCTION

Over the past decade, around the world, and particularly in Mali, conflict-related displacement sensitive to extreme weather and climate change, such as droughts, floods, and severe temperature variations, has contributed to accentuating vulnerabilities such as poverty, loss of livelihoods, and forced migration [1].

Internal displacement of populations exerts significant socio-economic pressure at the local level, both in places of origin and in places of refuge [2]. Estimates state that 3.6 billion hectares worldwide are affected by the effects of climate change and conflict. Between 2000 and 2008, the lack of water and the advance of the desert affected eighty-three (83) million people in the world[3]. During the same period, 99 million people were reportedly forced to migrate due to floods, and 39 million due to tropical cyclones or storms[3]. Although industrialized countries are more responsible for global warming, developing countries in Africa are the most affected by the adverse effects of climate events [4]. The management of resources, already scarce due to the effects of climate extremes, is causing conflicts that are leading to forced displacement of populations in extremely vulnerable conditions.

The extreme precariousness of these internally displaced people, combined with the destruction of the social fabric, as well as the lack of assistance for sustainable solutions to develop their resilience, is a major problem.

Problems with access to natural resources for internally displaced persons and the lack of livelihoods, and the erosion of the social fabric are sources of vulnerability. These vulnerable groups continue to suffer the adverse effects of extreme weather events in their displacement situations [5]. Displaced communities adopt negative coping mechanisms including selling household items, eating food that is not suitable for their eating habits, borrowing from friends, selling livestock,

and reducing the number of meals. This situation is attributed to high levels of poverty in households, low household purchasing power, and a lack of food aid. For these migratory phenomena, the causes are mostly of anthropogenic or natural origin [6]. Thus, in June 2013, the number of internally displaced people in Mali reached 353,455, its record level [7].Climate impacts on wars and the effect of these conflicts on displacement are highly correlated phenomena[7].

According to the International Organization for Migration (IOM), some host families, despite the rather modest living conditions, welcome the displaced in the name of solidarity. Early and forced marriages are the most recorded cases of gender-based violence (GBV) among the internally displaced population. Some girls are given in marriage as young as 14 years old. The real impacts of extreme events on populations are mainly recorded in the context of access to drinking water, health, education, culture, the economy, development, and food security[1]. Additionally, there is a lack of civil documents for the children [7].

In Sikasso region, populations displaced by conflict and the adverse effects of climate change are mobile between localities in search of opportunities for their livelihoods [8]. As the IDPs are not in a camp for displaced people in Sikasso, they are with host families and others are even renting on their own behalf. In a context of limited resources and increasing needs, our study will focus on the adaptation strategies and the resilience of internally displaced persons in the face of climate-related conflicts in Sikasso region.

The combination of climate change, conflict, and displacement is complex.[9]. Our study aims to provide data on the coping strategies of internally displaced persons in the context of their resilience. This work will help strengthen the Scientific Directory on Resilience to Conflict-Induced Displacement and Climate Change.

2. METHODOLOGY

2.1. Scope of the study

The Sikasso region is in the south of the national territory. It is composed of eight [8] health districts, 4 of which are functional, namely Kadiolo, Nièna, Kignan and Sikasso, and 4 non-functional: Dandérésso, Kléla, Lobougoula and Loulouni.

It is bordered to the north by the regions of Koutiala and Dioïla, to the south by the Republic of Côte d'Ivoire, to the west by Bougouni region and to the east by Burkina Faso.

The region occupies the wetland and sub-humid zone between hysothetes 750 mm in the north and 1150 mm in the south. Its climate is humid with 27°C and annual rainfall varies between 700 and 1200 mm in a normal year.

The region has great agro-sylvo-pastoral potential; it is a major crossroads and a cross-border exchange centre. Also, since the years of great drought (1970 – 1973) and crises related to the security situation, Sikasso has attracted many displaced populations who are among others Dogon, Fulani, Bambara from other regions such as Mopti and Ségou. The main ethnic groups in the region are: Senufo; Minianka, Bambara, Fulani and Bobo.

The city of Sikasso has 18 districts and 28 attached villages. If the district of Bougoula is located in the east of the city of Sikasso, Sirakoro occupies the northern part of the city. The two neighbourhoods are home to the majority of internally displaced people in Sikasso.

Located respectively 6 km and 3 km from the city of Sikasso, the districts of Bougoula hamlet and Sirakoro are more favoured by IDPs because of their location on the outskirts of the city where unfinished houses are easily accessible. Often rented, in temporary makeshift shelters, in houses donated by individuals, or with host families, the internally displaced people of Sikasso are quite mobile between the neighbourhoods under construction. The maps below indicate the setting of the study.

2.2. Type and period of study

This was a cross-sectional study that aimed to determine the adaptation strategies of internally displaced populations in Sikasso region in the context of their resilience. The study took place from January 1 to April 30, 2025, a period of about 4 months. Data collection was carried out in 20 days in the period from 1 to 20 February 2025.

2.3. Study population

Our study mainly targeted people aged 40 and over among the internally displaced persons of the Bougoula hamlet and Sirakoro districts of the commune of Sikasso, the staff of the administration, technical structures and NGOs involved in disaster risk management.

2.3. Sampling

We administered individual questionnaires to our targets. This approach consisted of investigating at least two people per technical service involved in disaster and climate management. Some community leaders as well as leaders of internally displaced persons were also surveyed. The choice of these people was reasoned according to their experiences and their involvement in disaster risk management. Internally displaced leaders are the direct guarantors to the structures involved in assisting the displaced. Some IDPs were surveyed outside of the leaders and their choice was random. For the technical structures, we left it to the hierarchy of each department to suggest the people to be investigated. In total, we surveyed 70 people.

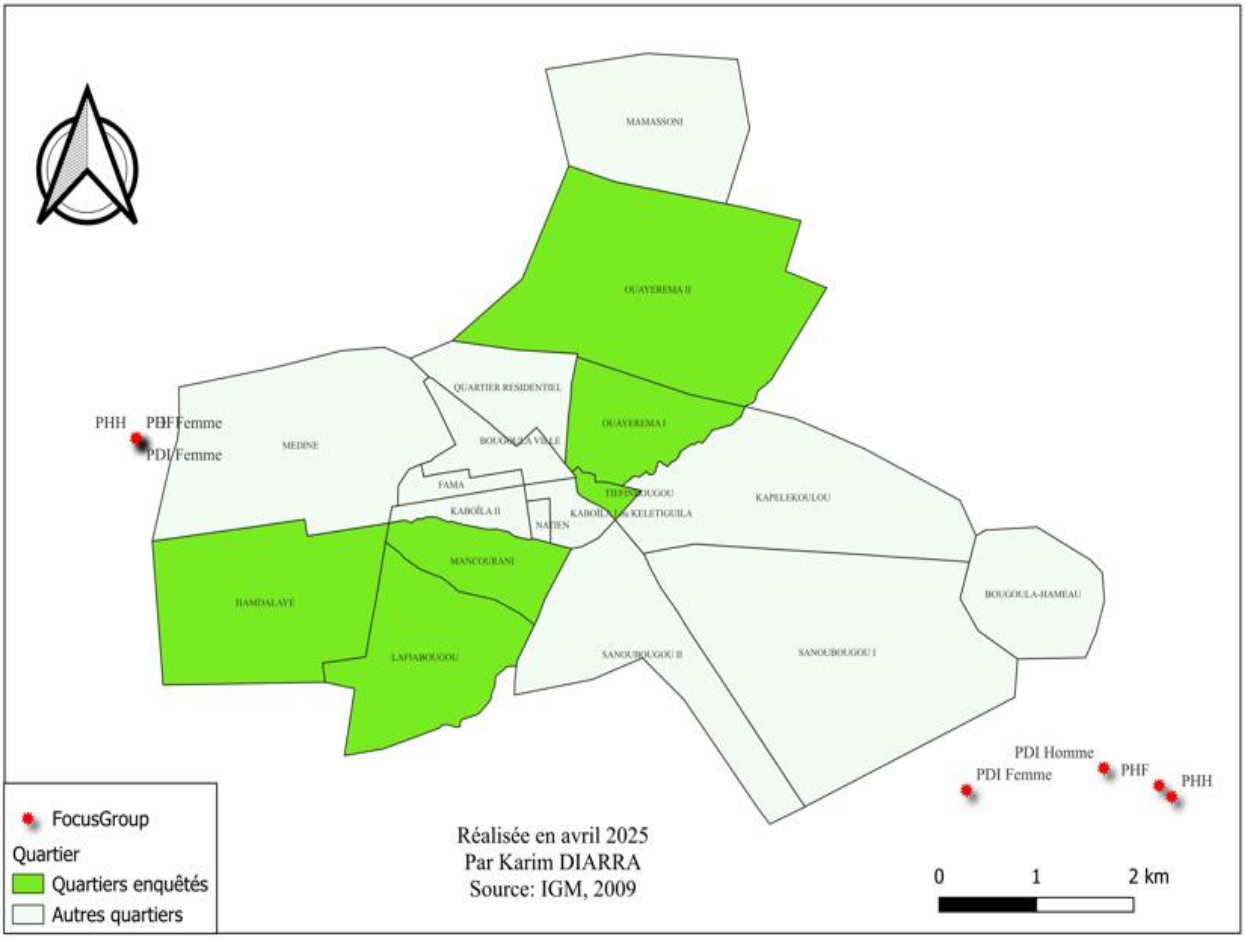

Figure 1: Location of IDPs

2.4. Sampling technique and collection tools

The sampling was stratified by level, where we chose the Sikasso region in a reasoned way, then the city of Sikasso and two districts of the city among others because of the large number of displaced people and their ease of access compared to other localities in the region. After the document review, we conducted individual interviews using questionnaires, telephones, notepads, and pens.

We were inspired by FAO's RIMA (Resilience Index Measurement and Analysis) approach for resilience assessment. It is an innovative quantitative approach that helps explain why and how some households are more resilient than others to shocks and stressors[10]. Qualitative assessment is based on a descriptive approach to information and knowledge and its structuring into qualitative classes such as "very vulnerable", "vulnerable", "fairly weak", "not vulnerable" through the participation of stakeholders in individual interviews. The RIMA approach takes into account criteria related to: access to basic services, assets (sources of income), safety nets, adaptive capacity and food security. Each of these criteria is scored out of 1 point and the sum of the whole makes 5 points which corresponds to resilience or lack of vulnerability.

2.5. DATA COLLECTION METHOD

After contacting the various heads of technical services and organizations involved in disaster risk management and climate change, as well as displaced leaders and a document review, we proceeded to collect data. The adaptation strategies of internally displaced persons were collected from internally displaced persons in the city of Sikasso in two neighbourhoods as well as from the administrative staff of structures involved in disaster risk management, respectively Bougoula hamlet and Sirakoro in the commune of Sikasso. For the technical services, the following structures were concerned: Civil Protection, Social Development, City Hall, Environment, Water and Forests, Mali Red Cross, Unicef, Helvetas, Regional Directorate of Health, Agriculture, Teaching Academy, Rural Engineering.

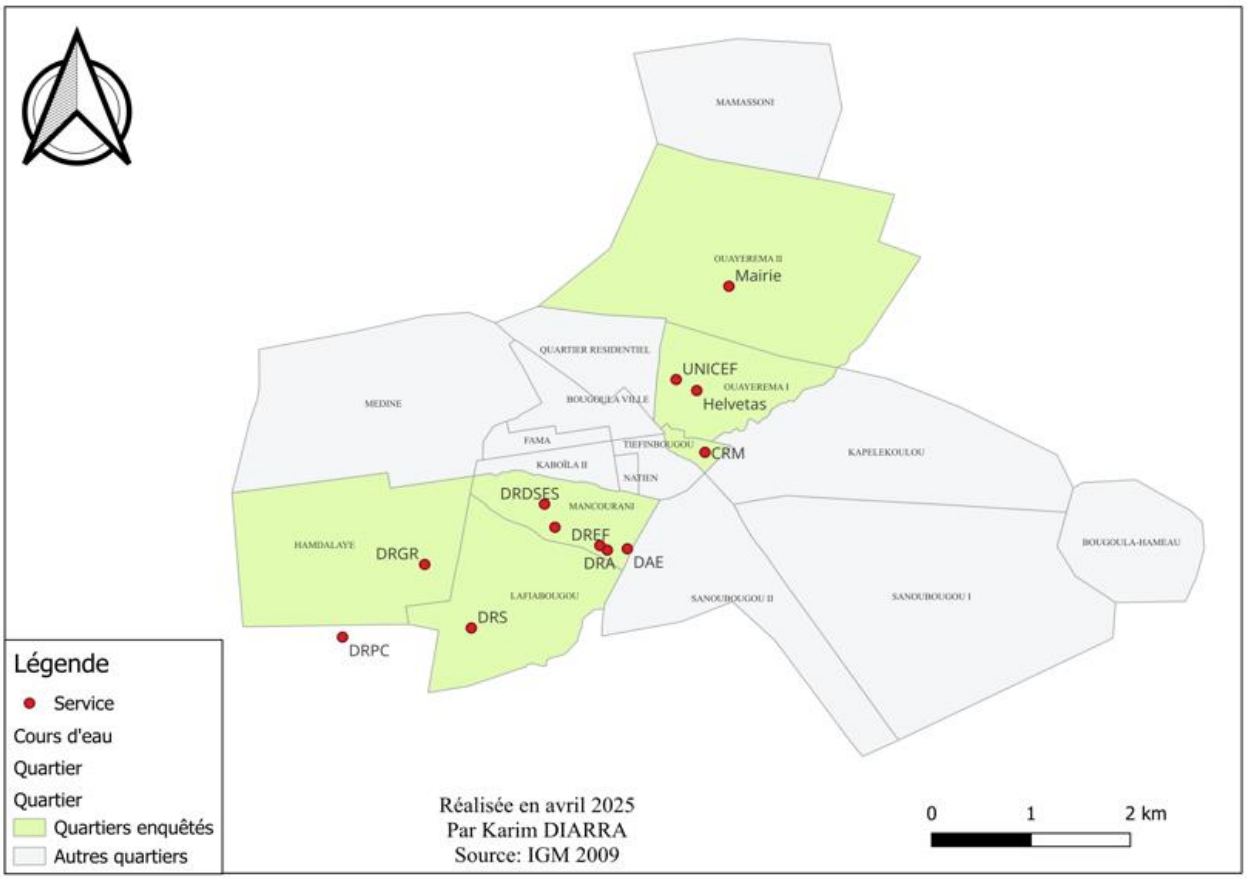

Figure 2: Target structures

2.6. Data Capture and Analysis Method

Data entry was done on the EPI info software. Data obtained during the collection phase from our targets were analyzed on SPSS 25 software, Excel and Epi info.

2.7. Ethical considerations

Our study protocol has been submitted for approval by the team of the Department of Studies, Research and Specialty in Public Health of the Faculty of Medicine and Odontostomatology. Informed consent was requested and accepted, confidentiality and anonymity were guaranteed, as well as data protection and security.

3. RESULTS

The 40-45 age group was the most represented with 32.89%, the mean age was 50.9 with a standard deviation of 6.63.

The male sex dominated our sample with 72.86% against a male/female ratio of 2.68. The married status is 97.14% against 2.86 divorced.

For professional experience, the 10 to 20 age group was the most represented with 47.1% and the highest experience was 46 years represented with 1.47%.

The adaptation strategies of internally displaced populations are dominated by market gardening activities with 56.88%. The off-season practice is the most represented with 20.89% in the host population.

The most represented very vulnerable level of internally displaced persons was 64.29%, followed by vulnerable with 28.57, and then the somewhat vulnerable with 7.14%. The less vulnerable level and the not vulnerable level were not shown. This reveals the higher level of vulnerability.

Food assistance was the most represented at 35.59%, followed by non-food at 32.20%, followed by cash transfer with 15.25%, then accommodation with 12.99% and support for IGAs and social integration with 3.95%.

The inadequacy of aid was the most represented with 44.28%, followed by the development of income-generating activities with 17.14%. 45.71% of respondents say that there is a positive impact of the assistance provided to IDPs on their resilience.

For the host population, the level of well-being most represented was fair at 65.71%. Internally displaced persons have a poor level of well-being at 61.43%.

55.71% are satisfied with the assistance provided by the government and its partners. This same level of satisfaction represents 21.43% of the assistance by the host population. The level of low satisfaction represented 40.00% for the assistance provided by the communities, but no representation for the same level of low satisfaction with the assistance provided by the state and its partners.

Table 1: Socio-demographic characteristics (age, sex, marital status, year of work experience).

Socio-demographic characteristics	Actual	Percentage
Age in age group		
40 to 45 years old	23	**32,89**
45 to 50 years old	16	22,85
50 to 55 years old	11	15,71
55 to 60 years old	13	18,57
60 to 65 years old	4	5,71
65 to 70 years old	2	2,85
70 and over	1	1,42
Total	70	100
Sex		
Feminine	19	27,14
Male	51	**72,86**
Total	70	100,00
Marital Status		
Divorced/widowed	2	2,86
Married	68	97,14
Total	70	100,00
Year of professional experience in the age group		
Under 10 years old	5	7,10
10 to 20 years	33	**47,20**
20 to 30 years	15	21,40
30 to 40 years	14	20,00
Abstention	2	2,90
More than 40 years	1	1,40
Total	70	100,00

Table 2: Adaptation strategies of IDPs and host populations

IDP Adaptation Strategies	Actual	Percentage
Reduction in the number of meals per day	4	3,67
Begging	5	4,59
Developing IGAs	5	4,59
Small Businesses	5	4,59
Ecosystem conservation	5	4,59
Dependence on aid	11	10,09
Small livestock	12	11,01
Labour/market gardening activities	62	56,88
Total	109	100,00

Table 3: Vulnerability score

Vulnerability score/level	Actual	Percentage
Not vulnerable	0	0
Less vulnerable	0	0
Somewhat vulnerable	5	7,14
Vulnerable	20	28,57
Highly vulnerable	45	**64,29**
Total	70	100

Not Vulnerable = 0, Less Vulnerable = 1, Somewhat Vulnerable = 3, Vulnerable = 4, Very Vulnerable = 5.

Table 4: Impacts of assistance on the resilience of displaced persons

Impacts	Actual	Percentage
No reviews	1	1,42
Well integrated socially	2	2,85
Current conditions better than at the beginning, flourishing	4	5,71
Solarization of children	4	5,71
Aid does not take into account the real needs of IDPs	4	5,71
Suffering relieved, giving hope	5	7,14
Aid for socio-economic reintegration	7	10,00
Development of IGAs	12	17,14
Insufficient aid	**31**	**44,28**
Total	70	100,000

Table 5: Perception of the impact of assistance on resilience

Resilience	Actual	Percentage
Yes	32	**45,71**
No	37	52,86
No reviews	1	1,43
Total	70	100,00

Table 6: Level of well-being

Standard of living	Actual	Percentage
Very bad	7	10,00
Bad	43	**61,43**
No reviews	1	1,43
Very good	0	0,00
Good	2	2,86
Passable	17	24,29
Total	70	100,00

Table 7: Satisfaction with attendance

Satisfaction with assistance	State and partners		Host community	
	Number n=70	Percentage	Number n=70	Percentage
2= Not very satisfied	0	0,00	28	**40,00**
1= Not Satisfied	3	4,29	2	2,86
3= Somewhat satisfied	12	17,14	25	35,71
5= Very satisfied	16	22,86	0,00	0,00
4= Satisfied	39	55,71	15	21,43
Total	70	100,00	70	100,00

4. DISCUSSION

Socio-demographic characteristics

In our study, men were the most represented with 76% and women with 24%. Our results are comparable to those of Lassana Touré et al, who find 90% of men compared to 10% of women [11]. The age group of 40 to 45 years was the most represented with 32.85%, the average age was 50.9 years, with a standard deviation of 6,69%. The gender gap in representation is explained by the fact that men are more representative in the administration than women. The married status was 91.14%, due to the advanced age of the respondents where the minimum age was 40 years. This could be linked to the need to have experience on the evolution of climate phenomena over a period of at least 30 years. Lassana Touré et al. in Mali found that 64% of their respondents were married, 4% widowed[11].

Resilience

As the displaced are deprived of all their means of subsistence, they are plunged into vulnerability, as this lady says: "*Having hosted the IDPs, I know all the difficulties and suffering endured by the host population in the accommodation and the pain of the displaced people*".

In our study, the vulnerable of internally displaced persons is more represented by the very vulnerable level with 64.29%, followed by vulnerable with 28.57, and then the somewhat vulnerable with 7.14%. The less vulnerable level and the not vulnerable level were not shown. This denotes the higher level of vulnerability. In a study by Diawara in Mali, communities with strong human capital are generally more resilient to crises, including those caused by climate change. Education and training enable people to

adapt to new climate conditions and adopt sustainable practices[12].

The level of poor well-being was 61.43%, which is explained by the fact that the displaced are weakened by their situation of forced displacement.

AUDIENCE

In our study, satisfaction with the assistance provided to IDPs by the government and its partners is dominated by the good level with a 5 score of 55.71%. For those brought to IDPs by the host community, the low-satisfaction level was the most represented with 40.00%.

For management, state actors were the most involved in our study with 26.61%, followed by humanitarians with 24.77% and the community with 119.72%. This is explained by the fact that the State is primarily responsible for the populations during a crisis or disaster.

According to our series, food was the most represented in the types of assistance with 25.85%, followed by cash transfers and support for income-generating activities.45.71% of respondents say that there is a positive impact of the assistance provided to IDPs on their resilience.

In our study, 55.71% are satisfied with the assistance provided by the state and its partners. This same level of satisfaction represents 21.43% of the assistance by the host population. The level of low satisfaction represented 40.00% for the assistance provided by the communities, but no representation for the same level of low satisfaction with the assistance provided by the state and its partners.

COPING STRATEGIES

Adaptation is a process of managing climate-related risks that puts into practice individual and collective measures for prevention, response and recovery[13]. According to our results, the most represented adaptation strategies were manual and market gardening activities with 55.05%. The Fonakeukeu case study in Cameroon finds the following practices according to the responses as adaptation strategies: research or adoption of short-cycle crops (81%), early sowing (41%), late sowing (13%), multiple sowing (97%), dry sowing (6%), reduction of the area planted (17%), use of chemical fertilisers or fertilisers (61%), abandonment of certain speculations 16%), introduction of new speculations (23%), intercropping system (15%), modification of the agricultural calendar (87%), change in cultivation technique (54%), use of fertilizers (10%), off-season (66%), increase in cultivated areas (29%), production of organic manure (96%). Most people tend to think that they will have to migrate to a big city and change the way they farm in light of the changes taking place in their environment[14].

5. CONCLUSION

The Region of Sikasso continues to be a preferred area for displaced people from the North and Centre following the multidimensional crisis that Mali has been experiencing since 2012.

This study is a contribution to the knowledge of the resilience of internally displaced persons to forced displacement caused by climate change and conflict, as well as adaptation strategies in response to the effects caused by them. The study reveals a high level of vulnerability of internally displaced people.

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