Stability Index – Liptako Gourma
REGIONAL REPORT | Round 1 | Nov. – Dec. 2021

April 2022

INTRODUCTION

The instability in the Liptako Gourma region of the Central Sahel has triggered significant displacement in communities in the three bordering countries: Burkina Faso, Mali, and Niger. This complex crisis is fueled by multiple interrelated risk factors, including growing competition over scarce resources, climate change, poverty, lack of livelihood opportunities, communal tensions, political volatility, demographic pressures, and violence related to organized crime and Non-State Armed Groups. It has led to the death of an estimated 5,000 people in 2021 and has triggered the displacement of more than 2 million individuals throughout the affected countries. However, even as humanitarian and development needs continue to escalate, there is evidence that some displaced persons are returning to their areas of origin or habitual residence, while others face prolonged displacement, including individuals displaced in Northern Mali that left their areas of origin more than a decade ago due to a separate, overlapping political crisis beginning in 2012.

In order to find durable solutions for internal displacement — whether through return to communities of origin, local integration, or relocation — and to prevent new displacements in the region, it is critical to understand the relative levels of stability in locations hosting returnees or displaced populations. Therefore, IOM has launched the Stability Index (SI) to evaluate and seek to understand which factors influence a location's stability, which can inform priority programmatic interventions along the humanitarian, peace and development nexus in order to strengthen the resilience and stability and prevent future forced displacements. This report presents the results of Stability Index assessments in Niger and Mali conducted in November and December 2021.

1. METHODOLOGY

The **Stability Index** combines 35 key indicators of stability to calculate a single Stability Score for each surveyed locality. These indicators relate to three key themes crucial to stability: **safety and security, livelihoods and basic services, and social cohesion.** Indicators for each of these themes are grouped to create sub-indexes to facilitate the comparison of localities by theme. (See *Appendix* for further information on the indicators included in this analysis.)

These indicators, taken in aggregate, highlight areas that are conducive to durable solutions for internal displacement, as well as unstable areas that may require humanitarian intervention. Three "anchor questions" about the perception of stability in the community (feeling of stability, future intentions of the community, trends of the situation) are used to validate the relationship between the Stability Score and community sentiment. (See *Appendix* for further information about how anchor questions are used for index validation.)

The Stability Index uses Principal Component Analysis to assess the impact of each indicator on the variability in the data. (see *Appendix for further information on Stability Index calculations*). The Stability Index and sub-indexes index range from 0 (poor conditions for stability) to 100 (good conditions for stability).

Figure 1. Average scores in Mali and Niger

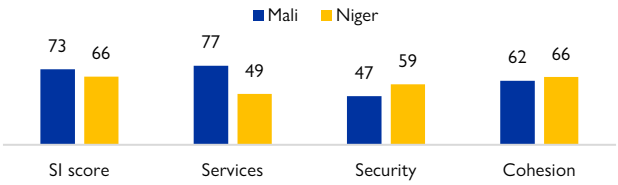


Table 1. Liptako Gourma Displacement figures as of January 2022

2,105,336 IDPs

189,871 Refugees

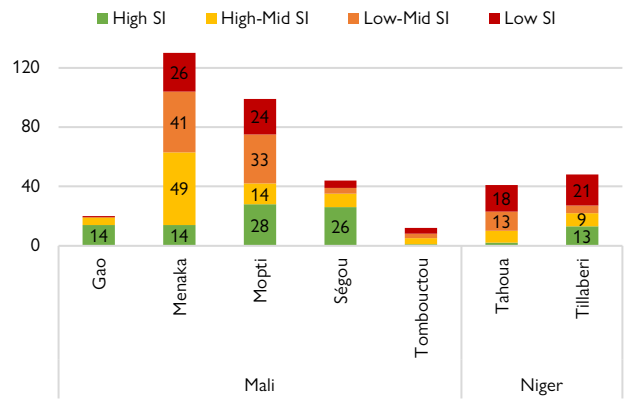
1.1 Data collection overview

The Stability Index includes data collected through key informant interviews at the locality level in **394 displacement affected locations** in Mali (Gao, Menaka, Mopti, Ségou, and Tombouctou) and Niger (Tahoua and Tillaberi). Key informants, including mayors, community leaders, and aid workers were interviewed in each location by enumerators in November – December 2021.

The key informant method has the advantage of rapidly collecting information about a large number of localities. Multiple key informants were interviewed in each locality, allowing IOM to cross-validate information. However, the main limitation of this data collection methodology lies in the fact that only a few informants report on the views of an entire community.

A total of 350 localities in Mali were surveyed in Gao, Menaka, Mopti, Ségou, and Tombouctou. In Niger, a total of 98 localities were surveyed in Tahoua and Tillaberi. Locations for data collection were selected through a mapping exercise to identify areas where IDPs and returnees are located. (See *Appendix* for further information on the locality selection process.)

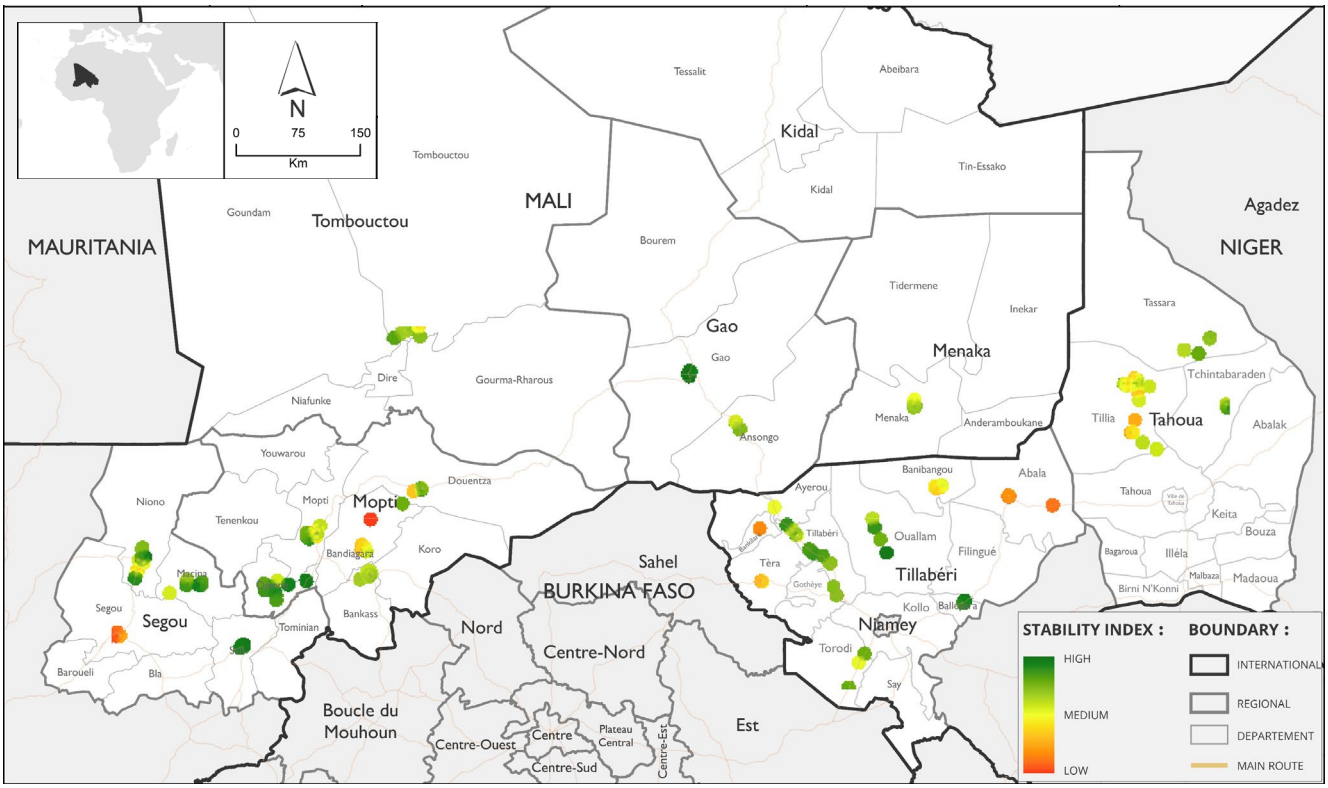
Figure 2. Number of localities surveyed per region



**High, high-mid, low-mid, and low categories refer to SI score quartile*

2. STABILITY SCORES OVERVIEW

Map 1. Stability scores of localities assessed in Liptako Gourma region



This map is for illustration purposes only. The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by IOM.

2.1 Stability Scores by Country and Region

Localities assessed in Niger had lower average Stability Scores (66) compared with those assessed in Mali (73). On average, Service Scores were much higher in Mali (77) than in Niger (49), but Security and Cohesion Scores were slightly higher in Niger.

In Mali, Gao (86) and Segou (80) were the regions with the highest average Stability Scores, while Tombouctou had the lowest (69). While Tomboctou had the lowest Services and Cohesion scores in the assessed regions of Mali, Menaka and Mopti had the lowest average Security Score.

In Niger, Tahoua and Tillaberi had similar average Stability Scores. However, the Services Sub-Index indicates that the localities assessed in Niger have comparatively lower access to services, particularly in Tahoua, with an average Services Score of just 37, significantly lower than the regional average of 71.

Table 2. SI and sub-index scores by country and region
Scores range between 1 and 100

	SI score	Services	Security	Cohesion
Mali	**73**	**77**	**47**	**62**
Gao	86	83	76	57
Menaka	71	77	34	75
Mopti	71	74	48	53
Segou	80	83	69	52
Tombouctou	68	62	59	48
Niger	**66**	**49**	**59**	**66**
Tahoua	65	37	63	68
Tillaberi	67	60	55	63
Regional Avg.	**72**	**71**	**50**	**63**

2.2. Comparative analysis of localities with highest and lowest SI scores

This table shows the stability score, three sub-index scores, stability "anchor questions", and top seven most influential variables. (The selection of most influential variables is explained in Section 4). As expected, the anchor questions, particularly the Feeling of Stability and Feeling of Community are closely related to the Stability Index Scores – all of the highest scoring localities also reported feeling safe and stable, while almost of the lowest scoring localities reported feeling unsafe and unstable.

Many of the key influential variables also have a strong association with the perception of stability, as they exhibit low scores in low-stability localities and high-scores in high stability localities. These indicators include the Freedom of Movement, Primary Schools, Market Situation, and Daily Public Life. Conversely, the Public Sector indicator appears relatively evenly distributed among high and low SI localities.

Table 3. Comparison of localities with highest and lowest SI scores in the region

				10		1	100			1	10 (Best)						1 (Worst)
				Anchor			Scores				Key Indicators						
	Country	Region	Locality	Feeling of Stability	Feeling of Community	Feeling about Situation	SI Score	Security Score	Services Score	Cohesion Score	Worried Security	NSAG Present	Freedom Movement	Primary Schools	Market Situation	Public Sector	Daily Public Life
Localities with the Highest SI Scores	Mali	Gao	Gadeye	10	10	10	99	99	96	100	10	10	10	10	10	7	10
	Mali	Ségou	Niono socoura	10	10	1	98	95	100	98	10	10	10	10	10	10	10
	Mali	Gao	Gao-farandjireye (3eme)	10	10	10	96	99	89	93	10	10	10	10	10	7	10
	Mali	Gao	Djoulabougou (5eme)	10	10	10	96	95	91	100	6	10	10	10	10	7	10
	Mali	Ségou	Yaniwere	10	10	1	95	98	79	96	10	10	10	10	10	10	10
	Mali	Mopti	Sofara	10	10	10	94	64	85	92	10	10	10	10	10	10	10
	Mali	Ségou	Niono socoura	10	10	1	94	97	93	89	10	10	10	10	10	10	10
	Niger	Tillaberi	Kabefo	10	1	10	94	81	92	95	10	10	10	10	10	6	10
	Mali	Gao	Djidara	10	10	10	94	82	86	89	10	1	10	10	10	7	10
	Niger	Tillaberi	Makalondi	10	10	1	93	75	91	98	10	10	10	10	10	10	10
	Mali	Ségou	Farakolo	10	10	1	93	94	85	89	10	1	10	10	10	10	10
	Niger	Tahoua	Tchintabaraden	10	10	10	93	100	70	98	10	10	10	10	10	1	10
	Mali	Gao	Plateau	10	10	10	93	95	83	87	10	10	10	10	10	10	10
	Mali	Gao	Sanaye (6eme)	10	10	10	92	99	79	88	10	10	10	10	10	7	10
	Mali	Ségou	Handallaye	10	10	1	92	90	91	94	6	10	10	10	10	10	10
Localities with the Lowest SI Scores	Niger	Tillaberi	Bankilaré	1	1	1	43	36	42	47	1	1	1	3	6	10	1
	Mali	Tombouctou	Edjerer	10	10	1	41	66	2	64	10	1	4	1	1	1	6
	Niger	Tillaberi	Kabefo	1	1	10	40	37	31	40	1	1	1	8	6	10	1
	Mali	Mopti	Soumane	1	1	1	40	20	50	10	1	1	1	10	1	7	1
	Niger	Tillaberi	Ezza	1	1	1	39	28	49	44	1	1	1	8	10	10	1
	Niger	Tillaberi	Miel Hamani	1	1	1	39	34	42	34	1	1	1	3	10	10	1
	Mali	Mopti	Mahamba	1	1	1	39	42	31	7	1	1	1	3	6	4	1
	Niger	Tahoua	Taksanainas	1	1	1	39	29	43	26	1	1	4	10	6	10	1
	Niger	Tillaberi	Gaoudel	1	1	1	38	8	32	57	1	1	4	8	6	10	1
	Niger	Tillaberi	Koutougou	1	1	1	38	20	32	88	1	1	1	10	1	9	1
	Niger	Tillaberi	Tera	1	1	1	36	26	28	36	1	1	1	3	6	10	1
	Mali	Ségou	Bouagui-Wéré	1	1	1	35	43	22	17	1	1	1	3	1	4	1
	Mali	Mopti	Toti	1	10	10	33	68	1	43	10	10	10	6	1	1	1
	Mali	Ségou	Dongoli	1	1	1	32	1	22	21	1	1	1	3	1	4	1
	Niger	Tillaberi	Ayorou	1	1	1	24	1	7	14	1	1	1	8	1	10	1

3. CLUSTER ANALYSIS

3.1 Cluster Generation

Grouping similar localities into clusters can help to uncover the distinctive profiles of geographic regions in order to facilitate targeted programming. This analysis uses machine learning to group similar localities into clusters in order to draw out underlying patterns about the conditions in those areas. (See *Appendix* for details on cluster generation.) High stability clusters can help to pinpoint "pockets of stability" at a level slightly less granular than the individual locality to facilitate feasible programmatic interventions. The map below visualizes assessed localities in the regions in Mali and Niger located in the Liptako Gourma as divided into six clusters. Each colour represents a cluster of localities with similar sets of responses to the Stability Index survey. The accompanying table provides a breakdown of the average Stability Index and sub-index scores for each of these clusters.

Map 2. Clusters of localities with similar characteristics

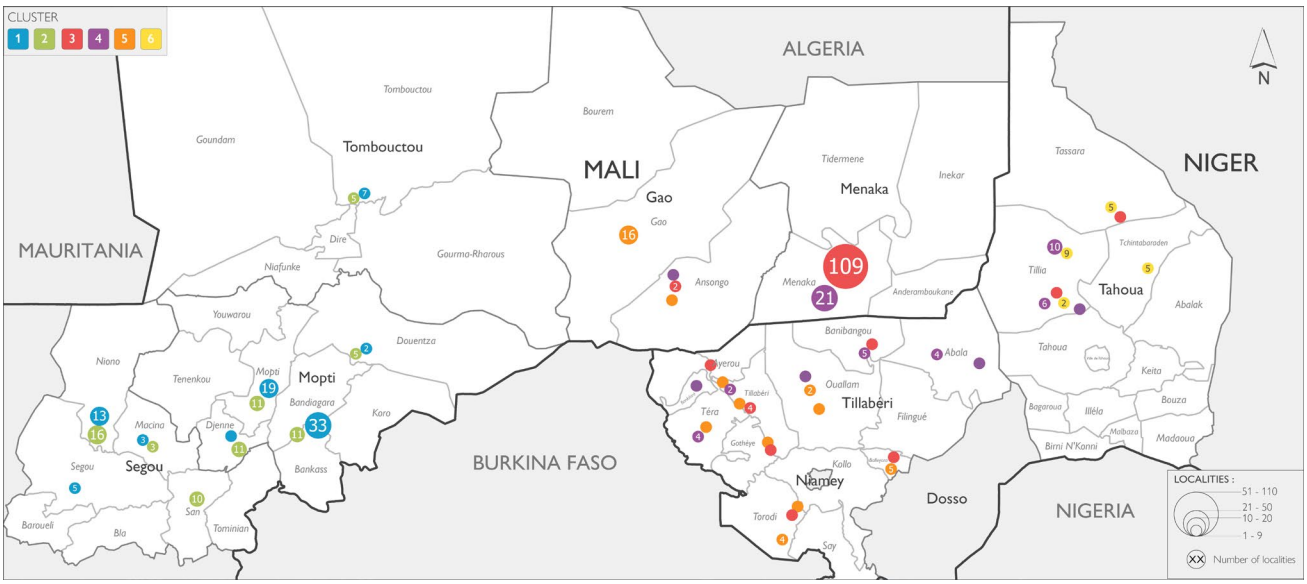


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Table 4. Average SI and sub-index scores by cluster

	Stability Index	Services Sub-Index	Security Sub-Index	Cohesion Sub-Index
Cluster 1: Low SI in Center Mali	63	56	53	58
Cluster 2: High SI in Center Mali	85	74	78	83
Cluster 3: Mid SI in Menaka – Low Security	74	78	53	79
Cluster 4: Low SI in Niger	55	38	52	58
Cluster 5: High SI Tillaberi and Gao – High Security	86	74	84	84
Cluster 6: Mid SI Tahoua	74	43	74	84

It is noteworthy that some clusters with similar average SI scores have markedly different scores on sub-indexes. For instance, clusters 3 and 6, both comprised primarily of localities in the eastern half of the Liptako Gourma region with SI scores averaging 74, have disparate security scores: while cluster 6 in Tahoua has an average security score of 74, cluster 3 in Gao and Tillaberi has a much lower average security score of 53. Conversely, cluster 6 has a much lower average services score compared with cluster 3. This may indicate that localities in cluster 6 may benefit from longer-term development assistance, particularly in terms of the provision of basic goods and services.

Additionally, clustering helps to visualize disparate localities within close physical proximity. For instance, clusters 1 and 2 in Center Mali distinguish two distinct groupings of nearby localities in Mopti and Segou. The localities in cluster 1 appear to be much less stable than those in cluster 2.

3.2 CASE STUDY

Overview of Two Nearby Low and High Scoring Clusters in Gao, Tahoua, and Tillaberi

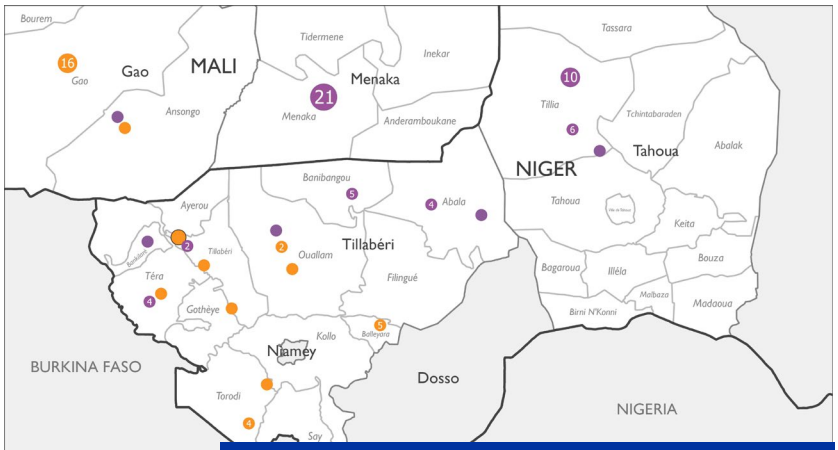
Cluster 4 - Low SI Localities Cross-Border

Cluster 4 consists of 22 localities in Mali and 35 localities in Niger, with an average SI score of 55. These localities are centered close to the border between Tahoua, Tillaberi, and Gao. The localities in Mali are primarily centered around Menaka. 74 per cent of these localities reported that their locality does not feel safe and stable, and all but one of those self-reported unstable localities also reported little to no police presence.

Cluster 5 - High SI Localities Cross-Border

Cluster 5 is comprised of 17 localities in Mali and 17 localities in Niger, in both Gao and Tillaberi, with an average SI score of 86. The localities in Mali are primarily centred around Gao city. Almost 95 per cent of these localities in this cluster reported that the locality is safe and stable, and 97 per cent of these localities reported that the population does not feel that they need to leave soon.

Map 3. Comparison of clusters 4 and 5



	Stability Index	Services Sub-Index	Security Sub-Index	Cohesion Sub-Index
Cluster 4: Low SI	55	38	52	58
Cluster 5: High SI	86	74	84	84

Table 5. Indicators with the largest differences between clusters

Average Scores per Cluster	Cluster 4	Cluster 5
Feeling Stability	4	9
Feeling Community	5	10
Daily Public Life	5	10
Presence Police Gendarmerie	3	8
Incident Trend Resource	5	9
Residents Worried Security	4	8
Farmland Situation	4	8
Incident Trend Activities	5	9
Basic Health Services	6	10
Primary School Situation	6	10
Formal Curfew	5	9
Participation Public Political Life	4	8

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Comparison and Analysis of Two Nearby Low and High Scoring Clusters

Although these two clusters are in close geographical proximity, occasionally almost overlapping, their profiles are quite distinct. Cluster 4, centered around Menaka, Gao, western Tahoua, and northern Tilllaberi, consists of localities where residents are more worried about their security and more likely to feel that they will need to leave soon as compared with those in cluster 5. Cluster 5 appears to have a stronger state presence and better access to basic services as compared with cluster 4, with more police presence, less security incidents, better access to health services, and more access to primary education.

Unsurprisingly given their proximity, the localities in these clusters also share several similarities. For instance, slightly more than half of respondents in each of these clusters reported that they have little to no cell or internet connectivity. Additionally, respondents in both clusters indicated that the housing is of poor quality. At the same time, both clusters reported low levels of illegal occupation of land, damage to homes, and inter-communal violence, and high levels of access to legal remedies to resolve conflicts.

These two clusters provide interesting possibilities for targeting programme interventions. For example, programmes focusing on development assistance and returnees in Tahoua, Tillaberi, and Gao may wish to consider targeting their efforts at localities in cluster 5. These localities are currently relatively safe and secure, but would benefit from infrastructure assistance in the form of electricity, housing improvements, and ICT connectivity. IDPs within the region may find these localities to be relatively stable.

Humanitarian actors, on the other hand, may consider focusing their efforts in this region of the Liptako Gourma on cluster 4, which reported low access of many basic services including health, water, and primary schools. Although the localities in this cluster also lack access to electricity and ICTs, it may be less beneficial to focus resources on this type of infrastructure development due to insecurity.

4. Analysis of Main Indicators Influencing the Stability Index

The Stability Index uses Principal Component Analysis to understand the impact of each indicator on the variability in the dataset. The indicators with the largest weight have the most influence in determining the Stability Score. The exploration of these key indicators allows for the identification of important factors that may impact the perception of stability in a locality. (For a more detailed overview of what each indicator measures, see *Appendix.)*

Five of the same variables appeared among the ten most influential in both Mali and Niger – Daily Public Life, Security Situation, Access to Water, Market Situation, and Resident Freedom of Movement.

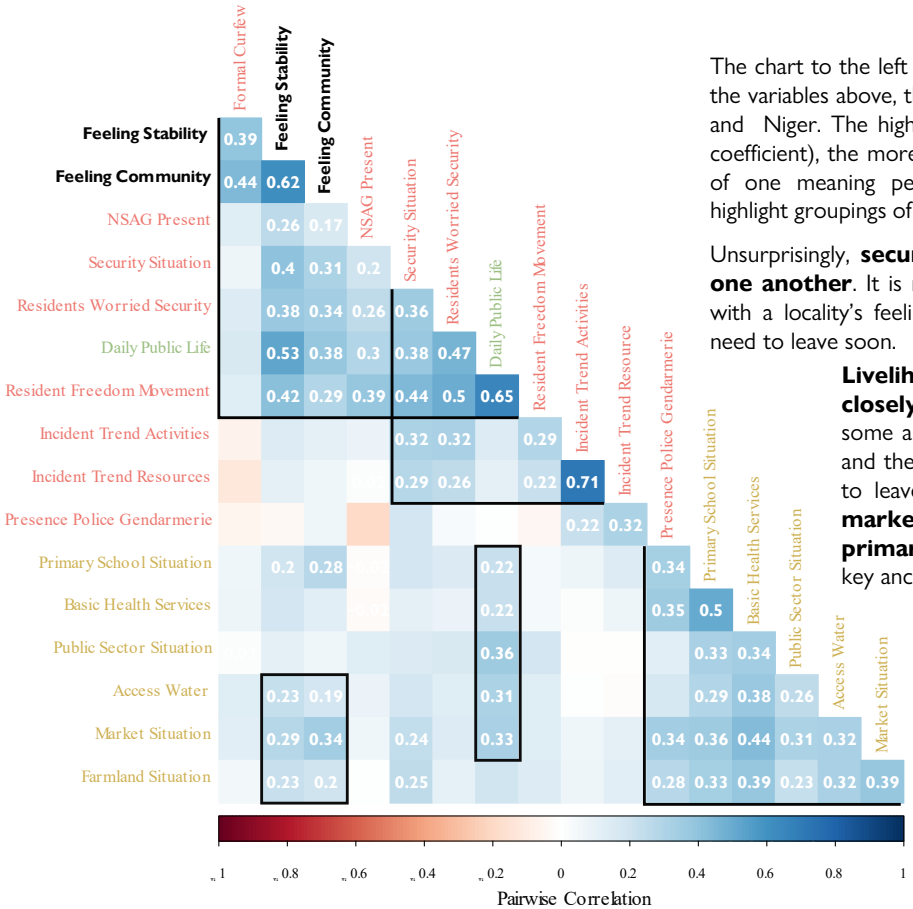
In the table to the right, it is evident that **Livelihoods and Services** indicators have a larger influence in Mali, whereas **Safety and Security** indicators influence more of the variation between localities in Niger. Daily Public Life (whether daily activities outside of the house are carried out as usual and without fear) is the only **Social Cohesion** indicator appearing on either list.

Table 6. Most influential indicators by country

	SERVICES / SOCIAL COHESION	SECURITY
	Mali	**Niger**
1	Market Situation*	Residents Worried About Security
2	Daily Public Life*	Daily Public Life*
3	Primary School Education	Freedom of Movement*
4	Presence of Public Sector Employees	NSAG Present
5	Basic Health Services	Recent Security Incidents*
6	Cultivation of Farmland	Formal Curfew in Place
7	Access to Water*	Security Incident Trends – NSAG Activities
8	Recent Security Incidents*	Access to Water*
9	Freedom of Movement*	Security Incident Trends – Resources
10	Police Presence	Market Situation*

**Indicator included in top ten for both countries*

Figure 3. Pairwise correlation among main indicators



The chart to the left shows an analysis of pairwise correlation among the variables above, the top 10 most impactful variables for both Mali and Niger. The higher the number in each square (the correlation coefficient), the more closely related a pair of variables, with a score of one meaning perfect positive correlation. The black outlines highlight groupings of variables that are intercorrelated.

Unsurprisingly, **security variables are highly correlated with one another**. It is noteworthy that they are also highly correlated with a locality's feeling of stability and whether residents feel they need to leave soon.

Livelihood and service variables are also closely correlated with one another. Moreover, some are closely correlated with the feeling of stability and the community's feelings about whether they need to leave soon. In particular, **access to water, the market situation, farmland situation, and primary school situation** are correlated with these key anchor questions.

Taken together, this may indicate that localities with high levels of security and good access to primary education, water, and markets may be promising candidates to explore for Humanitarian Development Peace Nexus (HDPN) programming. For areas with low access to these basic services, targeted humanitarian assistance to improve access to water, markets, and primary education may improve feelings of stability.

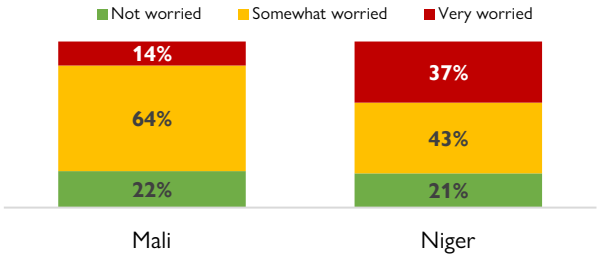
4.2 Analysis of Key Stability Index Indicators

1. Residents Worried About Security

Safety and security

The proportion of residents that reported feeling "very worried" about security was notably higher in the localities assessed in Niger (37%) as compared with Mali (14%). This indicator was the top-weighted factor in Niger's Stability Index calculations. Although the total proportion of localities where residents feel "very worried" is 14 percent, this figure varies greatly by Cercle (A2): while 39 per cent of localities in Mopti reported feeling "very worried", less than 1 per cent reported feeling "very worried" in Gao, Manaka, or Tomboctou.

Figure 4. Residents Worried About Security

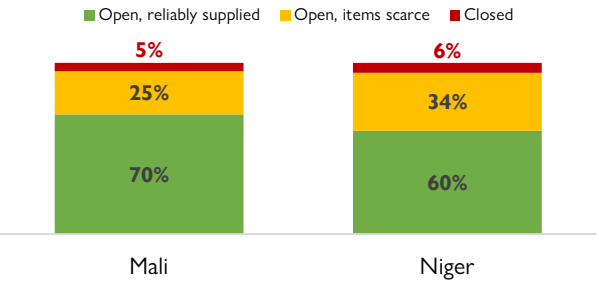


2. Market Situation

Livelihoods and Basic Services

The market situation is the top-weighted indicator in Mali and the tenth weighted indicator in Niger. Across both countries, 68 per cent of localities reported that their markets were open and regularly supplied, while just 5 per cent of localities reported that markets were closed. Of the localities with closed markets, 58 per cent reported that the locality felt stable and unsafe, compared to an average of 20 percent across the region.

Figure 5. Local Market Situation

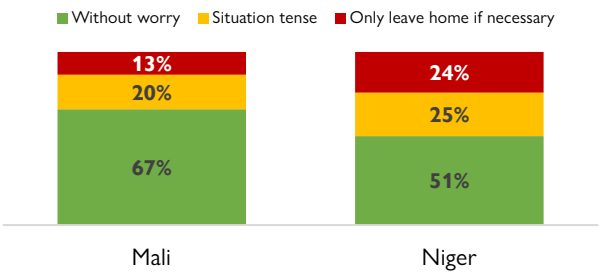


3. Daily Public Life

Social Cohesion

Daily Public Life is the second most influential indicator for both Mali and Niger. Nearly a quarter of respondents in Niger indicated that residents do not leave their homes unless absolutely necessary. On the pairwise correlation plot on the previous page, it is evident that Daily Public Life is strongly correlated with the Feeling of Stability, with a pairwise correlation coefficient of .53 – the highest of all indicators.

Figure 6. Daily Public Life

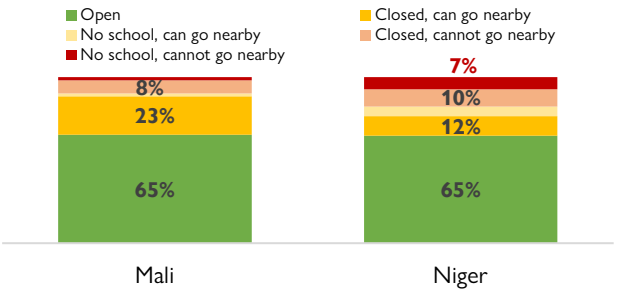


4. Primary School Education

Livelihoods and Basic Services

While 65 per cent of localities in both Niger and Mali reported that the local primary school is open and operating normally, 17 per cent of localities in Niger and 10 per cent of localities in Mali reported that there are no schools in their locality or nearby that primary-school aged children are able to attend.

Figure 7. Primary School Education

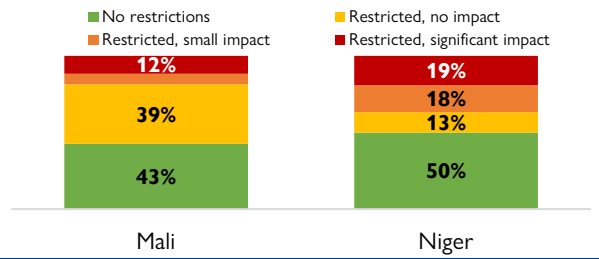


5. Freedom of Movement

Safety and Security

As evidenced by the pairwise correlation plot on the previous page, the freedom of movement is highly correlated with daily public life. Niger reported more localities where there are no restrictions on the freedom of movement (50%) compared with Mali (43%). However, a larger percent of residents in Niger reported that there were restrictions in place with at least some impact on their lives (37%) as compared with Mali (19%).

Figure 8. Freedom of Movement



4.3 Analysis of Anchor Questions

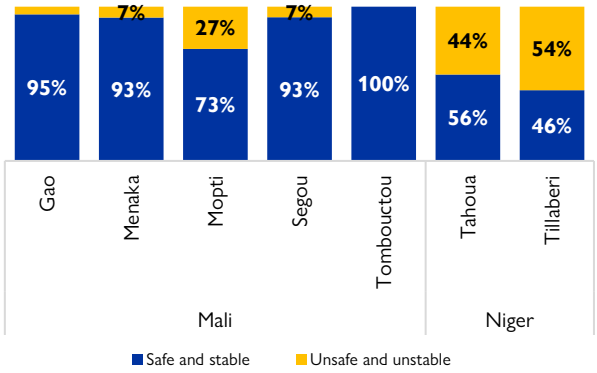
The first section of the questionnaire focused on the key informants' perception of stability in the assessed localities. These "anchor questions" were used to validate Stability Index findings against self-reported perceptions in the community. Key informants were asked three main questions to assess the perception of stability in their communities.

Feeling of stability

Does the locality feel safe or unsafe?

While over 87 per cent of key informants in Mali reported that their localities felt safe and stable, only 51 per cent of respondents in Niger felt that their localities were safe and stable. In Niger, the localities close to Niamey generally reported feeling stable, while localities along the borders with Burkina Faso and Mali were more likely to report feeling unstable. In Mali, Mopti had the highest percentage of respondents (27%) reporting that their locality was unstable, followed by Menaka (7%) and Segou (7%).

Figure 9. Feelings of Stability

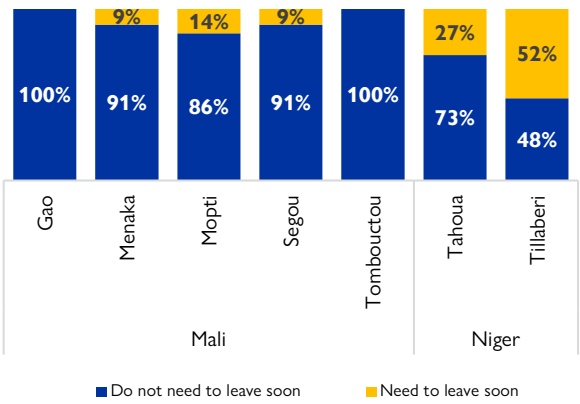


Future intentions of the population

Do people in the locality feel that they need to leave soon due to safety concerns?

Responses to this question about the intention to move were highly correlated with answers to the "feeling of stability" question. All of the localities in the two regions with the highest reported feeling of stability (Gao and Tombouctou) reported that their residents do not feel they need to leave soon. Similarly, the departments with the lowest self-reported feelings of stability, (Tahoua and Tillaberi) both had the highest percentage of key informants reporting that people from their locality felt that they might need to leave soon. These figures are particularly striking in Tillaberi, where more than half of the key informants indicated that residents may need to leave soon.

Figure 10. Future Intentions

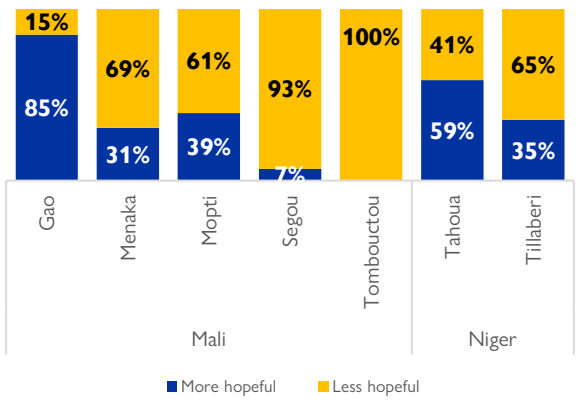


Changes in perception over the last 6 months

Do people feel more or less hopeful about the state of community compared to six months ago?

The responses to the perception of stability question were uncorrelated with either the feeling of stability or the future intentions of the population questions. Notably, the majority of respondents in Segou and Tomboctou, who reported high feelings of stability and little need to leave soon, overwhelmingly indicated that they feel less hopeful about the state of the community than six months ago (93% and 100%, respectively). 85 per cent of residents in Gao reported that they feel more hopeful than six months ago. Taken in tandem with the responses to the questions about feelings of stability and future intentions, this indicates Gao may be a notably stable region. This is supported by Gao's high average SI score (86), which is the highest average score in the region.

Figure 11. Changes in Perception



6. CONCLUSION

The main purpose of the Stability Index is to inform programmatic interventions that can improve the perceptions of stability at the locality or cluster level in order to facilitate durable reintegration of displaced populations in their communities of origin and to prevent future forced displacements. To take advantage of this index, the governments (at national and sub-national levels) of the Liptako Gourma Region and their partners should work closely together to identify localities/clusters and develop tailored programmatic interventions to increase the perception of stability based on the results of the different stability indicators, and particularly with the most influential variables.

Key Takeaways

Focus programmes on key indicators of stability

In both Niger and Mali, the indicators "market situation" and "water access" were among the top ten most influential indicators. Programmes targeting these two indicators (i.e. improving access to water and facilitating access to local markets) are likely to have a strong impact on community member's perception of stability.

Stronger focus on basic services and security

Across both countries, only one indicator belonging to the "Social Cohesion" scale is found in the top 5 influential variables. The primary variables for the perception of stability are found in the "Safety and Security" scale (10 out of 20 indicators) and the "Basic Services" scale (8 out of 20 indicators). This highlights the need to develop policies and programmes that positively impact safety and security and social cohesion and promote livelihoods and access to basic public services.

Higher impact using cluster analysis

Government authorities and their partners can programme more effectively and on a larger geographic scale than the locality level using a cluster approach. Grouping similar localities into clusters based on their characteristics can help to uncover the distinctive profiles of geographic regions in order to facilitate targeted programming, as demonstrated in the case study in section 3.2.

Opportunities for programming along the Humanitarian Development Peace Nexus

Analysing the differences between the localities with the highest and lowest scores on the Stability Index (section 2) can provide useful insights into programme priorities. Different programmes are needed in localities on opposite sides of the stability spectrum. For example, in localities with very low stability scores, immediate humanitarian projects might be needed to improve access to water or information and communication technologies, while in localities with higher stability scores development programming may be more relevant. The case study in section 3.2 highlighted markedly different needs for communities even within close geographical proximity. The localities in the high SI cluster reported high levels of safety and security paired with low levels of infrastructure such as ICTs and electricity and may thus benefit from long-term development investments. The localities in low SI cluster noted in the case study, on the other hand, reported low levels of safety and security in addition to lower access to basic services such as medical care and may thus benefit more from direct humanitarian assistance.

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7. APPENDIX

7.1 Selection of Localities

The selection of localities was as broad as possible in areas affected by displacement and/or returns in regions in Mali and Niger located in the Liptako Gourma. A list of localities to be surveyed was created based on data collected by IOM on displacement/returns and other existing data systems (census, administrative lists, etc.). The objective was to have a large enough number of localities at both the country and regional level to ensure a solid foundation for statistical analysis. A total of 394 locations in Niger and Mali, were covered. A locality is the administrative level 4 (lowest possible level). The level has a representation, whether formal (State) or informal (Chef de village).

7.2 Stability Index Calculation

The Stability Index calculation begins with survey design: this tool was developed with substantive input from community stabilization and HDPN experts. It includes a set questions assessing the conditions in a locality that were determined to be 1) potential indicators of stability and 2) possible to rank in terms of their stability implications. Questions were divided into four categories: anchor questions (perceptions about stability), safety and security, social cohesion, and access to basic services.

Before index calculation, responses were ranked ordinally from best to worst case scenario. Then, Principle Component Analysis (PCA) was run using all indicators *except for the "anchor questions"*, which are used instead to validate index results. The **weight** for each variable, determined via PCA, was combined with the ranked survey-responses for each locality to generate its overall **Stability Score**.

7.3 Sub-Index Calculation

In addition to the Stability Score, three separate **sub-indexes** were generated using the variables from each of the three themes in the survey: Security, Social Cohesion, Services. The sub-indexes were calculated by separately combining the **weights** from the Stability Index calculation with the variables for each theme, and then rescaled between 1-100. **The overall Stability Index is *not* an average of these three sub-indexes.** The sub-indexes facilitate the identification of localities that may need specific attention in one of these sectors.

7.4 Stability Index Validation

The Stability Index and the sub-indexes are **validated against the key questions on the perception of stability.** This ensures that there is a statistically significant relationship between the Stability Scores and the perception of stability. The relationship was validated via logistic regressions which indicate that a locality's Stability Index score has a statistically significant, positive correlation with both the community's feeling of stability and their feelings of whether they will need to leave soon. However, there is no discernable relationship between Stability Score and the perception about whether the situation is improving or getting worse.

7.5 Principal Component Analysis

The Stability Index is calculated using a dimensionality reduction technique called Principal Component Analysis (PCA), which **essentially condenses the information from over 30 variables into a single, easily comparable Stability Score**. PCA gives more weight to the factors that have a greater impact on the variability in the data, meaning that those factors make up a larger proportion of the Stability Score.

While each of the indicators assessed is clearly important for informing programming along the humanitarian-development-peace nexus, **PCA is particularly useful for demonstrating the impact of different indicators on one another, and the proportional influence of a given indicator on a given dataset**. For example, while the availability of electricity and access to health care are both individually important factors, they also heavily influence one another (this is called collinearity). PCA helps to see beyond the collinearity and drives at influence in a more coherent way, which is critical to understanding complex phenomena like the nature and conditions of return.

7.6 Cluster Generation

To facilitate the analysis of groups of localities, **clusters** were created using the K Nearest Neighbors (KNN) machine learning algorithm, weighted by geographic distance. KNN allows for the identification of groups of localities that are the most similar across all of the provided inputs. The inputs included the first five dimensions from the Principle Component Analysis results generated during the Stability Index calculation, as well as the geographic distance between the latitude-longitude points of each locality.

7.7 Limitations

Some localities that were not accessible during the data collection period were not assessed due to security or logistical reasons. This may have introduced bias as data points from some of the least secure locations were excluded from the analysis. This limits the generalizability of the Stability Index findings in extremely insecure localities.

It is important to note that the Stability Index is based on informants' perceptions of stability and reports of the conditions in their locality and does not claim to provide an objective measure of this complex topic. Key informants are not randomly selected and may have different opinions about the stability in their locality than some of their neighbors.

7.8 Survey Indicators

ANCHOR QUESTIONS: PERCEPTION OF STABILITY

These key indicators were used to measure the perception of stability in each locality. The key indicators where then tested against each of the thematic indicators below to identify the most influential thematic indicators on the perception of stability.

Feeling of Stability in the Locality

Does the locality feel safe and stable or unsafe and unstable?

Ability to Continue Living in Locality

Do people in the locality feel that they need to leave within the next six months?

Changes in Perception in the Last 6 Months

Do people feel more or less hopeful about the state of the community than they did six months ago?

SCALE 1: LIVELIHOOD & SERVICES

Shelter Access and Quality

Proportion of the community that has access to shelter and conditions of shelter.

Damage to Homes

Level of damage to homes due to conflict, and whether reconstruction is underway.

Primary Education

Access to primary education and availability of schools in the locality or in neighbouring towns

Health Center and Medical Care

Access to functioning health center in the locality or in neighboring town

Local Market

Whether markets are open regularly and supplied

Electricity

Electricity access and reliability in the locality

Drinking Water

Drinking water access and availability in the locality.

Farmland & Fishing Grounds

Extent of fishing grounds and farmland being used in the locality

Presence of Public Sector Employees

Whether public sector employees are present and how they reacted to the conflict.

Internet and Communications Technology

Access and reliability of internet or phone services.

7.8 Survey Indicators

SCALE 2: SOCIAL COHESION
Illegal Occupation of House, Land and Property
Land, habitat or property occupied illegally (without authorization from family, neighbors, local authorities)
Robbery Personal Effects
Robbery of personal belongings reported in locality in the last 6 months
Cattle Theft Reported
Cattle theft reported in the locality in the last 6 months
Daily Public Life
Whether residents are able to carry out basic activities without worry (going to the market, letting children play outside, street vendors, etc.)
Community Support
Likelihood of cooperation between neighbors in case of problems (such as with the supply of water or food) in the locality
Community Tension
Incidents or clashes involving two groups (religious, ethnic, herders/farmers, displaced/returnee/host communities) in the locality
Equal Access to Services
Populations in the locality have equal access basic services and resources no matter their age, sex or group (ethnicity, clan, displacement status)
Identity Documents
Level of identity document possession or access in the locality
Participation in Public Affairs
Level of participation in local public and political life (civil society organizations, unions, committees, social gatherings, religious groups)

SCALE 3: SAFETY AND SECURITY
Recent Security Incidents
Whether there have been serious security incidents in recent months
Security Incidents – Resources
Trends in the number of security incidents linked to resource tensions (cattle raiding, land conflict, etc.) over past three months.
Security Incidents – Non-State Armed Groups
Trends in the number of security incidents linked to NSAG activities (kidnapping, terrorist attacks, raids, etc.) over past three months.
Petty Crime
Trends in the number of petty crimes (theft, pickpocketing, vandalism, public intoxication, etc.) over past three months.
Community Concerns About Security
How concerned residents feel about their security (kidnapping, crime, fighting between armed groups, etc.).
Police Presence
Presence of police/gendarmerie in the locality
Security Forces Presence
Presence of security forces in the locality
Non-State Armed Groups Presence
Presence of Non-State Armed Groups in the locality
Informal Militias/ Vigilante Group Presence
Presence of informal self-defense militias and vigilante groups in the locality
Freedom of Movement
Residents' freedom of movement (to markets, to their homes, to workplaces, to farms, etc.) in the locality
Formal Curfew
Formal curfew for security reasons enforced by State
Informal Curfew
Informal curfew enforced by Non-State Armed Groups
State of Emergency
Whether the locality is under a state of emergency
Legal Remedies
Whether residents have access to legal remedies to resolve disputes