

Climate Vulnerabilities and Food Insecurity in Mali

Luc Tucker

SIP/2023/054

IMF Selected Issues Papers are prepared by IMF staff as background documentation for periodic consultations with member countries. It is based on the information available at the time it was completed on May 9, 2023. This paper is also published separately as IMF Country Report No 23/210.

2023
JUL



IMF Selected Issues Paper
African Department

Climate Vulnerabilities and Food Insecurity in Mali
Prepared by Luc Tucker

Authorized for distribution by Wenjie Chen
July 2023

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ABSTRACT: Mali is extremely vulnerable to climate change and the country is already facing acute climate-related challenges from higher temperatures and more frequent extreme weather events. The impact of climate change has also contributed to a rise in food insecurity, with almost a quarter of the population expected to be either facing food insecurity or at risk of doing so by mid-2023. That is already having a hugely damaging effect on Mali's economy and action is needed without delay to avoid a further increase in food insecurity.

RECOMMENDED CITATION: Tucker, Luc. Climate Vulnerabilities and Food Insecurity in Mali. IMF Selected Issues Paper (SIP/2023/054). Washington, D.C.: International Monetary Fund.

JEL Classification Numbers:	O11, O13, Q16, Q54.
Keywords:	Climate, food insecurity, agriculture.
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SELECTED ISSUES PAPERS

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Mali

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Contents

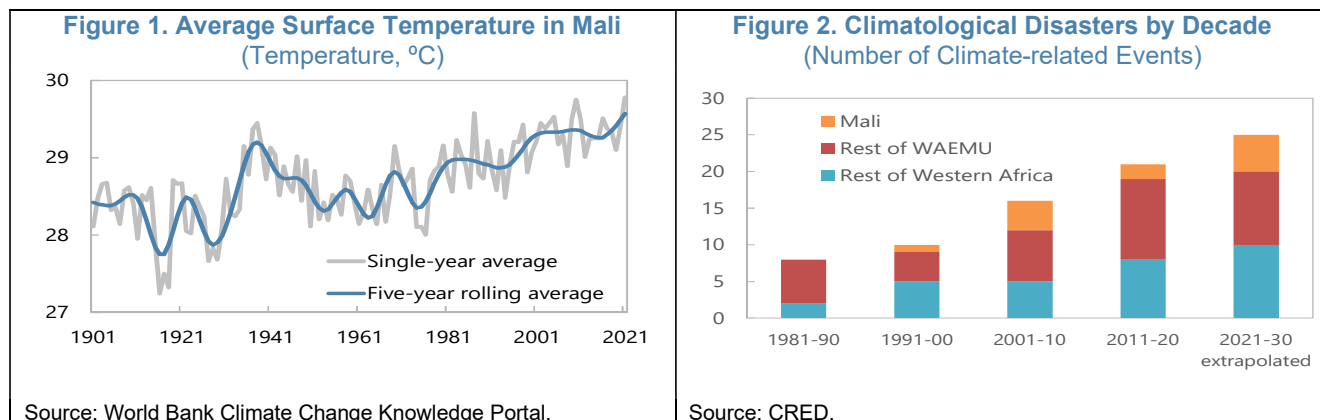
I. Current Challenges	5
II. Reform Priorities	8
III. Conclusion	9

FIGURES

1. Average Surface Temperature in Mali	5
2. Climatological Disasters by Decade.....	5
3. Climate-Related INFORM Risk	6
4. Price Levels in Mali	6
5. Prevalence of Insufficient Food Consumption, December 2022 to March 2023	6
6. Food Imports in Mali.....	7
7. Post-Disaster Savings Relative to Cost of Building Resilience in Sub-Saharan Africa.....	9
References	11

I. Current Challenges

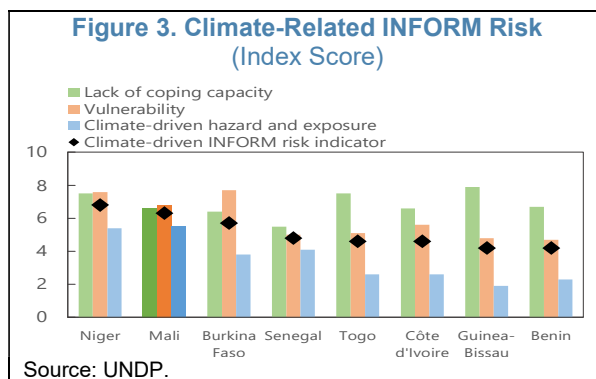
Climate change has already had a profound effect on Mali. Over recent decades, average temperatures have risen. Whereas the average temperature in Mali was around 28½°C between 1950 and 1980, between 2000 and 2020 it averaged 29½°C. 2021 was the hottest year on record at over 29¾°C (Figure 1). Mali has also suffered from more frequent climate-related natural disasters including droughts and floods, as have other countries across Western Africa (Figure 2).



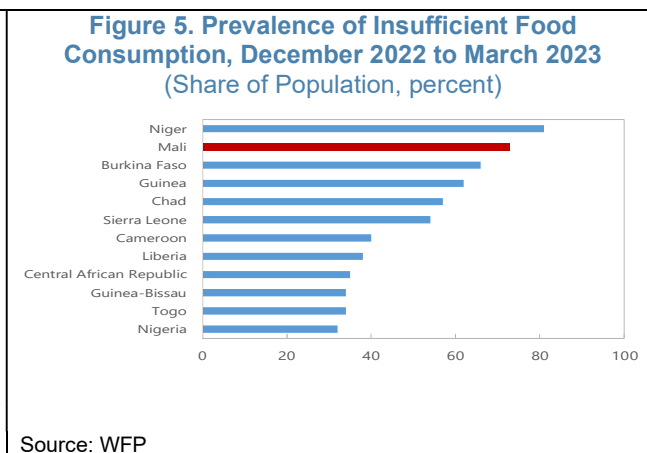
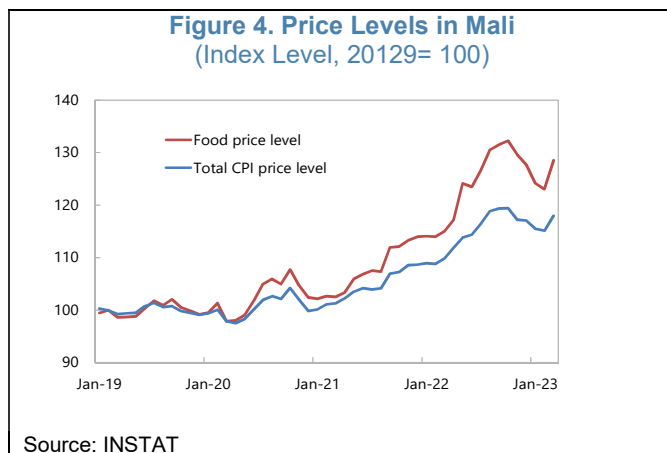
Mali is extremely vulnerable to climate shocks because of its heavy reliance on agriculture. Food and cotton production constitute around a third of GDP in Mali and almost 80 percent of livelihoods depend on agrarian and pastoralist activities that are highly affected by rainfall variability.

Climate change is already affecting agricultural production in Mali. Research from across developing countries suggests that a temperature increase of 1°C is associated with a 3 percentage point reduction in agricultural output (Dell, Jones, and Oklen, 2012). Analysis based on sub-Saharan Africa also shows that monthly economic activity in the region decreases by 1 percentage point if the average temperature is 0.5°C above the long-run average (IMF, 2020). In Mali, the risk from climate change appears even higher than in other sub-Saharan African countries. Climate change is estimated to reduce agricultural productivity by over 40 percent in Mali, which is one of the highest estimated impacts globally (Ortiz-Bobea and others, 2021). Additional variability in the water supply alongside increased demand would create further stress for the agricultural sector (WRI, 2019). A summary measure of climate-related risk shows that Mali faces one of the highest levels of risk of all the WAEMU countries (Figure 3). The risk assessment reflects the likelihood of challenging weather events such as flooding and droughts as well as human risks such as conflict.

As the disruption caused by climate change has been rising in Mali over recent years, food insecurity has also been increasing. The share of the population that is undernourished rose from just over 3 percent in 2017 to almost 10 percent in 2020, the latest year for which data are available (FAO, 2022). This pickup marked a reversal of the previous downward trend and contrasted with the experience of most other countries in the WAEMU. The increase may be linked to the numerous challenges facing Mali as a Fragile and Conflict Affected State (see Country Engagement Strategy for more details). These challenges include widespread local conflicts and insecurity which have hampered humanitarian access leading to increased population displacement and vulnerability (WFP, 2022).



Since 2020, the share of the population facing food insecurity has increased further. Mali has also been facing COVID-19-related supply bottlenecks, sanctions restricting food imports, and the war in Ukraine which has severely affected global food supplies. As a result of these combined shocks, food prices in Mali in late 2022 were around 30 percent above their 2019 average (Figure 4). Prices have remained elevated in early 2023. Food items now account for just under 60 percent of consumer spending in Mali and according to the latest data about three quarters of the population have insufficient food consumption (Figure 5). Many of these people are facing a particularly desperate situation. In early 2023, more than 15 percent of the population were estimated to be either facing severe food insecurity (761,000 people) or were at risk of doing so (2.9 million). By mid-2023 that share is projected to rise to 24 percent, with 1.3 million people facing severe food insecurity and a further 4 million people at risk (FSC, 2023).



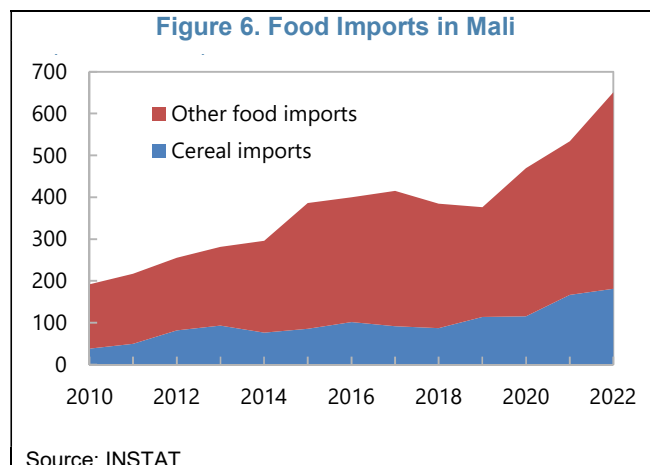
The increasing rate of food insecurity is likely to have long-lasting effects on the population of Mali.

Chronic malnutrition has been shown to cause irreversible cognitive and physical damage (WFP, 2022). For children in particular, reduced food supplies impede development and educational attainment. This could have a particularly outsized effect on Mali, given the age structure of the population, with a median age of 15. Food insecurity can also erode physical capital if households are forced to sell their physical assets in order to buy food. Given the low average incomes in Mali and wider fragility (see Country Engagement Strategy for more details), many households could be forced to sell assets in this way.

In Mali, like other countries in sub-Saharan Africa, the link between climate change and food insecurity is well established. Analysis based on data from Mali as well as other countries in sub-Saharan Africa shows that food insecurity increases by 5–20 percentage points with each flood or drought (IMF, 2020). A separate model also shows the channels by which that can happen (Baptista and others, 2022). In that model, climate shocks depress agricultural production, such that households are forced to sacrifice productive capital to satisfy their immediate food consumption needs. This further reduces agricultural output. Notwithstanding an increase in food imports, food prices increase in rural and urban areas. Overall, food consumption declines and the number of permanently food insecure households rises, with a long-term scarring effect on growth and productivity.

Climate change is therefore likely to have played some role in the rise in food insecurity since 2018, and the challenges are likely to be even greater going forward. Regional analysis in Mali shows a significant overlap between the areas affected by insecurity and climate change and those facing food insecurity (IPC, 2023). Political instability, security issues and weak institutions such as in Mali can undermine efforts to build resilience and respond to natural disasters (Navone, 2021). Fiscal space is also limited in Mali and international aid flows have declined significantly. If climate change increases population displacement and aggravates social tensions, that would be expected to further reduce fiscal space, creating a vicious cycle. Rapid population growth will also add to these challenges.

The combined effects of climate change and food insecurity have created an urgent balance of payments need related to the global food shock. Mali's food imports have risen rapidly in recent years. The price of imported cereals increased by 5½ percent in 2022, which contributed to an 8 percent rise in total cereal imports. Overall, the value of Mali's total food imports increased by 15 percent in 2022 and were 65 percent higher than in 2019 (Figure 6). Given that food insecurity is already widespread in Mali, higher prices for imported basic necessities create an acute risk of widespread hunger and loss of life.



II. Reform Priorities

Building future resilience to climate change will require effective adaptation strategies in the primary sector. Improving infrastructure for irrigation, as well as providing reliable access to water and electricity, would help to limit the impact of climate-related natural disasters on agricultural production (Selassie, 2021).

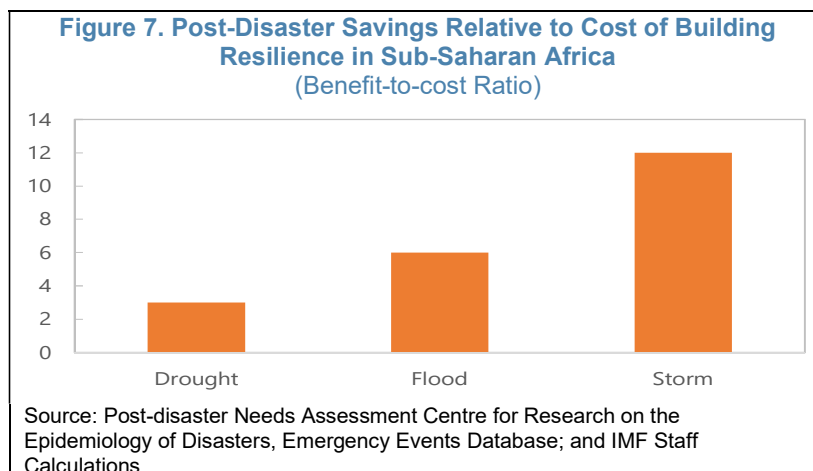
Investment in seeds, pesticides and fertilizers that are more suited to higher average temperatures or more resilient to extreme weather may also help producers to achieve higher returns. In extreme cases, producers may be encouraged to switch to producing entirely different crops if conditions suggest that it would be beneficial. The switch to climate-smart agriculture would benefit from investment in information technology infrastructure as well as knowledge sharing (CIAT and others, 2020).

Climate change is exacerbating already large inequalities in Mali, so it is important to monitor the distributional effects and support those households and businesses most affected. The poor and most vulnerable are especially subject to the adverse impact of climate change. Limited financial buffers, low levels of education and geographic constraints mean that those groups currently have little opportunity to adapt, which increases the likelihood of economic hardship including falls in income and periods of unemployment. Women and girls are particularly exposed because of factors such as restricted social mobility, limited access to resources and constrained participation in decision-making.

Those households most affected by climate change could benefit from targeted support or wider safeguards. Access to social services, health and education could help to reduce the impact of climate-related shocks on the rural population. Insurance mechanisms could also be used to spread risk. This could involve government support in the form of transfers or subsidies in response to climate-related natural disasters. To speed up delivery times, social protection programs can be designed to automatically trigger cash transfer payments as soon as weather shocks materialize.

Many of the households most affected by climate change would also benefit from efforts to address food insecurity. Targeted cash transfers could help poor households meet basic nutritional needs. But measures need to be effectively targeted to limit the fiscal impact. The national database of social protection beneficiaries provided by the Unified Social Register (RSU) will help in that regard if it is regularly updated. Reliable payment mechanisms will also be required.

It will be important to create sufficient fiscal space to cover the cost of building resilience to climate change. Some forms of adaptation, including improvements to infrastructure, can involve significant up-front costs. These costs can seem prohibitive, particularly given the current pressure on public finances, but research suggests that financing adaptation to climate change, especially through infrastructure spending, is ultimately much more cost effective than providing ex post disaster relief (IMF, 2020).



Mali currently faces tighter financing conditions, but there are a number of potential options available for financing climate-related expenditures when conditions allow. Climate financing—for governments, businesses, and households—needs to prioritize climate change adaptation. Funding methods could include: (1) concessional financing, particularly through climate funds; (2) debt instruments that are linked to climate change; (3) international carbon credit schemes; and (4) climate-related insurance schemes (Belianska and others, 2022; IMF, 2023). Combined efforts by the authorities and external lenders could help to increase Mali's access to these types of funding. The accreditation of Mali's climate agency would be an important step in making Mali eligible to receive funds from international partners. Efforts could also be made to lower administration charges where possible and reduce language barriers.

Some other countries in sub-Saharan Africa are facing similar issues linked to climate change and food insecurity, so there is scope for mutually beneficial international cooperation. Cross-country insurance programs could help national governments to pool risks and spread the cost of extreme weather events and natural disasters among a larger group. Funding for these schemes could come from bilateral and multilateral donors, as well as financial markets. Regional trade can also serve as a form of insurance by allowing countries to increase exports in the event of excess harvests or draw in extra imports when food production falls below expectations. This makes it important to avoid protectionist policies or trade embargoes which prevent that. Strengthening international relationships could lead to further donor support and concessional lending linked to climate change and food insecurity.

III. Conclusion

With climate change already adding to food insecurity in Mali, there is an urgent need to address these related issues. The country is extremely vulnerable to climate change, and food insecurity is rising. Any further increase in food insecurity has the potential to exacerbate social tensions, with the risk of further conflict. It will also have a lasting adverse impact on economic growth and poverty. There is therefore a pressing need to act without delay. Given the severe climate change and food insecurity challenges faced by Mali, the country stands to benefit more than most from strengthening its international relationships to find mutually beneficial solutions including climate-related funding schemes or cross-country insurance programs.

References

- Baptista, D. and others, "[Climate Change and Chronic Food Insecurity in Sub-Saharan Africa](#)", IMF Departmental Paper, September 2022.
- Belianska, A. and others, "[Climate change and select financial instruments: an overview of opportunities and challenges in sub-Saharan Africa](#)", IMF Staff Climate Note, November 2022.
- Dell, M., Jones, B. and Oklen, B. "[Temperature Shocks and Economic Growth: Evidence from the Last Half Century](#)", American Economic Journal 4 (3): 66–95, July 2012.
- Food and Agriculture Organization of the United Nations (FAO), "[Potential impacts of climate change on food security in Mali](#)", 2012.
- Food and Agriculture Organization of the United Nations (FAO), "[Mali: response overview](#)", May 2022.
- Food Security Cluster (FSC), "[Résultats de l'Analyse de la Situation de l'Insécurité Alimentaire Aiguë Actuelle et Projetée](#)", March 2023.
- IMF, Sub-Saharan Africa Regional Economic Outlook, Chapter 2, "[Adapting to Climate Change in Sub-Saharan Africa](#)", April 2020.
- IMF, Sub-Saharan Africa Regional Economic Outlook Analytical Note, "[Building a More Food-Secure Sub-Saharan Africa](#)", October 2022.
- IMF, Sub-Saharan Africa Regional Economic Outlook Analytical Note, "[Closing the Gap: Concessional Climate Finance and Sub-Saharan Africa](#)", April 2023.
- Integrated Food Security Phase Classification (IPC), [Cadre Harmonisé](#), 2023.
- International Center for Tropical Agriculture (CIAT) and others, "[Climate-Smart Agriculture in Mali](#)", CSA Country Profiles for Africa Series, 2020.
- Mbaye, A. and Signé, L. "[Climate change, development, and conflict-fragility nexus in the Sahel](#)", Brookings Institute Working Paper, March 2022.
- Navone, A. "[The Intertwined Futures of Climate Action, Fragility and Peacebuilding](#)", United States Institute of Peace, April 2021.
- Ortiz-Bobea, A. and others, "[Anthropogenic climate change has slowed global agricultural productivity growth](#)", Nature Climate Change, April 2021.
- Reliefweb "[Global Information and Early Warning System on Food and Agriculture Country Brief Mali](#)", October 2022.
- Selassie, A. "[The African Century](#)", December 2021.
- Tesfaye, B. "[Addressing Climate Security in Fragile Contexts](#)", Center for Strategic and International Studies, February 2022.
- World Resources Institute (WRI), "[Aqueduct Water Risk Atlas](#)", 2019.
- World Food Program (WFP), "[Global Report on Food Crises](#)", May 2022.
- World Food Program (WFP), "[Mali Country Brief](#)", November 2022.
- World Food Program (WFP), "[HungerMap: West Africa key insights and trends](#)", March 2023