Resilience strategies in response to drought and Covid-19 among Senegalese farm households

Awa Diouf and Thierno Bocar Diop

Farm households typically adopt resilience strategies to cope with shocks when they occur, but some of these measures, like lowering consumption or reducing spending, can be burdensome or ineffective. This study analyses resilience strategies put in place by farmers to cope with droughts and Covid-19. The results of this study suggest several implications for policies designed to increase the resilience of farm households. In response to recent droughts, government and NGO assistance have been more effective than farmers' own resilience measures such as off-farm activities and sale of farm assets, but this outside support risks creating dependency issues. In parallel with direct aid measures for the most vulnerable, governments should apply policies to improve the enabling environment for resilience strategies such as off-farm income-generating activities. In addition, government should set up more inclusive social safety net programs to reduce the vulnerability of households and to help them withstand sudden shocks such as Covid-19. Both exogenous and endogenous resilience measures are necessary, particularly for the most vulnerable households. Exogenous support measures, however, should not replace other policies aimed at reducing household vulnerability. Endogenous resilience strategies, which allow farmers to act on their own and directly meet their needs, also require support in the short to medium term.

The Vulnerability of Agriculture to Shocks

Agriculture is one of the most vulnerable sectors to the various shocks experienced by developing countries. These shocks can be economic or social, but above all climatic. Because agriculture in developing countries is still predominantly extensive and depends on climatic factors, in particular rainfall, shocks such as drought can negatively impact farmers' yields and incomes. Recently, the Covid-19 pandemic reemphasized the vulnerability of food systems in developing countries to shocks. Restrictive policy measures reduced access to markets for crop inputs and caused a drop in market demand for many agricultural products, leading to reduced yields and incomes. Many farm households suffered not only from an increase in input prices, but also from an increase in food prices.

To cope with these various shocks, farmers can apply several endogenous and exogenous resilience measures. This study aims to analyse the effectiveness of different resilience measures against climate and health shocks among rural farm households in Senegal. We ask:

- What are resilience strategies applied by Senegalese farm households?
- How effective were these resilience strategies against drought in years before Covid-19?
- How did farmers respond—with similar or different resilience strategies—to the Covid-19 pandemic and associated lockdowns?

We seek to provide guidance for public policies seeking to sustainably improve the resilience of farmers to environmental and public health shocks.

Study Approach

To answer these questions, we applied two methodological approaches. (1) For the period before Covid-19, we apply the propensity score method (PSM) to Senegal's national agricultural survey data for the 2017–2018 crop season, focusing on households that have suffered from drought as the most serious shock. More specifically, among households that experienced drought as the most severe shock, we compare the value of the production sold among those who have

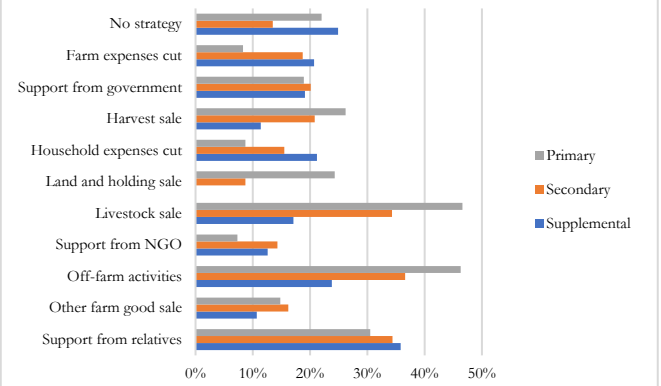
adopted a given resilience strategy versus those who have not applied any resilience strategy. (2) For the Covid-19 period, we analyse an original "Covid-19" database produced by the Initiative Prospective Agricole et Rurale (IPAR) focused on the Niayes area in Senegal. The lack of observations for households not having applied any resilience strategy in response to Covid-19 makes the PSM method unusable. Ultimately, given the sudden nature of the crisis and its repercussions for food systems, almost all farm households had to adopt one or more strategies. The analysis of the IPAR dataset therefore focuses on descriptive statistics of the resilience strategies adopted by farmers according to their sociodemographic and economic characteristics. Specifically, we ask: What were the strategies favoured by farmers according to their region, their main farm activity, their source of income, and the value of their production?

Main findings

How agricultural households coped with droughts

During the 2017–2018 crop season, drought was the most severe shock suffered by 24 percent of households in the sample, or 60 percent of households that have experienced any shock. To deal with this shock, farmers applied several resilience strategies, as summarized in Figure 1. The sale of livestock and off-farm activities were the most applied strategies by farm households having suffered from drought. This is followed by seeking support from relatives and friends. Government aid is used by the same proportion of households as a primary, secondary, and supplemental resilience strategy. The sale of land or buildings is applied by some households as a primary resilience strategy (though never a supplemental strategy when other options are available).

Figure 1. Resilience strategies applied against droughts



We aggregate the full set of possible resilience strategies into three categories for further analysis (Table 1): (1) *off-farm activities*: this strategy is considered endogenous, and does not depend directly on the main household activity, which is typically agriculture; (2) *sale of agricultural assets*: this strategy can have an impact on the productivity of the agricultural household because it involves the sale of goods normally intended for income-generating activities; and (3) *aid from government and NGOs*: this strategy is considered exogenous because it does not depend on the household but on social protection policies put in place by the government and non-governmental organizations.

Table1. Production sales (log) as a function of primary, secondary, and supplemental resilience strategies adopted in response to drought.

Resilience strategies	Nearest neighbor	Primary		Secondary		Supplemental	
		r(att)	N	r(att)	N	r(att)	N
Off-farm activities	(1)	-1.531 (1.536)	402	**4.182**** (2.043)	153	0.00423 (1.560)	155
	(2)	-1.061 (1.469)	402	**4.077**** (2.012)	153	0.471 (1.371)	155
Sale of agricultural assets	(1)	-0.648 (3.368)	61	-0.106 (4.674)	24	1.404 (3.784)	48
	(2)	0.861 (3.441)	61	2.117 (4.297)	24	2.939 (3.224)	48
Aid from government and NGOs	(1)	**4.774***** (1.753)	87	4.486 (3.670)	47	0.546 (1.951)	122
	(2)	**4.628***** (1.531)	87	3.842 (3.802)	47	0.617 (1.917)	122

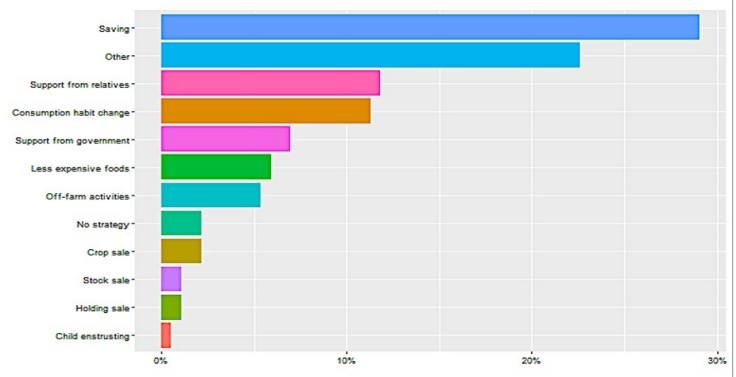
Source: Authors' calculations.

Results suggest that the exogenous resilience strategy of government aid is significantly associated with higher production sales value. Off-farm activities only appear to be effective only when applied as a secondary strategy complementing some other primary strategy. The sale of agricultural assets is not significantly associated with the value of production sales. Thus, exogenous measures appear more effective than endogenous resilience strategies in response to drought. These patterns may reflect the well-established finding that the sale of agricultural assets in response to shocks reduces availability of agricultural factors of production, which can have a negative impact on output and production sales. Similarly, engaging in off-farm income-generating activities decreases the time spent on agricultural activity and can therefore negatively affect production and sales. However, when off-farm activities accompany another resilience strategy, they can be effective coping measures in response to drought (Table 1).

How agricultural households coped with the first wave of Covid-19

The first case of Covid-19 in Senegal was detected on February 2, 2020. The first wave of the pandemic occurred between March and December 2020 and was hence covered by a survey carried out by IPAR as part of a project measuring the impacts of Covid-19 on food system actors in the Niayes area. The Niayes area covers four regions and supplies Senegal with about 60% of its consumption of horticultural products. With the negative effects of Covid-19 on food systems, producers have had to adopt various resilience strategies. Figure 2 shows that the use of savings was the most used strategy among respondents (more than 25%). Unlike the pre-Covid-19 period, off-farm activity was not widely adopted by farm households as a resilience strategy. Indeed, restrictive policy measures directly affected economic activity as a whole, reducing off-farm opportunities. This made it more effective for households to use savings to compensate for losses of income during the pandemic and associated lockdowns. Others changed their eating habits, lowered certain expenses, solicited the help of relatives and friends or sought government assistance to cope with the crisis. These patterns in resilience strategies differ dramatically from the patterns observed in response to drought—highlighting that the nature of the crisis can cause a change in the resilience strategies applied by households.

Figure 2. Resilience strategies during the Covid-19.



Source: Authors' calculations

Further analysis provides more information on the characteristics of households that applied a given strategy in response to the Covid-19 shock. Farmers with older household heads tended to rely more on external sources of support such as government and NGO aid flows, as well as support from relatives. This may reflect the relative vulnerability of these households, who may have limited endogenous resilience strategies (such as savings) available. It might also highlight the devastating effects of Covid-19 on some already vulnerable households, who became even more vulnerable as the pandemic continued. The public health shock exacerbated their already strained economic conditions and increased their dependency on external supports.

Policy Implications

It is crucial for policy makers to put in place a variety of support structures in order to increase the resilience of households active in food systems, in particular agriculture, which employs a large population of already vulnerable food system actors and must yet feed a continent marked by a

high prevalence of food insecurity. The results of this study suggest several implications for policies designed to increase the resilience of farm households.

In response to recent droughts, exogenous resilience methods, including government and NGO assistance, have been more effective than endogenous resilience measures such as off-farm activities and sale of farm assets. However, given the sudden nature of climate shocks and the limited forecasting capacities of developing countries, this solution may not be optimal. Indeed, one of the main criticisms of helping vulnerable households is dependency. Dependence on external aid (government, NGOs, others) may increase households' vulnerability, as this aid may not be sustainable. In addition, in the event of a sudden shock, the government may act late or make targeting ineffective, increasing the vulnerability of farm households. In fact, a recent IPAR survey during Covid-19 with the monitoring committees, distribution committee, and beneficiaries of the state emergency food aid program showed some failures related to targeting and storage, but also the delay in distribution in certain areas (Tounkara et al., 2021).

In parallel with direct aid measures for the most vulnerable, governments should apply policies to improve the enabling environment for resilience strategies such as off-farm income-generating activities. In some cases, policymakers may favour aid as a resilience strategy because it involves direct action towards households, which increases their popularity (cite). But in many instances the creation of an environment favourable to investment—through for instance credit, infrastructure, and education—could more effectively support the development and effectiveness of endogenous strategies to shocks and allow households to better fight against climate shocks in the medium and long term.

Government should set up more inclusive social safety net programs to reduce the vulnerability of households and to help them withstand sudden shocks such as Covid-19. The Covid-19 pandemic had serious consequences for farm households for which their resilience strategies were often inadequate. The pandemic has emphasized the importance of farm households' savings, which requires an income that covers more than consumption needs. This will undoubtedly require further investment in and development of the agricultural sector. Some other major adaptation strategies—including changing eating habits and reducing household spending—risk making households even more vulnerable over time. Moreover, many vulnerable farmers relied more on external help from governments or NGOs.

Both exogenous and endogenous resilience measures are necessary, particularly for the most vulnerable households. Exogenous support measures, however, should not replace other policies aimed at reducing household vulnerability. Endogenous resilience strategies, which allow farmers to act on their own and directly meet their needs, also require support in the short to medium term. For instance, well-targeted agricultural subsidies and aid for the intensification of agriculture may allow farm households to develop resilience to climatic threats, while policies fostering a business environment conducive to investment may enhance both on-farm and off-farm opportunities. Policies favouring education, which gives more opportunities to farmers; trade policies adapted to the development of robust local and regional food systems; and other policies supporting agricultural production and rural communities have the potential to not only increase production and household incomes, but also support national sustainable development goals more broadly.

Selected References

Tounkara, S., Faye, S., & Ndiaye, D. (2021). Le programme d'aide alimentaire d'urgence de l'État du Sénégal dans le contexte de la Covid-19: Étude qualitative des opérations de mise en œuvre.

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