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## **Misfortunes never come singly: Structural change, multiple shocks and child malnutrition in rural Senegal**

### **Key messages:**

- **Natural, biological, economic and health shocks and stresses often accompany one another, jointly affecting poor people's welfare in terms of income, consumption and health.**

- **Children are especially at risk, as they are the most vulnerable members of society, yet children can escape poverty traps so long as shock impacts are managed.**

- **Interventions and programmes that anticipate shocks and different impact pathways will support improved and more sustainable outcomes.**



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# Background

The proverb ‘misfortunes never come singly’ suggests that adverse events are connected, and that their impact is made worse because they happen together. The exposure of poor households to multiple and reinforcing shocks undermines their ability to escape from poverty traps. Climate risks and shocks therefore need to be considered in combination with other economic, biological and health shocks when designing development interventions and programmes for child health.

Droughts are a major risk to food producers in rural Senegal, and climate change projections warn that risks are increasing. Droughts are not the only adverse events households face. Peaking international food prices in mid-2008 and early 2011 increased food insecurity. This had harsh consequences in Senegal, which has high levels of undernourishment and of food import dependency.

The timing and coincidence of shocks can increase impacts, especially for children. In the long term, child nutritional status is particularly important as it affects individual health and working performance in adulthood (Alderman et al., 2006). Our research looked at the effects of multiple shocks on child weight and height, using a novel dataset of children living in poor households in rural Senegal.

The dataset was collected in two rounds during 2009 and 2011 after the second international food price spike. Originally, the purpose of data collection was the evaluation of a United Nations Development Programme (UNDP) intervention providing multifunctional platforms (Programme National Plateforme Multifonctionnelle or PN-PTFM), namely generators for off-grid village electrification. The comprehensiveness of the questionnaires allows exploring other relevant research questions. About 1900 households were asked whether they had experienced climatic, economic, biological and health shocks, and the year in which these events last occurred. We analysed how droughts and food prices affected child weight- and height-for-age, taking into account the impacts of other natural, biological, economic and health shocks. Notably, in 2011 we observed important structural improvements in both child anthropometrics and household socio-economic status due to nation-wide food and agricultural programs, thus we explore also the interaction between droughts, food prices and the structural changes in 2011.

## Box 1: Food Security in Senegal

Undernourished population:

20%

Population with inadequate access to food:

30%

Food import dependency:

50%

Source: (FAO 2013)



Woman and her child in a rice field, Senegal © USAID, CC2.0 <https://creativecommons.org/licenses/by-nc-nd/2.0/legalcode>

# Main findings

Between 3% and 6% of households were affected by drought, and up to 76% of households were affected by high food prices in 2011. The low prevalence of drought impacts is because we looked specifically at shocks during the Senegalese dry season (January–June), when little rain is expected. However, many Senegalese households also produce market crops in the dry season, and dry season droughts can significantly reduce income. In 2011, we also saw significant improvements in child height- and weight-for-age, possibly because of improved access to intervention programmes and services.

Our first finding concerns the effect of higher food prices and drought on children. An increase in purchase prices and droughts explained up to 24% and 43% of the standard deviation in child weight-for-age, respectively,<sup>1</sup> despite the considerable overall improvements in 2011. This highlights the potential benefit of measures to protect child health from droughts and food price shocks, even during periods of macroeconomic growth. Similar effects for droughts were found when considering child height-for-age. By contrast, food price shocks did not significantly reduce child height-for-age in 2011. However, this may be because reduced height-for-age results from long-term malnourishment, not captured in the short-term sampling of this study. By contrast, weight-for-age indicators better reflect the impacts of short-term malnourishment.

<sup>1</sup> After controlling for other economic, biological and health shocks.

Is it the case that misfortunes never come singly? Our second finding applies to children in households that reported both drought and food price incidence. For these children, experiencing both shocks has a negative but insignificant effect on both weight- and height-for-age. In economic terms, this suggests competing price and income effects: higher food prices increase the income of farmers producing for markets. This is particularly the case in times of scarcity, such as drought, also depending on other shocks. We explore this effect more in depth by considering several channels of effects.

**Cracked Earth in Nature Reserve of Popenguine in Senegal**  
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# Differential effects and possible pathways

The impacts of droughts and high food prices affected some groups more than others. Boys were more vulnerable than girls (most likely due to higher biological vulnerability to illness and low food intake), and the children of mothers with higher education levels were less likely to be negatively affected. Seasonal effects, different shock intensities, different drought measures and household involvement in social organisations, producer organisations, women's empowerment groups and groups for the management of multifunctional platforms and economic interests had no effect on these results.

The lack of significant effect of both shocks might be explained by household or village enrolment in specific social protection programmes. The dataset does not report this information, however the PN-PTFM can be considered a special form of social protection programme. The main results hold even after controlling for PN-PTFM availability, although PN-PTFM availability is positively but not significantly associated with both child weight-for-age and child height-for-age. Since 2006, there has also been increasing implementation of the national nutrition programme (Nutrition Enhancement Program – PRN) in rural areas. The programme aims to reduce child malnutrition through community activities such as growth monitoring, food supplements for underweight children and information, education and communication sessions for pregnant women (Natalicchio, 2011). Using data from the Senegalese Unit against Malnutrition, we tracked villages in our dataset in a 10 km radius around programme delivery sites, and found that our main results still held.

Additionally, in 2009 the Government of Senegal launched the GOANA (Grande Offensive Agricole pour la Nourriture et l'Abondance or Grand

Agricultural Offensive for Food and Abundance) programme aimed at making Senegalese households food self-sufficient by 2015 by increasing land cultivation and rice production (the major staple in Senegal). We estimated the drought and price shock effects controlling for rice-producing households and found the main results were unaffected. However, the variable accounting for rice producers was negative, suggesting rice production is not the main channel of insignificant effects on children experiencing both droughts and increasing prices.

Finally, we considered peanut production, since groundnuts are the main cash crop cultivated by surveyed households. Peanut cultivation and harvest took place in the year before the survey (during the period May–November 2008 and 2010) with very favourable rains. Household stocks for export should therefore be high, which in principle could cause a downward pressure on prices. However, peanut prices for both shells and kernels sharply increased during in the survey periods, which may account for higher household incomes. Econometric analysis shows that the height and weight of peanut farmers' children were not negatively affected by droughts and increasing food prices in the first half of 2011. Peanut farmers' children were healthier because of consecutive exceptionally good harvests in 2009 and 2010, and an increase in the price at which peanuts were sold at the beginning of 2011. These two factors acted as counterbalances to the negative effects of the early 2011 droughts.

# Analysis

Understanding the effects of multiple shocks on rural household welfare is crucial for informing interventions to make families and individuals more resilient. Our study suggests some important policy messages.

First, certain groups of individuals are more vulnerable to shocks (children and especially boys) and thus need special attention. In the case of children below five years, as the negative association between shocks and child health was significant only for children without educated mothers, investments to increase education of the mothers should be promoted.

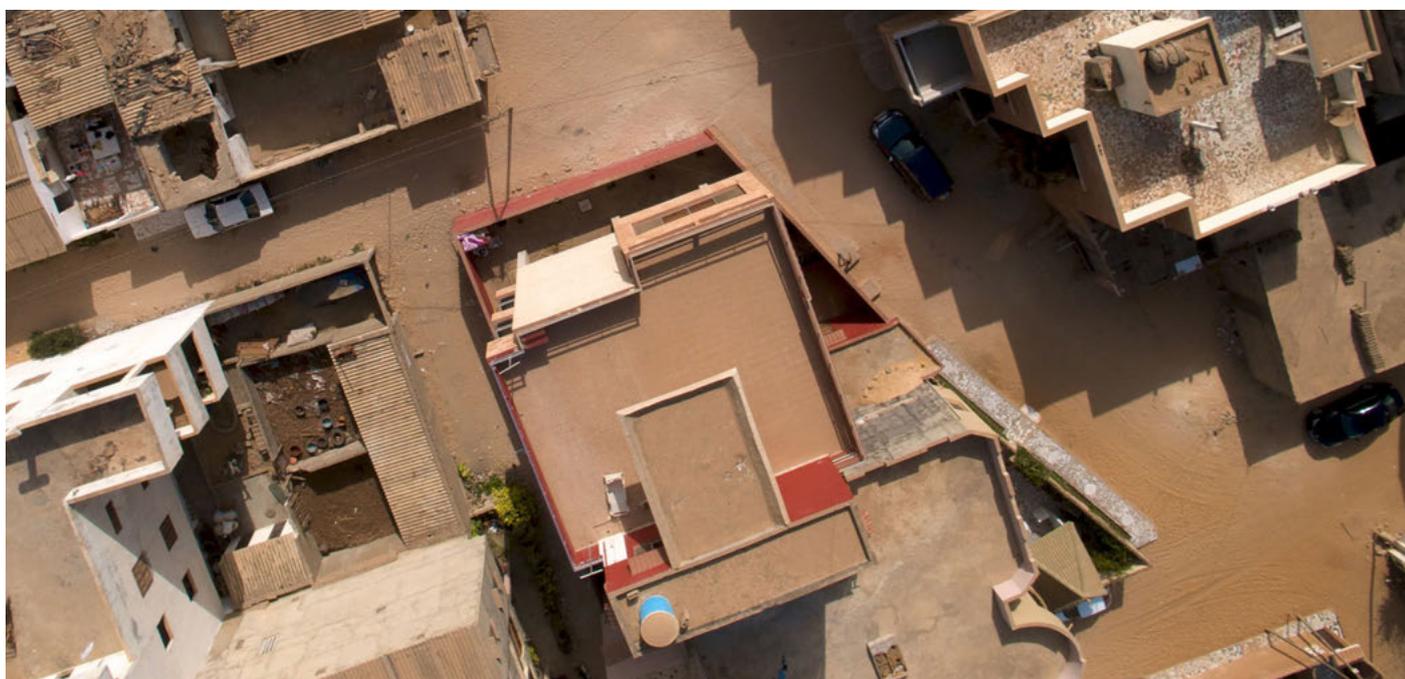
Second, we attempted to explicitly consider the resilience role of ongoing social policy programmes aimed at improving child nutrition (i.e. PRN) and agricultural household production means (i.e. through accessibility to multifunctional platforms), and large-scale programmes to reduce food import dependence (i.e. the GOANA programme). However, in absence of more accurate measures of program targeting, availability and enrolment and their actual links to climate and price related shocks, we cannot derive clear conclusions about the role of programmes for child health resilience. Collection and disclosure of these data will be crucial for a thorough and reliable evaluation of impacts.

**Boy shepard**

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Dakar roofs

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Third, children living in households that experienced simultaneous droughts and increasing food prices were left unaffected. This is despite the average effect of droughts (increase in purchasing prices) for the full sample being negative and significant, accounting for 43% (25%) of the standard deviation of child weight-for-age. The type of crops this subset of households produces and the timing of the analysis (considering shocks in January–June, focusing on the 2011 increase in international food prices) suggest the competitive advantage of cash crop farmers who are net sellers. However, we point out that, since our analysis focuses on the short term, we are not able to strongly claim cash crop income is a sustainable strategy to offset the adverse effects of shocks. This will also depend on the stability of external demand. For example, in the case of peanut production for export, recent developments show steadily increasing demand from China, Lebanon and other foreign buyers. This makes peanuts the new ‘gold’ for Senegal (Cissé, 2014). If external demand keeps increasing, the cultivation of peanuts may boost the economy of Senegal.

Other studies have shown how high food prices can have positive effects for smallholders who sell their products on the market (while harming poor consumers). Caverio and Galián (2008) suggest an additional range of factors required for increasing prices to have positive effects:

- Access to markets: small farmers often have difficulties in accessing the markets owing to physical constraints (lack of infrastructure connecting

villages to main domestic and global markets) and constraints on the availability of financial assets and services (high transaction costs).

- Access to inputs: if the prices of critical farming inputs such as fertilisers and pesticides increase more than producer prices, positive effects of rising food prices may be offset.
- Size of landholdings: small-scale farmers have challenges in accessing credit because of a lack of collateral. This indicates the need for secure land rights and access, and for extension services.
- Government investments and interventions in the agriculture sector have to be directed appropriately to avoid potential unwanted effects (e.g. a reduction in taxes on staple food may sharply reduce fiscal revenues, preventing the government supporting structural investments).

# Conclusions

Our analysis shows that growing up in poor shock-prone environments does not necessarily mean children cannot escape poverty. In the case of Senegal we find positive income effects from simultaneous price and drought shocks for the health of children in households cultivating peanuts. Still, more research is needed to address knowledge gaps on the relationship between child health and multiple shocks.

Knowledge gaps for future research include:

- strategic analysis of sustainable socioeconomic development patterns in Senegal: how income from cash crops sales has been allocated between consumption and saving/investment;
- assessment of long-term effects of price dynamics on households welfare;
- what has been and will be done to enhance Senegalese household resilience to climate short-term variability and long-term changes;
- the effects of the 2011 international food price spike and government food price controls on urban households

For policy-makers, multi-shock analyses and consideration of the different impact pathways could inform short-term intervention decisions and long-term programmes aimed at structural change. These could mitigate household and individual shock risks, while maximising resilience.

*‘...growing up in poor shock-prone environments does not necessarily mean children cannot escape poverty.’*



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## Research for climate-resilient futures

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