

## **Non-linear relations between income and vulnerability to drought: evidence from Malawi and Botswana**

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Assessing the vulnerability of food security to climate change by integrating socio-economic and environmental factors.

Vulnerability to drought is determined by environmental, socio-economic and institutional factors that lead to a lack of capacity to cope with even small rainfall perturbations. Identifying who is vulnerable is necessary to target actions that limit the impacts of droughts and to facilitate better coping and adaptation strategies. It is expected that under climate change the incidence and severity of droughts are likely to increase and the Intergovernmental Panel on Climate Change (IPCC) considers African countries to be particularly vulnerable to the effects of climate change. The poor are also considered most likely to be disproportionately affected by climate change impacts, particularly those engaged in agriculture and livestock dependent livelihoods. As a result development programmes have focused on improving the livelihoods and incomes of poor rural agricultural households, particularly in Africa.

This paper develops the hypothesis that households may actually become more vulnerable to droughts as they transition away from traditional agriculture towards more modern agricultural livelihood strategies. As such it is those in middle income groups who may be more vulnerable to drought than the poor or the better-off. This paper will present qualitative evidence from households in Malawi and Botswana of an “inverted U-shaped” relationship between vulnerability of livelihoods to drought and income. We hypothesize that this relationship arises because although traditional farming practices such as the use of traditional seed varieties and broadcast planting are less productive they are able to deliver harvests across a range of rainfall conditions. In contrast higher yielding modern crop varieties accompanied by the use of fertiliser have a narrower range of rainfall tolerances. High yields in “good” years, along with other assets, are therefore needed to buffer the losses from this strategy in years of drought. Middle income groups are often in transition from traditional to modern agricultural practices. As a result their use of higher yield varieties but lack of capital to buffer losses increases their vulnerability to drought.

The consequences of this hypothesis for research and policy are explored. Firstly, more empirical evidence is needed to discover the contexts in which the hypothesis is supported and middle income groups demonstrate greater vulnerability to drought. Secondly, it highlights a need for a more nuanced approach to identifying vulnerability to climate change that goes beyond focusing just on the “poor”. And thirdly, with more countries, communities and households being encouraged towards more modern agricultural practices in order to improve yields and so food security, more support is needed to help those in the middle to cope and adapt so as to reduce their vulnerability to drought while in transition.