

**Researchers**

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4,085 farmers

**Research Implemented by IPA**

No

# Insurance Against Cognitive Droughts: The Psychology of Water Scarcity and Insurance

## Abstract

Recent research suggests that droughts and other natural disasters may impact farmers' cognition as well as their agricultural income. As water becomes scarcer and the risk of a poor harvest increases, the stress of coping with a drought may cause farmers to perform worse on other mental tasks. In Brazil, researchers examined whether rainfall scarcity affected performance on cognitive tasks, and if so, whether offering rainfall insurance could help alleviate this stress. Results indicate that experiencing low rainfall or being primed to think about the consequences of low rainfall reduced farmers' cognitive ability and that offers of free index insurance did not mitigate these effects.

## Policy Issue

Natural disasters can have lasting impacts that continue to harm communities after the direct economic effects have dissipated. In particular, droughts have been linked to higher infant mortality, later reductions in educational attainment, and lower lifetime earnings for those born during or directly after the drought.<sup>1,2</sup> In addition, recent research indicates that these natural disasters may also harm farmers' cognition in the short term. As water becomes scarcer and the risk of a poor harvest increases, the stress of coping with a drought may cause farmers to perform worse on other mental tasks. Droughts and other natural disasters may then lead to suboptimal economic choices at exactly the time when it is most crucial for farmers to allocate resources efficiently. To what extent does the risk of drought affect cognitive performance, and can tools that mitigate economic risk also limit these cognitive effects? Researchers tested whether rainfall scarcity affected poor farmers' cognition, and if so whether offering free index insurance could mitigate these effects on

cognitive performance.

## Context of the Evaluation

In Ceará, in Northeast Brazil is poorer than average (per capita income of BRL 616 in 2010, compared to Brazil's average of BRL 1052), and drought prone - 60 percent of municipalities had below-normal rainfall between 2011 and 2015. In 2013, all municipalities except the state capital received emergency funds from the federal government to support the estimated 1.8 million family farmers living in the state. In response to the high prevalence of drought, the Brazilian federal government operates a rainfall insurance program to help farmers in the case of extreme, municipal-wide agricultural losses. The standard plan provides farmers with BRL 170 (US\$65) per month for five months if agricultural losses in the municipality are greater than 50 percent of the expected harvest; this is a significant sum in an area where about 80 percent of surveyed farmers earned less than US\$100 per month. Approximately 90 percent of farmers in the state are enrolled in this insurance plan.

## Details of the Intervention

Researchers partnered with Ceará State's Foundation for Meteorology and Water Resources and the Rural Development Secretariat of Ceará to evaluate the cognitive impacts of exposure to rainfall risk and of a supplemental insurance program.

The study recruited 4,087 farmers across 47 municipalities in Ceará to participate in the study; of these, 2,822 participated in at least one mobile-phone based survey. Participants were surveyed six times over the phone through an interactive voice response system. During each call, half of the participants were randomly selected listen to a message designed to "prime," or remind, them about the effects of drought in their municipality. The other half of participants listened to a neutral message.

Through a separate set of phone calls, researchers offered the free supplemental insurance program to 1,192 randomly selected farmers. The product would pay out an additional BRL 170 (US\$65) to farmers, on top of the payments they receive from the existing public insurance program, in municipalities that suffered greater than 70 percent harvest losses. This payout would come in June, two months before the (more generous) government payout in August.

Researchers measured the effects of exposure to rainfall risk and risk mitigation through the insurance product on farmers' performance on a set of cognitive tasks.

## Results and Policy Lessons

Results indicate that experiencing low rainfall or being primed to think about the consequences of low rainfall reduced farmers' cognitive ability and that offers of free index

insurance did not mitigate these effects.

**Worries:** Farmers who'd had more days without rain in the previous week reported being more worried about rainfall, as did farmers who were primed to think about droughts. The effect is stronger earlier in the rainy season (when uncertainty is greater) and for those who experienced below-normal rainfall shocks in the previous month. The effect of priming is equivalent to having one additional day with no rain in the previous week.

**Cognitive performance:** Farmers who experienced harvest losses or had more rainless days in the prior week performed more poorly on cognitive tasks, as did farmers primed to think about droughts. The magnitude of the effect of priming is equivalent to the effects of an additional day without rain in the previous week, or to losing 40 percent of a harvest. Earlier on in the season, farmers in municipalities without harvest losses experienced about 20% of the average cognitive effect for those who did, suggesting that at least part of the effect may be driven by risk.

**Focus:** While farmers primed about droughts performed significantly better in water- and money-related tasks (relatively to overall), a result consistent with the mental bandwidth/cognitive load theory, researchers did not find similar effects caused by exposure to rainfall shocks.

**Demand for products:** When given the chance to listen to offers for products related to rainfall protection (credit to install irrigation or crop insurance) compared to similar non rainfall-related products (general credit for consumption or funeral insurance), farmers who experienced lower than average rainfall were less interested in the rainfall protection-related products. This result could suggest that the additional cognitive load resulting from rainfall risk also prevents farmers from using products that could help mitigate those same risks.

**Effects of insurance:** The free index insurance offers did not affect worries about rainfall nor cognitive measures, not even among those at greater risk – those without access to irrigation or government insurance or who were exposed to negative rainfall shocks. Similarly, insurance did not affect worry among those primed to think about droughts. One explanation may be that the farmers in the sample were already enrolled in the government's more generous insurance program, so the supplemental insurance offer had little additional effect. However, in municipalities with higher average trust (measured by research at baseline through conventional trust games), insurance did mitigate worries and cognitive load.

## Sources

<sup>1</sup> Shah, Manisha and Bryce Millett Steinberg. 2013. "Drought Of Opportunities: Contemporaneous And Long Term Impacts Of Rainfall Shocks On Human Capital." Working Paper.

<sup>2</sup> Rocha, Rudi and Rodrigo R. Soares. 2012. "Water Scarcity and Birth Outcomes in the Brazilian Semiarid." Working Paper.

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