



## Resilience and Health Shocks

The potential of health savings accounts  
and health loans

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## Introduction

In September 2014, researchers Laura Paul and Ghada Elabed from the Agricultural and Resource Economics Department of the University of California, Davis, collaborated with Megan Gash of Freedom from Hunger to conduct a field experiment in rural Burkina Faso aimed at understanding how households respond to shocks and build resilience to face future shocks. In arid agricultural regions such as the Passoré Province of Burkina Faso, households have access to few resources for facing numerous health and environmental shocks. Economic games were used to introduce health savings accounts (HSAs) and health loans to participants, mimicking real-life products by a local financial service provider (FSP). Participants encountered real-life scenarios and were asked to manage shocks with the resources provided through their game, and their decisions on the use of those resources were recorded. There were real economic incentives to participate; the women received monetary rewards for attendance as well as for their final wealth level at the end of the game. The research identified key strategies that households used to respond to shocks—with and without access to the HSA and loan. The research aimed to help FSPs better understand the potential impacts of financial tools created specifically to cope with shocks and build resilience.

## Potential of Health Savings Accounts and Health Loans

HSAs and loans have benefits for households facing risks, but they also present trade-offs. On one hand, keeping money in a single-purpose savings account means less investment in productive capital, such as livestock. Because there are fewer funds available to invest, HSAs might result in lower earnings potential. On the other hand, saving for health shocks early and often would help households build resiliency; especially for the poor who may not have assets to sell or may not be able to rely consistently on informal loans. It can further help households avoid unplanned expenditures. Health loans enable households to spread out the negative shock over time, reducing the severity of the shock and the level of liquidity required to respond. However, health loan access is often conditional on having an HSA, limiting availability.<sup>1</sup> This research sought to understand whether households using these products were better off in light of these trade-offs and limitations.

## Methods

### Research Partners and Participants

Two Freedom from Hunger partners—le Réseau des Caisses Populaires du Burkina Faso (RCPB), a credit union that provides formal financial services, and Office de Développement des Eglises Evangéliques (ODE), a nongovernmental organization (NGO) that facilitates saving groups (SGs)—participated in this research. RCPB implements Freedom from Hunger’s Credit with Education as part of its village-banking program and, in 2006, designed and implemented a health savings and loan product. ODE implements Saving for Change, a methodology for self-managed savings and lending groups integrated with simple training in health, business, and money management. RCPB and ODE identified female members of their village banks and SGs across 20 villages near Yako in the Passoré Province; 400 were randomly selected to participate in the economic games (five did not complete the activity). Elabed designed the game, and Paul, with assistance from Elabed and Carter, oversaw data collection and analysis. A

1. However, the HSA and loan are available to all clients throughout the entire RCPB network.

short survey collecting mostly demographic data preceded the games. The Burkinabé research firm Centre de Recherche sur le Developpment Applique collected the data for the survey and the games. Note that the summary of the game design and findings in this research brief borrows heavily from a forthcoming working paper by Paul.

### Economic Game Design

The game aimed to gain insights on household decision-making and the potential of two novel financial instruments—an HSA and health loan. The HSA and loan were based on those of RCPB.<sup>2</sup> They were tested here to further understand the use and potential of the two products to help clients manage costly negative health shocks. Knowing more about the role that targeted financial instruments play in helping people manage health shocks is particularly helpful for financial services providers in designing effective products and services. Unpredictable incomes and scarce resources create a significant need from the poor for reliable and useful products to help cope with events in a way that directs them toward a path of resilience and away from one of vulnerability.

Participants in the economic games made choices about the allocation of resources against expenses in hypothetical scenarios. The game was divided into three rounds. In each round, participants played three “years” of the game, with each year divided into two seasons for a total of six seasons in each round. In the dry season participants received FCFA 6,500<sup>3</sup> of fixed revenue from a typical income-generating activity, such as selling crops, and in the rainy or hungry season before harvest, they received a lower amount, FCFA 5,000. After receiving their fixed income at the start of a round, they then determined the amount to spend on food (FCFA 3,000 for “higher-quality” food or 1,500 for “lower-quality” food) and the amount of money to invest in productive capital, in this case, chickens. Chickens cost FCFA 2,000 to purchase, they produced a chick that could be sold for FCFA 500 in revenue each round, and had a 10 percent chance of dying in each round. The risk of mortality was added as a way of making the investment in livestock more realistic; it could be profitable and also risky. Any money not spent on food, chickens, or hypothetical shocks was informally saved at home. The games were calibrated during a pilot stage to obtain realistic estimates for the amounts.

Participants faced three types of hypothetical shocks: livestock mortality, a health shock framed as malaria occurrence,<sup>4</sup> and a social shock framed as a family member or neighbor asking to borrow cash (with no expectation of the borrower repaying). In each round of the game, after participants received their fixed income, they learned whether any of their chickens had died, received FCFA 500 of income for each surviving chicken, and decided the amount to put into savings. Participants then learned whether they contracted malaria (50 percent probability) or whether a family member or neighbor asked to borrow money (also a 50 percent probability). The health shock imposed costs—either FCFA 4,000 up-front for treatment or FCFA 4,500 paid in a subsequent round due to loss of productivity caused

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2. See Gray and Gash (2015).

3. The Oanda Currency Converter (<http://www.oanda.com/currency/converter/>) quotes the exchange rate of US\$1= 578 FCFA as of 15 September 2015.

4. The incidence of malaria was chosen as the health shock because it is a very common disease in Burkina Faso. For more information on malaria incidence see the World Health Organization at [http://www.who.int/malaria/publications/country-profiles/profile\\_bfa\\_en.pdf?ua=1](http://www.who.int/malaria/publications/country-profiles/profile_bfa_en.pdf?ua=1). (Accessed 14 October 2015.)

by having malaria. There was a clear financial incentive to treat the illness. Participants covered these costs with household savings or through the sale of chickens. The social shock incurred an up-front cost of no more than FCFA 1,000 from cash savings only and did not require the sale of livestock if cash were unavailable.

Participants played the three-year (six-season) decision-making sequence for three rounds. In the first round, participants managed the shocks with income and livestock only. They then had access to HSA in round two, and access to both HSA and a health loan in round three. Note that they had to divide their income among food, livestock (a risky but profitable investment), and savings before knowing the outcomes of the shocks. Mimicking the RCPB product, HSA required a seasonal minimum deposit (FCFA 500), and the money saved here was available only to use for the health shock. Money placed in HSA could not be used for food or investment in chickens, but it was protected from the social shock of loan requests from family and neighbors. The account acted both as a commitment device and as a risk-free place in which to save. Participants with at least FCFA 2,000 in HSA could take out a health loan of FCFA 2,000 to pay for treatment if hit with a malaria shock. Table 1 summarizes the parameters of the entire game for each of the three rounds.

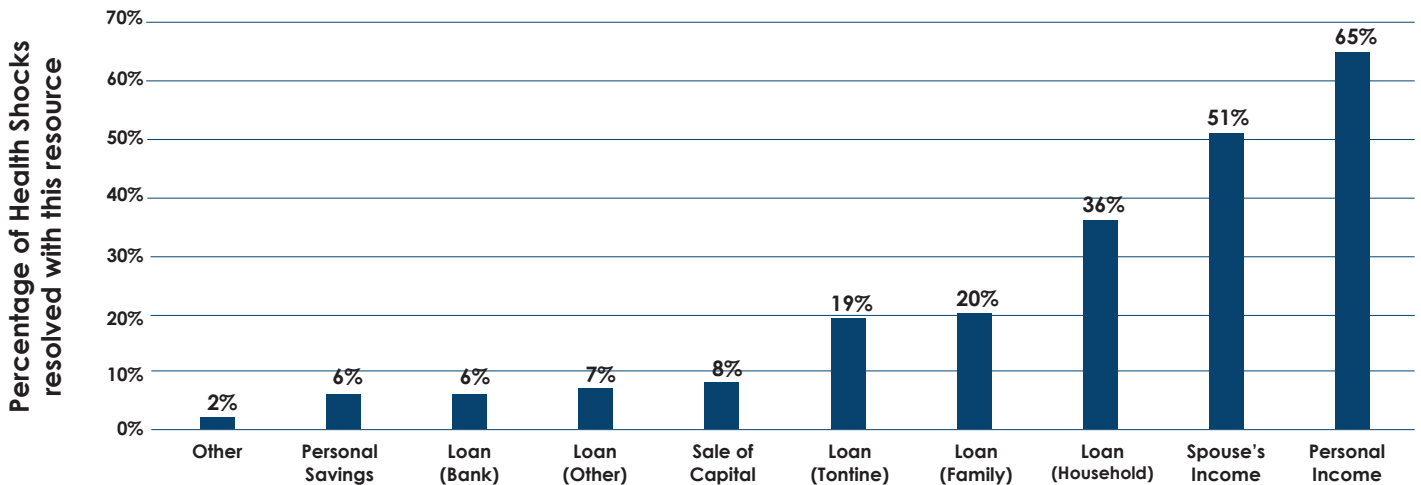
**Table 1. Game parameters, by round**

	Round 1	Round 2	Round 3
Fixed income	FCFA 6,500 in dry season; FCFA 5,000 in rainy season	FCFA 6,500 in dry season; FCFA 5,000 in rainy season	FCFA 6,500 in dry season; FCFA 5,000 in rainy season
Variable income	FCFA 500 per chicken	FCFA 500 per chicken	FCFA 500 per chicken
Chicken mortality outcome (10% individual chance of chicken dying)	Yes	Yes	Yes
<b>Shocks</b>			
Health (50% probability): FCFA 4,000 for treatment; FCFA 4,500 for productivity lost, paid in cash or selling of livestock	Yes	Yes	Yes
Social (50% probability): FCFA 1,000 cash only	Yes	Yes	Yes
<b>Decisions</b>			
Food FCFA 1,500 or FCFA 3,000?	Yes	Yes	Yes
Buy FCFA 2,000 chickens?	Yes	Yes	Yes
Keep savings at home?	Yes	Yes	Yes
HSA? (FCFA 500 minimum seasonal deposit)	N/A	Yes	Yes
Health loan? (FCFA 2,000)	N/A	N/A	Yes

## Findings

Short surveys conducted just before the games provided information on demographics, income-generating activities (IGAs), and resources to manage health shocks. Participants were, on average, 42 years old and had five children. Almost all women identified a source of income independent of household agricultural activities—most sold a millet-based drink or other food items. As mentioned earlier, all participants were active members of village banks through RCPB or SGs through ODE. That many of these households face serious health risk is clear: 72 percent of respondents reported a serious health shock in the past two years. While almost all have used their personal income or their spouse's income to cover costs of these shocks, many also relied on informal and formal loans and the sale of such household capital as livestock. Figure 1 depicts various resources women reported to cover serious health shock expenses.

Figure 1. Resources Used to Resolve Serious Health Shocks



## Computer Simulations

To understand how participants managed resources in the face of shocks, as well as to further explore the potential impacts of HSA and the health loan, the outcomes analysis used data generated from the games as well as data created from computer simulations based on the game scenarios. The computer simulations predicted how women would play, according to the actual game rules and to slight variations of them. This was done to determine the best strategy for maximizing the welfare of players. Outcomes from both the computer simulations as well as the games provided insight.

The computer simulations used a single-decision protocol, or rule of thumb, to examine the potential returns to HSA and loan use. The rule of thumb dictated keeping cash away from the home, always investing in chickens since they generate income, and saving the remaining cash in HSA (when it was available). Malaria treatment was paid using assets in the following order of preference in the simulations:

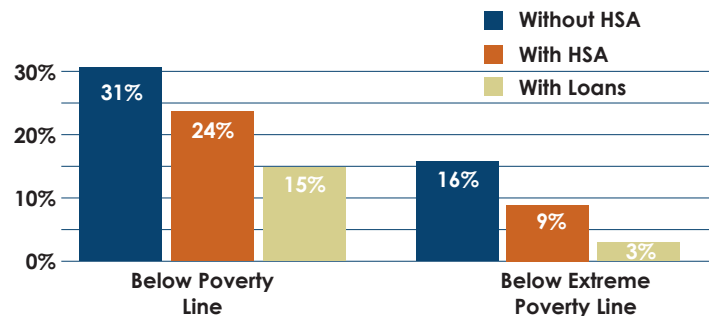
1. Cash
2. Loan, if available
3. HSA, if available
4. Sale of chickens

As in the real games, if the sum of assets were insufficient to pay for treatment, then the penalty of “loss of productivity” was imposed and the participant paid FCFA 4,500 to the game administrators in subsequent rounds. The final wealth of participants was determined by the sum of the cash at home, value of chickens, and value of the health savings, minus any debts at the end of the round 3. An arbitrary poverty line placed at the 30th percentile level in the first round of the activity without financial tools served as a benchmark for relative outcomes regarding wealth levels at the end of the game.

The parameters used in the games included what was later realized to be an unrealistically high return to the productive asset, framed as chickens (the return is revenue generated per chicken as compared to the cost of the chicken: FCFA 500 to 2,000, or 25 percent). The return to the asset was framed as the sale of chicks the chickens produced. As a result of the unrealistically high return rate, HSA made the poorest worse off since they were not investing that money in chickens. When the revenue from the chickens was decreased in the simulations to a more realistic revenue estimation, from 25 percent to 12.5 percent of FCFA 250, HSA uniformly improved outcomes. The health loans then further increased the well-being of participants. Decreasing the revenue from chickens increased the value of the savings instruments (the health savings and loan) because the expected opportunity cost of saved money, or the foregone revenue from a chicken, decreased and made investing in the chickens less attractive. When the revenue for chickens was at 25 percent, the poor were slightly worse off and the wealthy were slightly better off. With the more realistic return rate, both the poor and the wealthy were better off.

More specifically, with the lower return rate to chickens, 30 percent of participants ended the game below the poverty line when they did not have access to HSAs or loans, while only 23 percent of participants were below the same poverty line when they used HSAs. Participants were even better off when accessing both HSAs and health loans, with only 15 percent of participants falling below the poverty line. The difference is even more striking with an extreme poverty line: in the simulations without HSAs or loans, 15 percent of participants were under the extreme poverty line, as opposed to only 9 percent when HSAs were available, and 3 percent with HSAs and loans. The findings suggest that HSA is a tool that will act as a safety net for people at the bottom of the income distribution. Figure 2 illustrates the outcomes.

**Figure 2. Simulation Outcomes with Reduced Revenue from Chickens**



The rule of thumb for the game could be translated into real-world advice for clients of HSA products. The savings rule in the simulations was to always invest in productive livestock and save the remainder of income in the HSA, when available. This could be translated to day-to-day life in the form of weekly savings commitments to build up sums and to mentally take into account, or earmark, that money for expected health shocks. The analysis showed that an effective rule of thumb can be developed to help both the wealthy and poor be better off with these tools.

### Economic Game Outcomes

Since the game was actually played with the high 25 percent return rate on chickens, the outcomes were similar to what the computer simulation showed with the same parameter—that there were only a few benefits when participants had HSAs available versus when they did not. The gains from health loans found in the simulations, even at the high return rate on chickens, were not mirrored in the game data (data are not included in Figure 3). This could be due to the small number of participants who took loans during the administration of the game.

Further insights, however, came from the long-term outcomes or patterns emerging over six seasons from round 2. Long-term costs, such as forgone investment and income, of the health shock were slightly less for participants that had access to HSAs. Over time, participants were also able to build up resilience to, or the capacity to recover from, the health shocks. The health shock in the game required a payment of FCFA 4,000 for malaria treatment, but the long-term cost of a health shock was often much more because of losses in potential earnings generated from livestock. Figure 3 shows that when participants had access to HSAs, the long-term cost was less than when participants lacked access to HSAs, particularly during the early rounds of the games before participants had the opportunity to build up much resilience. In the final three seasons, the cost, *all other things being the same*,<sup>5</sup> to a household with access to an HSA and without are statistically indistinguishable. In other words, two participants with the same assets and wealth by the fourth season but differing access to HSAs will incur the same cost of a health shock. Recall, though, that in the first three seasons, the participants without access to HSAs will have incurred greater costs of health shocks (through using livestock to pay for treatment and foregone income) and might not have had the opportunity to build up assets due to lost income the same way those with HSAs would have had.

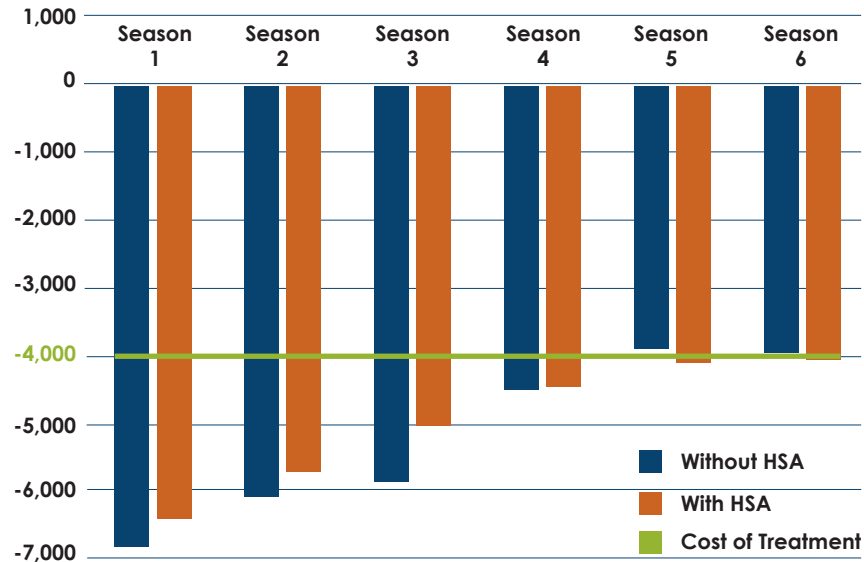
The largest determinant of participants' final outcomes was their luck with random shocks. Participants who experienced the most health shocks overall were the worse off at the end. They had little opportunity to build up their livestock and savings and thus had little resilience to subsequent shocks. Participants who were hit with a health shock early were also generally not as well off as participants who had the same number of shocks, but experienced them later on.

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5. Figure 3 was constructed using the results from a regression of health shocks and other controls on final wealth outcomes data.



Figure 3. Long-Term Cost of Health Shock (results from round 2, with HSA available)



## Conclusion

The findings suggest that HSA and the health loan have the potential to help the poor better manage health shocks, leaving them better off financially and reducing their long-term costs. This finding is similar to results found in rigorous research conducted in Kenya, where health savings mechanisms were tested among similar poor populations (Dupas and Robinson 2013), and highlights the value of FSPs and development practitioners investing in the design and development of shock-specific financial tools.

Statistical analysis of the games indicated that participants, in practice, did not benefit as much in the games as in the computer simulations, which were run using the rule of thumb of invest first, save remaining funds second—rules not always used by participants in the game. This rule of thumb should be promoted and practiced more to maximize positive impacts of a shock-specific financial tool. Economic games could be used to introduce the financial tools and a solid rule of thumb, helping to increase the chances of proper adoption. Using these financial instruments properly could then create real gains in building household resilience and long-term well-being.

## References

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