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Toward Scalable Agricultural Insurance

Early Evidence from a Dynamic Trigger Program in Kenya

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Introduction

Smallholder farmers in Kenya face substantial production and marketing risks driven by climate variability. In the arid and semi-arid areas of Eastern Kenya, rainfall is erratic even within a single season, yet most farmers depend on rain-fed production with little or no access to irrigation, credit, or savings to fall back on. Without a way to cushion these shocks, farmers are often reluctant to invest in inputs such as improved seed, fertilizer, and better agronomic practices that could raise their yields and resilience in good years. It is this chronic exposure to unpredictable and largely uninsurable risk that led the International Food Policy Research Institute (IFPRI), in collaboration with Kenya's Ministry of Agriculture, to design and scale an agricultural index insurance product for farmers in Eastern Kenya under the Kenya Agricultural Insurance Program (KAIP).

Agricultural index insurance was developed to protect smallholder farmers against production risk without the prohibitive administrative costs of assessing losses on individual farms, making it feasible to insure large numbers of farmers at once. Payouts are tied to an observable proxy, such as rainfall, measured against a fixed threshold. Yet uptake of index insurance has remained persistently low. Research has largely attributed this to basis risk, among other factors such as poor understanding, low trust in the product, and limited liquidity. Basis risk refers to the divergence between what the index measures and the loss a farmer actually experiences. As efforts to scale index insurance programs have intensified, basis risk tends to widen further, since

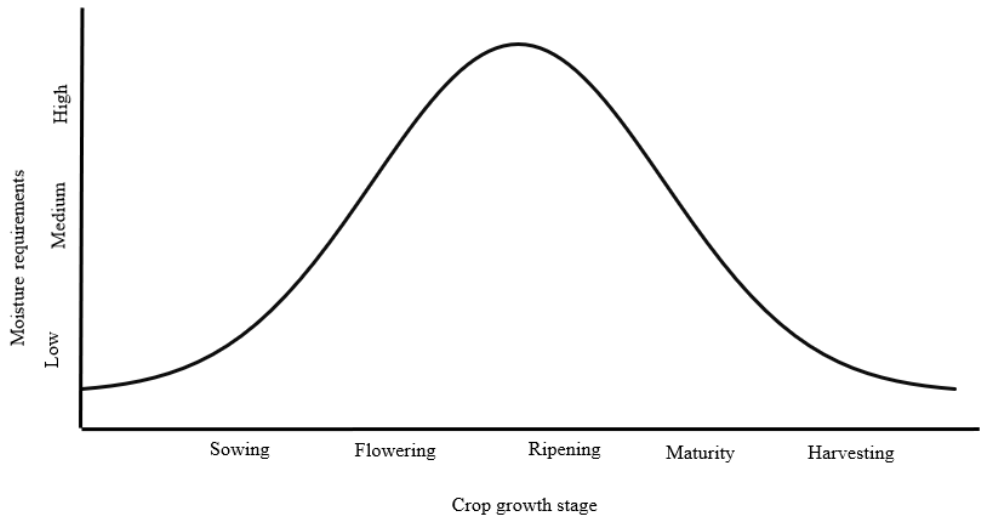
expansion into new areas brings different rainfall patterns and cropping calendars, making index design a moving target rather than a one-time exercise (Clarke, 2016).

IFPRI and KAIP collaborated to reduce design basis risk by developing and scaling a dynamic, crop-phenology-based trigger product. Instead of evaluating cumulative rainfall against a single seasonal threshold, the dynamic trigger adjusts as the crop moves through its growth stages, so the index is most sensitive to rainfall deficits exactly when the crop is most vulnerable to them. This project note describes the design behind the dynamic index and shares early implementation findings from Makueni county in Eastern Kenya.

About Dynamic Index Insurance Program

A dynamic index trigger follows crop phenology which is the growth stages of a crop from planting to harvest. Unlike static indices that apply uniform thresholds across the entire season, dynamic triggers adjust according to the specific water and weather needs of the crop at each growth stage (Figure 1). Insufficient rainfall during germination or flowering, for example, has far more severe yield consequences than the same deficit at maturity, and a phenology-based index can capture this variability more accurately. By tailoring thresholds to crop development, such indices improve the correlation between measured weather conditions and actual farm losses, ensuring that farmers receive payouts when they need them most (Turvey et al. 2019; Shee, 2022).

Figure 1: Typic crop(maize) growth stage and dynamic trigger



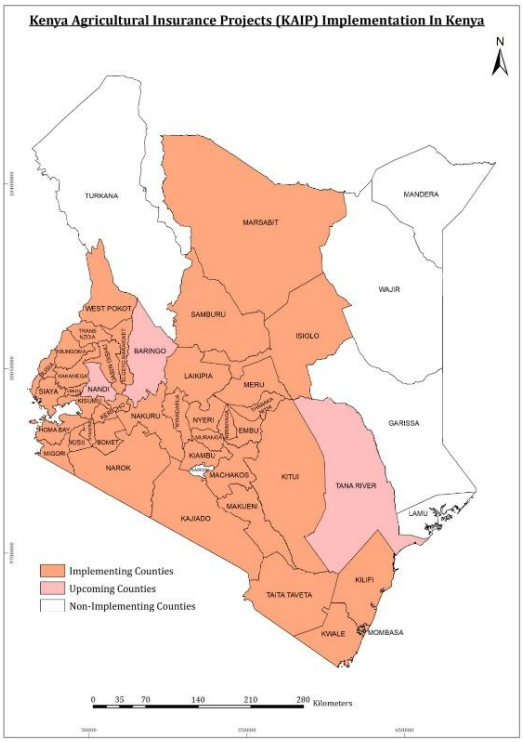
The trigger mechanism operates by continuously comparing the rolling 21-day cumulative rainfall with the dynamic trigger threshold. An event occurs when the rolling 21-day rainfall falls below

the corresponding dynamic trigger level. For each potential event window, the 21-day cumulative rainfall is evaluated against the trigger value for that specific day of the season. If rainfall remains above the trigger, the analysis proceeds to the next sequential 21-day window. When the observed rainfall falls below the trigger level, a payout event is activated. In accordance with the insurance policy design, events cannot overlap. Once an event is triggered, the next eligible evaluation window begins after the preceding event period ends. But closely tracking farm losses, this approach is expected to enhance farmer trust in insurance products, increases uptake, and strengthens the credibility and sustainability of programs such as KAIP.

The Kenya Agricultural Insurance Program

In 2016, the Government of Kenya launched the KAIP program to cushion smallholder farmers against escalating climate risks by providing access to affordable, tailored insurance products. Designed as a public-private partnership, KAIP brings together the government, insurance companies, and development partners around two core objectives: strengthening smallholder farmers' resilience to agricultural risk through expanded investment opportunities and providing direct financial support to farmers through agricultural insurance. The program now operates across most counties in Kenya (Figure 2) and covers five value chains: maize, sorghum, green grams, potatoes, and onions. As of 2025, KAIP has trained more than 3.5 million farmers and provided insurance coverage to 1.6 million farmers across 38 counties. For farmers with less than twenty acres of land, the government covers up to 50 percent of insurance premiums per acre, substantially reducing the cost burden for low-income households. The program relies primarily on area yield index insurance, which tracks average yields across a region, and weather-based index insurance, which draws on rainfall data from satellite or ground stations. Together, these approaches minimize the high costs, delays, and inaccuracies associated with assessing losses on individual farms, while keeping payouts more transparent and timely (Timu et al, 2025).

Figure 2: Map of KAIP implementation areas across Kenya



Study Area

The collaborative implementation was conducted in Makueni County, a semi-arid county in Kenya's Eastern province and one of KAIP's implementing counties (Figure 2). The county's rainfall is bimodal, split between the long rains (March–May) and short rains (October–December), but both seasons are erratic in onset, distribution, and total volume, leaving farmers with little certainty about when or whether the rains they depend on will arrive. Most households in Makueni farm smallholder, rain-fed plots planted with maize, sorghum, and drought-tolerant legumes like pigeon peas, green grams, and cowpeas. Farmers have limited access to irrigation to buffer against poor rainfall years. Livestock, mostly goats, sheep, and local zebu cattle supplement crop income and serve as a liquid store of value that households draw down when harvests fail. Agricultural financial access has improved with the spread of mobile money, but formal credit and insurance uptake remain low, and many households still rely on informal savings groups or shop credit to smooth consumption between harvests. This combination of unreliable rainfall, heavy reliance on rain-fed staple crops, and limited formal financial inclusion is what makes Makueni a useful testing ground for a phenology-based trigger. The insurance product was specifically designed to insure maize and beans farmers during the short rain season of 2025.

Implementation

The program was implemented between September 2024 and October 2025. The following activities were conducted during this period***:***

1. ***Stakeholder and partnership engagements;*** Before implementation, it was important to have the right set of partners. APA Insurance came on board as an underwriter of the program, alongside a reinsurer to backstop the risk. We also secured the support of local Ministry of Agriculture extension personnel, who would be responsible for training farmers, following up on enrollment, and providing support through the season.

    a. ***Training of trainers:*** The Ministry of Agriculture extension personnel were trained first, equipping them to understand the dynamic index insurance product in depth before they were asked to explain it to anyone else. This approach allowed the program build local capacity efficiently, relying on extension staff's existing relationships and credibility in their communities rather than sending in outside trainers for every session.

    b. ***Farmer Training:*** Trained Ministry of Agriculture personnel then led training sessions for farmers at the community level. Training covered two areas. The first was insurance literacy: helping farmers understand how the insurance product worked, what would trigger a payout, and what the product would cost them. The second was agronomic practice, reinforcing sound production decisions alongside a clearer sense of which risks the insurance was designed to cover, and which it was not. Pairing the two was deliberate to help farmers in understanding the type of insured risks and when to anticipate a payout. Given that women face disproportionately great barriers to financial market participation, the trainers used various incentives to encourage more women participants.

    c. ***Insurance uptake:*** The underwriter, APA insurance, collected premiums from farmers ahead of the season. Mobile payment was used to facilitate payment and transparency. A total of 2,460 farmers took up the dynamic index insurance product, with women accounting for approximately 41 percent of participants. On average, farmers covered about 2.01 acres, with an average premium payment of approximately KSH 3,914 (about US$30).

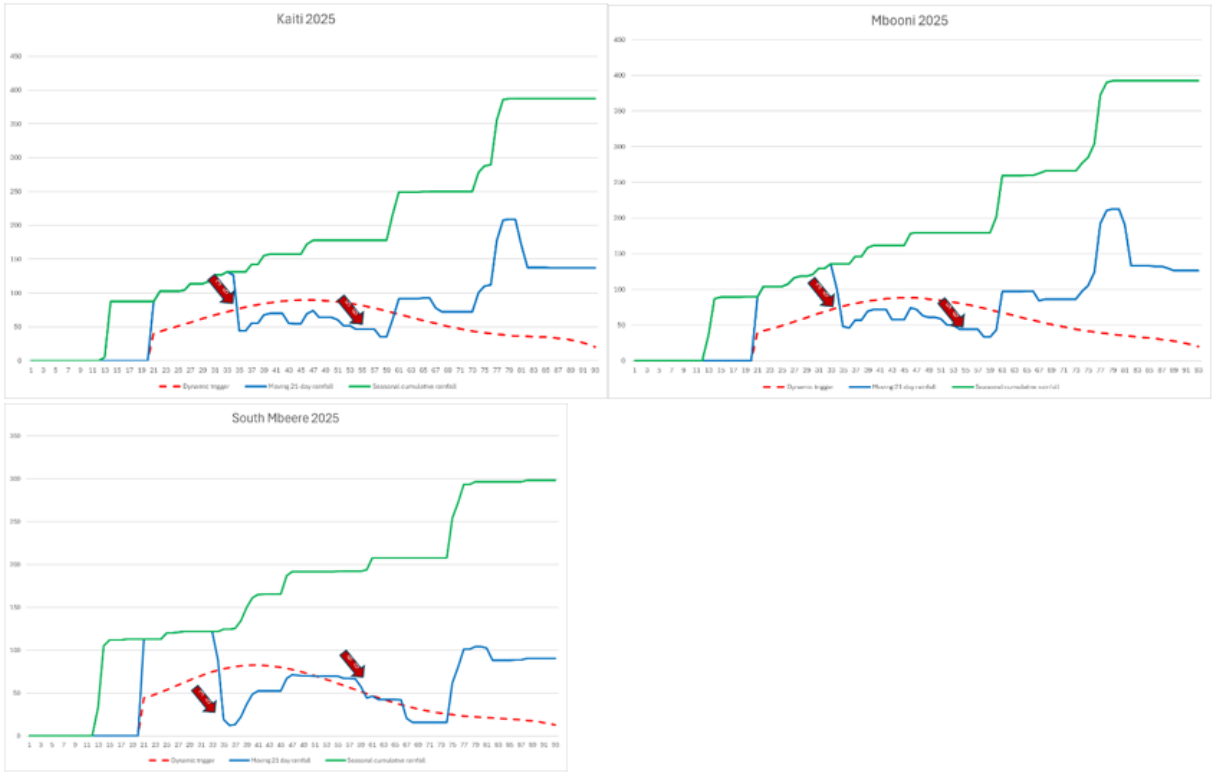
Payouts and Impacts

Based on the dynamic rainfall trigger insurance analysis for the 2025 cropping season, payouts were triggered in four sub-counties due to dynamic rainfall deficits. The final payout amounts are summarized below.

Sub-county	Payout amount (KSH)
Kaiti	6593
Mbeere South	6382
Mbooni	6104
Mbeere North	2651

Figure 3 shows several rainfall deficits occurring during the growing season across the four sub-counties, with arrows marking the periods when these events occurred. In each case, the deficits caused the rolling 21-day rainfall totals to drop below the dynamic trigger thresholds, generating a payout event. The number and timing of these events varied across sub-counties, reflecting differences in local rainfall patterns over the season, and areas that experienced deeper or more persistent deficits generated correspondingly higher payout values.

Figure 3: Rainfall deficit during maize growing season in Kaiti, Mbooni and South Mbeere sub-counties, Kenya



To assess how well the index reading matched the farmers' lived experience during covered the season, and to explore the potential impacts of payouts on household and farm outcomes, a focus

group discussion (FGD) was held in April 2025 with 165 insured farmers from the county. The discussion centered on three areas: farmers' perceptions of rainfall outcomes during the season, communicating information about the forthcoming payout, and exploring the potential impacts that payout would have on their households and farms. Farmers corroborated with the index reading that the rainfall conditions during the season had been below average. They also indicated that the payouts would be useful in supporting reinvestment in their farms and sustaining production the following season. They noted that timely payouts will help them absorb the shock of the poor season without forcing them into costly coping strategies such as selling livestock, and overreliance on food aid.

Conclusion

These findings are preliminary, drawn from a single season of implementation in one county, and should be interpreted with that caution. Even so, the early evidence from Makueni is encouraging, the dynamic trigger generated payouts that aligned closely with the rainfall deficits farmers reported experiencing, suggesting the phenology-based approach can meaningfully reduce basis risk relative to static index designs.

Realizing this potential at scale will require a proper evaluation of the product's effectiveness through multiple rounds of implementation across a broader range of counties, capturing the variation in rainfall regimes, cropping systems, and farmer behavior that scale-up. It is also important to conduct a quantitative household-level data collection to measure intrahousehold impacts of the program particularly, how payouts affect decision-making, resource allocation, and wellbeing across different members of the household, especially women. Finally, it is important to integrate the dynamic trigger approach into Kenya's national agricultural insurance framework would help extend its reach and embed it more sustainably within existing government structures, rather than leaving it dependent on project-based funding.

Alongside this expansion, some practical challenges will need to be addressed. Most importantly, farmers were not always truthful about the acreage they insured, introducing uncertainty into premium calculations and payout targeting that better verification mechanisms will need to resolve as the program grows.

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