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AREA YIELD-BASED INDEX INSURANCE AND INSURANCE-SAVINGS ACCOUNTS FOR RISK MANAGEMENT AMONG SMALLHOLDER FARMERS IN NEPAL

BASIS Assets & Market Innovation Lab and the I4 Index Insurance Innovation Initiative (BASIS/I4)

1 SUMMARY

The BASIS Assets and Market Access Innovation Lab and the I4 Index Insurance Innovation Initiative (BASIS/I4) propose a pilot of area yield insurance for rice farmers in Nepal's Terai region. This region was identified after an initial feasibility study determined that this "sweet spot" was the area and commodity with the greatest opportunity for both significant development impacts and where data can be effectively used to predict farmer outcomes and applied to an index insurance contract.

Given the failure to find a reliable external predictor, such as rainfall or satellite measures, we propose an area yield-based contract as the solution with the greatest potential to protect farmers from agricultural risk. Area yield-based insurance contracts are potentially the highest quality index insurance contracts, but they are also expensive to administer. As such, we propose the implementation of a small pilot study across 125 multi-ward zones to assess both the implementation costs and the development impacts of an area yield contract. Scaling up an area yield approach would only be worthwhile if its social and economic impacts are large enough to justify the costs. This study will seek to assess both the impacts and the costs of this risk management solution.

2 BACKGROUND

The BASIS/I4 have been developing and rigorously evaluating index insurance interventions for risk management for smallholder farmers across the world. I4 has developed a broad portfolio of projects investigating both the effectiveness and the development impact of index insurance interventions. Based on our prior study of the potential for agricultural insurance in Nepal (undertaken at the request of the USAID mission), we propose to apply this knowledge and experience to test index insurance as a risk management solution in Nepal.

2.1 Agriculture & Risk in Nepal

Farming by nature is a risky activity. The main source of risk in developing countries is often yield uncertainty: farmers cannot perfectly predict their yield at the time they plant because of variations in weather and other natural conditions. Such risk can have dual negative effects:

- ***Ex post* effect**: if a disaster happens, uninsured farmers often have to sell assets in order to repay debts and smooth consumption pushing them into destitution. Insurance helps farmers cope with such disasters and prevents them from falling into a level of destitution from which it is difficult to recover (a poverty trap).

- ***Ex ante* effect**: when risk-averse farmers perceive their activity as risky, they may choose to underinvest in "risky" business opportunities in order to avoid risk, often at the cost of lower expected or average earnings. By reducing risk, insurance can encourage investment, increase the demand for credit, and improve access to finance because lenders have a guaranty that farmers can repay loans when a disaster occurs. These investments can help increase yield and reduce poverty.

Despite the potential for both *ex ante* and *ex post* impacts of insurance, insurance markets remain underdeveloped in developing countries, including Nepal. One of the most important factors explaining the absence of insurance markets in developing countries is the prohibitive cost of traditional insurance: insurance companies cannot supply insurance products at the level of price that poor farmers demand such products due to the high cost of assessing losses and delivering indemnities.

While farmers may often have informal risk-sharing arrangements to help a single farmer in a time of significant individual loss, when a disaster strikes an entire community, these informal arrangements do not provide adequate protection to farmers. Many of the predominant risks to agriculture are shared by many farmers in a region at the same time—drought and floods, for example, and generally impact many people in the same geographic area at the same time. Index insurance is an innovative alternative that is designed to deal with precisely these types of covariate, or shared, risks.

The weakness of index insurance is that it only covers shared risk, common to all or most farmers in an area. Idiosyncratic risk, or risks that affects one farmer in an area but few or none of his peers, is not covered by index insurance. As such, index insurance is only an appropriate solution if a significant amount of the risk faced by farmers in an area is shared risk, such that it provides a reasonable degree of protection to the farmers. If this is not the case, such an insurance product may not meet safe minimum standards (additional details on "safe minimum standards" available in section 2.4 below).

2.2 Potential Impacts of Index Insurance

Based on our previous experiences and results, we expect both *ex-ante* and *ex-post* impacts from providing index insurance products. The provision of index insurance can encourage farmers to invest in "risky" but more profitable business opportunities (*ex-ante* impacts). And farmers often cope with shocks by selling their assets in order to repay debts or smooth consumption. The indemnity from index insurance can prevent from such losses in the assets (*ex-post* impacts).

Several recent studies find strongly positive *ex-ante* and *ex-post* impacts of index insurance provision (e.g. Elabed and Carter 2015a; Janzen and Carter 2013; Karlan et al. 2014; Mobarak and Rosenzweig 2012). For example, Elabed and Carter (2015a) find that the area-yield index insurance provision for the cotton farmers in Mali lead to a 15% increase in the cotton area and a 14% increase in the seed expenditure per hectare. Karlan et al. (2014) find the rainfall index insurance provision in Ghana induced a 15% increase in total agricultural investment. Related to *ex-post* risk coping behavior, Janzen and Carter (2014) find the index insurance provision in Kenya reduces the probability of selling assets when farmers go through a disaster.

Low demand for index insurance remains a challenge. Using framed field experiments in Mali, Elabed and Carter (2015b) show that the compound lottery structure of index insurance dampens the demand for index insurance and stress the importance of minimizing the basis risk in insurance contracts. Area-yield index insurance has lower basis risk than other index insurance products since area yield is the best predictor of shared or common risk in the area, and so should experience less of a "dampening" effect on demand.

2.3 Insurance & Regulatory Environment

In January 2013, The Government of Nepal (through the Insurance Board) introduced crop and livestock insurance directives to encourage insurance companies to develop *commercial* agricultural insurance. The objective is to offer farmers and investors in the agricultural sector the tools to reduce the risks associated with loss/damage resulting from situations beyond control- (flood, landslide, drought, excess rainfall, hailstones, snowfall, frost, diseases/pests, earthquake, etc.).

The directive introduces the obligation for non-life insurance companies to offer agricultural insurance but the authorities have not aggressively enforced this obligation in order to let insurance companies adapt and learn. The directive also offers guidelines for the insurance policies that insurance companies can use. Insurance companies are also free to submit their own schemes for approval by the Insurance Board. While there has been some participation by the insurance companies in the provision of livestock insurance, very little has been done to provide crop insurance in Nepal.

In an attempt to make insurance affordable to smallholders, the Ministry of Agricultural Development (MoAD) introduced a subsidy on the premium paid for insurance of crop and livestock in June 2013. The MoAD provides a 50 percent subsidy on insurance premiums paid by individual farmers, farmers' groups and farmer cooperatives. The maximum value at risk for this subsidy program is Rs. 10 million (USD 100,000). This subsidy scheme was originally scheduled to stop after 5 years; insurance policies would have to reach sustainability by that time. However, given the low levels of uptake on the subsidy, it is no longer clear if/when these subsidies will be withdrawn.

In the 2013-2014 fiscal year, less than 20% of the budgeted amount was used. In response to this low disbursement level, the subsidy was increased to 75% next fiscal year and the overall budget was cut in half (to USD 650,000). The government remains committed to supporting crop insurance, however, and is willing to hear new suggestions and recommendations on how best to encourage the development of a crop insurance market.

2.4 USAID-Nepal Index Insurance Feasibility Study

In 2014, USAID-Nepal approached the BASIS AMA Innovation Lab and it's I4 Index Insurance Innovation Initiative to conduct a feasibility study of the potential for index insurance for smallholder farmers in Nepal.

In the first stage of this study, BASIS/I4 researchers looked across a broad variety of commodities and geographic areas to create a short list of those commodities/areas where insurance can have large impacts by crowding in new investment and prudential risk-taking by small-scale farms. Based on this initial work, researchers determined that insurance for rice in the Terai had the greatest potential for development impact through an index-insurance product.

In Stage 2, researchers closely examined rice in the Terai to determine whether an effective index insurance contract could be designed. Unfortunately, the research returned a pessimistic conclusion on the feasibility of an effective index insurance contract using an external measure (rainfall, satellite, etc.). Based on prior success in Tanzania, BASIS worked with a leading geospatial software engineering firm to use high-resolution satellite information, coupled with modeling approaches, to try to correlate these data with yields. However, the results indicated that the satellite measure would not predict farmer losses at the tolerable level and so would not be a feasible index. This is primarily due to dense and persistent cloud cover during the growing season that severely limits the quality of satellite data available.

Using data BASIS/I4 had collected in the Terai, the research team tested the feasibility of an area yield-based product. An area yield contract relies on a seasonal yield survey in which average yields in a region (such as a VDC or a Ward) are directly measured and then used as the basis for payouts. Insurance payouts are then triggered whenever VDC yields fall below a trigger level (e.g., 80% of their long-term average).

As this is based on actual yield information rather than an external indicator, this should be best able to predict farmer outcomes. Based on our initial analysis, at least forty percent of the overall risk faced by farmers could be covered by a "multi-ward" area-yield index, set at the level of several neighboring wards. Had this area yield contract existed in 2014, 66 percent of farmers who reported losses in our survey would have received a payout, had they had an area-yield index insurance policy.

While the analysis reveals that the idiosyncratic risk is relatively high in the Terai, the level of risk coverage that would be offered by an area yield contract at this level would still offer valuable risk management for farmers. Our research to date indicates that an area-yield index insurance product would meet the "safe minimum standards" for index insurance, such that the willingness to pay for index insurance is not below the expected average payout. In other words, buying this index insurance product would not make farmers worse off than not buying it.

To assess whether or not the proposed area-yield index insurance would meet these safe minimum standards, we conducted an analysis of the maximum price that farmers are willing to pay for this insurance product. In other words, we compute the price at which farmers would be indifferent between having no insurance and purchasing an insurance product. Such equilibrium price is called a "reservation price". Using data from our retrospective yield survey, we compute the reservation price for area-yield index insurance with some assumptions. The reservation price is linked to the degree of risk aversion people have. Indeed, someone who is risk neutral would necessarily have a reservation price equal to the actuarially fair price. However, someone with a greater level of risk aversion could be willing to pay a much higher price for insurance contracts that provide some risk reduction because he fears low yield years much more than he enjoys high yield years.

From our survey data, we obtain the estimates on the standard deviation of the normalized area yield and the standard deviation of idiosyncratic errors, which are 22.92 and 36.77. In other words, we specify the normalized individual yield (denoted as $yield_i$) distribution as

$$yield_i = yield_v + e_i$$

where $yield_v$ follows N(100, 22.92) and e_i follows N(0, 36.77).

With a specific utility function assumed, we can compute the reservation price for area-yield index insurance that would trigger when average yields in a designated area fall below 80% of its historical average (consultation with farmer groups will be used to pick the level of coverage and other contract features that most appeal to farmers). Because the calculated reservation price is greater than the actuarially fair premium, which is the expected average payout, farmers would not be worse off with the area-yield index insurance.

Figure 1 Reservation Prices

Figure 1 illustrates the relationship between the reservation price and the degree of risk aversion when the 50% of income comes from rice farming and the other 50% comes from elsewhere which is not risky. The left y-axis is measuring the reservation prices as the share of the expected average income and the right y-axis is measuring the reservation prices as the share of actuarially fair premium. The actuarially fair premium is about 1.17% of the expected average income and about 2.34% of the historical average of area yields. For the relative risk aversion coefficients in 1.5 – 2.5, the reservation price ranges from 136 – 170% of the actuarially fair premium.

This means that the most of farmers would pay more than the expected insurance payout for the area-yield index insurance that covers the 80% of the historical average. Note that the reservation price increases as the share of income from the rice farming increases. The more a farmer relies on rice farming, the more valuable rice income smoothing via insurance may be to them.

3 PROPOSED INTERVENTION

Based on the findings from the feasibility study, as well as our discussions with USAID, the Government of Nepal, and other potential partners, the BASIS/I4 team proposes the following:

1. Design and implement two area-yield index insurance contracts: Define "Insurance Zones" and design and implement two types of area-yield index insurance contracts, Full Protection and Catastrophic Protection.
2. Work with the Government of Nepal to implement the application of "smart subsidies" to an area yield-based index insurance product; these subsidies are budget neutral compared to their current subsidy scheme and develop a marketplace for agricultural insurance.
3. Further develop and test a new model for the aggregation of insurance demand by creating insurance-savings groups and payout distribution, the "I4 VISA Model".

Combined, the BASIS/I4 team believes these actions will help develop a market for crop insurance in Nepal. We now discuss each of these tasks in greater detail.

3.1 Area-yield Index Insurance Contract Design

As a part of contract design, we will define "Insurance Zones". If the size of "Insurance Zone" is too large, the correlation between individual yields and area yields would be weak and hence there would be greater basis risk (or risk that area yield contract would not be triggered when individual insured farms suffer losses). If the size of "Insurance Zone" is too small, individual farmers are capable of coordinating to affect the area-yield index to try to force a payout. As such, the index insurance contracts for small "Insurance Zones" are more prone to have moral hazard and adverse selection problems. Moreover, the size of "Insurance Zone" is directly related with the cost of implementation. Therefore, considering this size-cost trade off, we define the size of "Insurance Zone" as about 400ha of rice fields with about 400~500 farms. Each VDC includes about 2.7 Insurance Zones. The distribution by district is reported in Section 4.

We propose two area yield-based index insurance contracts: Full Protection and Catastrophic Protection. Full Protection covers up to the 80% of historical average area yield. In addition to Full Protection, we introduce Catastrophic Protection that covers the 50% of historical average area yield. Catastrophic Protection covers disastrous losses that can threaten the survival of farm households whereas Full Protection covers more losses but is more expensive.

This section presents illustrations of the two contracts. Using parameters from our recall survey data, we compare the payout schedules and the contract prices of Full and Catastrophic Protection contracts. The contracts are based on the historical average area yield of 3,300kg/ha (Black dashed line in Figure 2) and the farm price of rice of $0.20/kg.

Figure 2 illustrates the payout schedules for each contract. Blue solid line describes the indemnity payout schedule for Full Protection. The insurance payout for Full Protection triggers when the area yield of an "Insurance Zone" falls below the 80% of its historical average (Blue dashed line). Note that Full Protection has four payout intervals. Red solid line describes the payout schedule for Catastrophic Protection. The payout triggers when the area yield falls below the 50% of the historical average (Red dashed line) and it has only one payout interval.

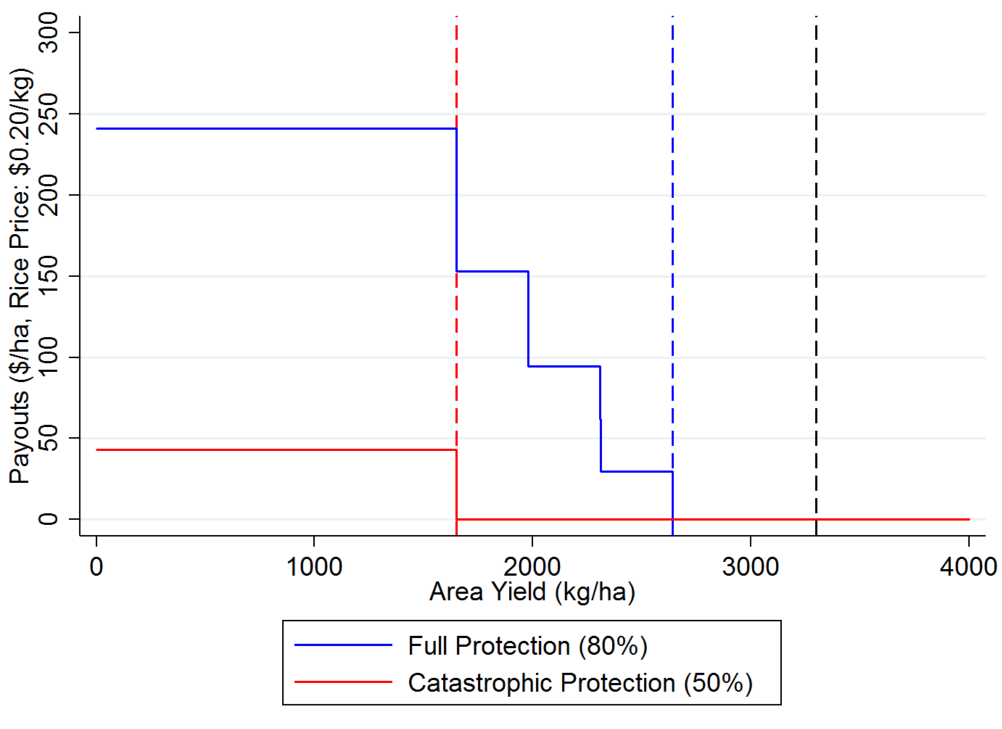

Figure 2 Payout Schedules

Table 1 and 2 show the payouts in detail and fair and market premiums for each contract based on our retrospective yield survey. From our survey, we parameterize the historical average of an area as 3,300kg/ha with a standard deviation of 249.6 kg/ha. The estimated probability for each interval is computed based on the normal distribution with this parameterization. We assume the price of rice is $0.20/kg.

Table 1 describes Full Protection contract. As Figure 2 illustrates, the insurance payout triggers when the area yield falls below 2,640kg/ha, which is the 80% of its historical average. The payouts are computed as the 80% of the historical average area yield minus the conditional expected area yield for each interval. For example, the area yields in between 70~80% of the historical average have the conditional expected yield is about

2,491.5kg/ha and therefore, 2,640 – 2,491.5 = 148.5 kg/ha is the insurance payout for this interval. Similarly for other intervals, the sums of the conditional expected area yields and the insurance payouts are equal to the 80% of the historical average area yield.

The fair premium of this insurance product is calculated by summing up the product of the payout and the corresponding estimated probability. The market premium is the sum of the fair premium and the mark-up of 40%. This mark-up estimation is based on our experiences with the insurance industry in other contexts. The estimated market premium is $20.51/ha for Full Protection.

Table 1 Payout schedule and premium: Full Protection with 80% coverage

Yield Interval (% of Normal Yield)	Payout (A)	Estimated Probability (B)	Expected Payout (A x B)
Above 2,640kg/ha (80%)	$0.00/ha	81.2%	$0.00/ha
2,310~2,640kg/ha (70~80%)	148.5kg/ha x $0.20 =$29.70/ha	10%	$2.97/ha
1,980~2,310kg/ha (60~70%)	479.9kg/ha x $0.20 =$94.38/ha	5%	$4.72/ha
1,650~1,980kg/ha (50~60%)	765.6kg/ha x $0.20 =$153.12/ha	2.5%	$3.83/ha
Below 1,650kg (50%)	1,204.5kg/ha x $0.20 =$240.90/ha	1.3%	$3.13/ha
Fair Premium	$2.97/ha+$4.72/ha+$3.83/ha +$3.13/ha =$14.65/ha		
Market Premium (40% Mark-up)	$14.65/ha x 1.4=$20.51/ha		

Table 2 describes Catastrophic Protection contract. The insurance payout triggers when the area yield falls below 1,650kg/ha, which is the 50% of its historical average. The payouts are computed as the 50% of the historical average area yield minus the conditional expected area yield for the area yields below the 50 % of the historical average. Similar to Full Protection, the fair premium is calculated by summing up the product of the payout and the corresponding estimated probability and the market premium includes the 40% mark-up.

Table 2 Payout schedule and premium: Catastrophic Protection with 50% coverage

Yield Interval (% of Normal Yield)	Payout (A)	Estimated Probability (B)	Expected Payout (A x B)
Above 1,650/ha (50%)	$0.00/ha	98.7%	$0.00/ha
Below 1,650kg (50%)	214.5kg/ha x $0.20 =$42.90/ha	1.3%	$0.56/ha
Fair Premium	$0.56/ha		
Market Premium (40% Mark-up)	$0.56/ha x 1.4=$0.78/ha		

In Summer 2016, we plan to conduct a detailed area yield survey, which will provide more precise information for the estimation on the distributions of area yields. Section 4 discusses the survey in more detail. With more precisely estimated area yield distributions, we will have improved versions of Table 1 and 2. As soon as the contract design is ready, the contracts will be presented for review by partner insurance companies and ultimately by the Insurance Board of Nepal.

3.2 An Alternative Subsidy Scheme

Many governments offer insurance subsidies by offering a fixed percent cost share on whatever amount of insurance the farmer chooses to buy. Of course if the farmer buys no insurance, then no subsidy is paid, and the market does not begin to develop. To date, the Government of Nepal has pursued this strategy with poor results, as described in section 2.3 above.

BASIS/I4 recommends an alternative, "budget-neutral" subsidy scheme that 1) provides better risk protection to farmers and 2) creates and promotes the market for agricultural insurance. Instead of partially subsidizing every agricultural insurance product, we recommend that the Government of Nepal provide a 100% subsidy on the insurance premium for Catastrophic Protection and a partial subsidy rate for the supplementary protection. We recommend a 100 percent premium subsidy for Catastrophic Protection, and a 60 percent premium subsidy for additional cost for the Full Protection contract.

Even with an anticipated insurance company mark-up, the cost per unit of catastrophic risk coverage is still quite low, which makes this a budget-neutral option compared to the government's current subsidization at a 75% level (assuming the same uptake rates). This 100% coverage of catastrophic risk would be implemented through the innovative new "I4 VISA Model" (detailed below).

By providing free Catastrophic Protection, we expect farmers to have better risk protection and the market for agricultural insurance to be created. We propose 100% premium subsidy for Catastrophic Protection & 60% premium subsidy for additional cost for Full Protection. This simple shift in how subsidies are allocated across risk layers should aid the development of the insurance market.

The following simple budget layout shows the sense in which our proposed alternative scheme is approximately budget-neutral for the Government of Nepal.

- *Current Standard Scheme: 75% Premium Subsidy for Full Protection*
  - Subsidy for Full Protection: $20.51/ha x 75%= $15.38/ha
  - Per Hectare Government Cost: $15.38/ha

- *Our Proposal: 100% Premium Subsidy for Catastrophic Protection & 60% Premium Subsidy for Additional Cost for Full Protection*
  - Subsidy for Catastrophic Protection: $4.38/ha x 100%= $4.38/ha
  - Subsidy for Additional Cost to Full Protection: ($20.51/ha-$4.38/ha) x 60%=$9.68/ha
  - Per Hectare Government Cost: $4.38/ha + $9.68/ha=$14.06/ha

This proposal has been presented to both the Ministry of Agriculture and Development and the Insurance Board. These preliminary meetings were positive, but we have not obtained commitment from the government to test this revised "smart" subsidy scheme. We will have to secure all appropriate approvals and achieve full cooperation in order to move forward with this proposed subsidy scheme.

3.3 Village Insurance-Savings Associations (VISA)

The BASIS/I4 team also proposes and innovative approach to risk management and resilience for vulnerable smallholder agriculturalists: the Village Insurance-Savings Association (VISA). Inspired by the microcredit sector's Rotating Savings and Credit Associations (ROSCAs), and their success in developing a market and inspiring small-scale farmer investments, VISAs have the potential to spur farmer investment in insurance and to aggregate insurance sales to make sale and distribution of contracts both logistically feasible and financially profitable for the insurance sector.

Similar to ROSCAs, VISAs would meet regularly and contribute a small, agreed upon set amount each meeting to gradually pool enough savings to purchase the insurance. These meetings could begin shortly after harvest, and would continue until sufficient funds have been saved for the purchase of insurance.

When all farmers have reached the target amount to purchase insurance, the purchase is escalated to the local insurance agent. The local office supervisor coordinates with an internally elected "VISA Animator" from the group to transfer the money for purchase of the aggregated VISA insurance contracts. The local offices aggregate the sales from across the VISAs in their zone, and pass on to the Insurance Entity, which will then coordinate with the government for application of relevant insurance subsidies.

Also, similar to the way the formation of ROSCAs opened the door to micro-loans, this innovative I4-VISA methodology allows demand for insurance to be aggregated, enabling the private sector micro-insurance providers to sell products in remote and difficult-to-reach areas that previously did not have access to these risk management tools. It also enables the private sector to offer products for very small parcels of land that would otherwise not be reasonably insurable.

When contracts are issued, and when payouts are issued, the process reverses and works back down the organizational chain from the Insurance Entity back to the individual farmer. Once the premiums have been collected and channeled upward (and the subsidies have been contributed from the government), the head office will issue contracts to their local offices, which will then distribute accordingly to the VISAs in their sales zone. The village animator will distribute to their group members.

In the case a payment is triggered by the area-yield index, payouts will be distributed the same way. In this way, there is no need for insurance sales agents to go farmer-to-farmer, either for insurance sales, claims verifications, or payout distribution. This helps maintain a reasonable cost of insurance.

4 RESEARCH DESIGN

This section describes a proposed research design in detail. Based on the proposed intervention, we design a pilot study that provides a proper dataset to evaluate the impacts of area-yield index insurance intervention for rice farms in Nepal.

4.1 Sample Selection

We plan to randomly sample 250 Insurance Zones (about 100,000 ha) out of 1,095 Insurance Zones (Section 3.1 above defines insurance zones). As noted in Table 3, we plan to sample proportionally at the district level (i.e. Number of Sampled Insurance Zones in District d= 250 * Number of Insurance Zones in District d/1,095).

Table 3 Rice Planted Area, the Number of VDCs, Total Insurance Zones and Sampled Insurance Zones by District

District	2013/14 Rice area (ha)	Number of VDCs	Number of Insurance Zones	Number of Sampled Insurance Zones
Nawalparasi	48,350	74	121	28
Rupandehi	70,500	71	176	40
Kapilbastu	72,000	78	180	41
Dang	38,320	41	96	22
Banke	36,500	47	91	21
Bardiya	52,000	32	130	30
Kailali	71,450	44	179	40
Kanchanpur	48,796	20	122	28
Total	437,916	407	1095	250

And then we will randomly assign 125 Insurance Zones (about 50,000ha) as “Treatment” group leaving other 125 Insurance Zones as “Control” group. Random sample selection will be stratified at the district level.

4.2 Yield Survey for Contract Design

In addition to our retrospective survey on the historical yields, which is conducted in March 2015, we plan to have a larger scale area yield survey in Fall 2016. We will utilize this survey to complement our retrospective survey and the district-level yield data in Agricultural Yearbook by Ministry of Agriculture and Development for estimating the area yield distributions.

We propose to sample 40 witness farmers per each Insurance Zone for 125 "Treatment" Insurance Zones. Our 2015 survey data reports the average rice plot size per farm is about 0.8ha, which implies that the sample area per Insurance Zone would be 30~40ha (8 ~ 10% of total rice area per Insurance Zone). Total survey area would be 4,000~5,000ha with 5,000 farmers from 125 Insurance Zones (See Table 3).

4.3 Implementation

Using the dataset from multiple sources (2015 retrospective survey, 2016 area yield survey, Agricultural Yearbook 2001-2014), we finalize the contract design based on the descriptions in Section 3.

We plan to have partners in place to take the contracts to market in Winter 2017 for rice season in 2017. After the Ministry of Agriculture and Development, Insurance Board and partnered insurance companies approve the proposed contracts, education and training will take place in "Treatment" Insurance Zones. Partnered insurance companies will market the area-yield index insurance products in treatment zones.

Among "Treatment" Insurance Zones, we will randomly select 60 Insurance Zones for implementing VISAs. VISAs will be formed in these "VISA Treatment" Insurance Zones. Partners to help us to form VISAs need to be selected in near future. Preliminary discussions with an NGO that has used local ROSCAs for the provision of more sophisticated financial services have been promising. We are still in the process of getting a more precise quote of how much it would cost to implement the VISA model in the proposed study areas.

4.4 Feasibility of Index Insurance for Other Crops

As detailed above, we chose rice as the test case for this pilot project for a number of reasons, including the likelihood that index insurance could be more effective for this crop compared to other crops grown in areas with greater local variability in farmer outcomes. This choice of rice does not of course mean that index insurance cannot work for other crops that are of national economic importance and important to the food security of individual rural households. We thus request a small amount of additional funding to explore the feasibility of index insurance for maize and, or other crops. Following the methodology used to explore the feasibility of index insurance for rice, the requested funds will allow us to explore whether or not there is enough common or "correlated risk" to make index insurance feasible for these other crops. The precise crop to be chosen for this secondary study will be selected in consultation with MOAD.

4.5 Impact Evaluation Surveys

For impact evaluations, we propose three rounds of surveys: Baseline in Fall 2016, Midline in Fall 2017 and Endline in Fall 2018. Survey questions include information on rice farming practice (e.g. rice planted area, rice farming related investment), risk coping strategy (e.g. changes in assets, wage employment), and welfare measures (e.g. income, food security measure).

We plan to randomly sample 10~20 rice farms per Insurance Zone for our 250 sample Insurance Zones. Therefore, we will have 1,250~2,500 farms in "Treatment" Insurance Zones and the other 1,250~2,500 farms in "Control" Insurance Zones. (Based on our 2015 survey, this sample size will have 70~94% power for the minimal detectable effect on rice area of 10%. More precise power calculation is required.)

The three rounds of survey with 2,500~5,000 farms will provide us a panel data for profound statistical analysis for impact evaluations. This will allow us to analyze the impacts of area-yield insurance provision on farm practice, agricultural investments, food security and other welfare measures.

4.6 Timeline

Summer 2016	• Select Partners (Insurance companies and survey company) • Define Insurance Zone
Fall 2016	• Yield Survey • Baseline Survey • Index and Contract Design
Winter 2017	• Education and Training • Marketing for 2017 Rice Season • Retrospective Yield survey for other crops to determine index insurance feasibility
Fall 2017	• Yield Survey • Indemnity Payouts Delivery for 2017 Rice Season • Midline Survey via Mobile
Winter 2018	• Marketing for 2018 Rice Season
Fall 2018	• Yield Survey • Indemnity Payouts Delivery for 2018 Rice Season • Endline Survey
Winter ~Summer 2019	• Impact Evaluations

5. BUDGET

The total cost for the project is $1.097 million, of which $732 thousand is requested from the Nepal mission. Of this funding, $575 thousand is for date collection (for both yield, impact and other crop surveys). Another $280 thousand has been allocated for the design and implementation of the Village Insurance Savings Association (VISA) model.

BASIS/I4 can contribute $200,000 in funds made available to BASIS by the USAID Global Climate Change Office for the purpose of developing and testing index insurance as a mechanism to promote resilience and climate change adaptation. We are assuming that the USAID Global Development Lab will contribute $140 thousand to support a Phase II of the VISA model. Funds provided by BASIS from other sources will allow a complete elaboration of the proposal for the VISA program. Should the Global Development Lab prove unable to provide the additional funding, other sources will be approached to close the funding gap. In the worst case scenario, the project can continue without the full development of these local, village-based insurance savings groups.

6. RISKS

Successful implementation of this proposal is dependent on several additional factors, which pose some risks. First, this implementation of the proposed area-yield index insurance product is dependent on regulatory approval of the insurance product, such that it can be marketed and sold in the desired area in the targeted time frame. In addition, this proposal assumes a suitable and willing insurance company can be identified as a partner for the project.

With regard to the implementation of the "I4 VISA Model" of insurance distribution, especially "VISA" group identification or formation, we will work with Freedom From Hunger, an NGO that has significant experience in the creation and capacity development of savings cooperative groups. We are requesting some support from mission for this model, and the AMA Innovation Lab will also use some of our available funding for this, but we will be requesting additional funding for the full support of the VISA model from the Global Development Lab of USAID/Washington. To date, discussions with the Global Development Lab have been promising, and they have a strong interest in supporting this project.

6 CONTRIBUTION TO USAID OBJECTIVES AND INITIATIVES

The original index insurance feasibility study described above was conducted at the request of the USAID mission in Nepal. The BASIS/I4 team has worked closely with mission personnel, and continues to consult them regularly to ensure that the project stays closely tied to mission goals, objectives, and priorities.

According to the USAID-Nepal Country Development Cooperation Strategy (CDCS) 2014-2018, the overarching goal over the five-year period is to foster a "more democratic, prosperous, and resilient Nepal". By addressing both ex ante and ex post negative coping mechanisms for risk, an effective insurance contract that offers a high degree of protection to farmers has the potential to not only increase resilience to shocks, but to simultaneously enable increased productivity-enhancing investments for smallholder farmers.

One of the crosscutting considerations noted in the CDCS is resilience. Specifically, the document notes "USAID Nepal will address 'resilience deficits' by working closely with the Government of Nepal to support good governance, the shortest route to alleviating extreme poverty." Another crosscutting consideration is "Science, Technology, Innovation, & Partnerships". The document notes "USAID will increasingly seek to use cutting-edge science and technology, innovative approaches, and new partnerships to scale up results more quickly and efficiently. In particular, the Mission will seek increased partnership with private sector, civil society, academic, and GON actors."

With regard to the geographic focus of this study (the Far-west, Mid-west, and West Terai), the CDCS notes that "[t]he region is…typified by high population density, less developed infrastructure, and vulnerability to climate change, yet possesses significant unmet agricultural, economic and nature conservation potential." This region was selected for the pilot study in consultation with mission personnel to align with mission priorities.

7 OUTREACH AND DISSEMINATION

As part of this research, the BASIS/I4 research team will write a series of outreach materials on the project design, updates and lessons learned along the way, and findings and results. These will be issued as part of the BASIS/I4 Brief series, I4 Updates, and other documents as appropriate. The findings and lessons learned from this project will also be incorporated into our more generalized research dissemination around risk management for smallholder farmers. Researchers will also use the results of this study to inform academic papers and presentations.

At the conclusion of the study, we will also conduct a dissemination activity in Nepal to ensure that results are shared with stakeholders, including USAID, the Government of Nepal, insurance companies, and other development agencies. If appropriate, additional dissemination activities will be planned to share results regionally.

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