GRANT PROPOSAL

A PRODUCTIVE SAFETY NET FOR NORTHERN KENYA'S ARID AND SEMI-ARID LANDS: THE HSNP^{+} PROGRAM

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A Productive Safety Net for Northern Kenya's Arid and Semi-arid Lands: The HSNP^{+} Program

1. HSNP^{+}: A Productive Safety Net Complement to the Hunger Safety Net Program

The Hunger Safety Net Program (HSNP) to be launched later this year in northern Kenya will provide reliable cash transfers to poor households.[1] These cash transfers should improve the capacity of beneficiary households to meet immediate, essential needs and to invest in improving their future prospects (for example, by paying for children's school fees, for health care, for veterinary care or supplemental feed for stressed livestock, etc.). By increasing access to cash, the HSNP may also help stimulate the emergence and growth of non-pastoral commercial enterprises, generating employment, income and other "multiplier" gains to residents of the arid and semi-arid lands (ASAL) of northern Kenya. If access to funds were the only thing holding back poor households, the HSNP should suffice as a policy instrument for sustainable poverty reduction.

But given the considerable risk faced by ASAL households, theory and empirical evidence both suggest that there may be considerable value-added from augmenting HSNP with a Productive Safety Net (PSN) aimed at insuring households' critical assets against catastrophic loss. We call this augmented program HSNP^{+}. HSNP^{+} can have three key effects:

- *Stem the Downward Spiral of Vulnerable Households into Poverty*
  Because it provides indemnity payments after a shock, a PSN should help stem the collapse of vulnerable-but-presently-non-poor households into the ranks of the poor following a drought (or related crisis) due to irreversible losses from which they do not recover. By setting a safety net beneath vulnerable-but-not-yet-poor households, a PSN can help safeguard HSNP resources for poorer, eligible households by keeping their ranks from swelling to the point that it overwhelms the program following a crisis, when HSNP transfers are most needed. Recent theoretical work by Barrett, Carter and Ikegami illustrates that policies targeted at the vulnerable-near-poor can over time reduce the depth of deprivation experienced by the neediest.

- *Stabilizing Pathways from Poverty through Asset Accumulation*
  By insuring assets against catastrophic loss, the PSN enhances incentives for HSNP-eligible households to build their asset base and climb out of poverty, i.e., to join the local "middle class". If limited asset accumulation among the ASAL poor is not only due to insufficient access to cash (which HSNP can help resolve) but also due to the high risk of investment in this setting (which HSNP cannot address) then PSN should provide a helpful stimulus.

- *Crowd-in Finance for Ancillary Investment and Growth*
  This risk effect is not just limited to the incentives faced by households. The size and targeting of HSNP transfers necessarily and appropriately limits the program's ability to

[1] The HSNP program, under the sponsorship of DfID and the Government of Kenya, will provide monthly payment of approximately $15 to qualifying households.

provide the cash needed for some potentially high-return investments that often require access to credit (e.g., a lorry for a livestock marketing cooperative, a refrigerator for a commercial veterinarian). Private creditors presently unwilling to lend for such ventures due to the risk associated with big shocks like drought might become willing to lend if the assets that secure their loans could be insured. Insurance can thereby "crowd-in" much-needed credit for enterprises in the region without leaving poor ASAL residents excessively vulnerable to losing assets when nature fails them.

These three effects provide the basic, pro-poor rationale for PSN as a complement to the HSNP.

2. Using Index Based Livestock Insurance to Implement a PSN

To achieve the impacts enumerated above, a PSN needs to be designed in such a way that it reliably and predictably compensates target recipients for asset losses incurred. However, in the remote and infrastructure deficient areas of Northern Kenya, it would be prohibitively costly to observe, verify and indemnify the losses experienced by individual households. Conventional individual insurance would face severe and likely uncontrollable problems of adverse selection (high risk individuals—who could not be easily identified nor charged compensating higher premiums—would be more likely to sign up for coverage, distorting the insurance pool) and moral hazard (individuals would have fewer incentives to take care of insured animals, again distorting the risk pool, as it would not be possible to determine whether an animal died because of natural causes or negligent behavior). In short, without massive subsidy, an individual-based insurance scheme will simply not provide the sustainable protection needed to alter the dynamics that add to the ranks of the poor trapped in the ASAL of Kenya.

An Index Based Livestock Insurance (IBLI) scheme offers a solution to these problems and can be used as the foundation for an implementable PSN program. The idea of index insurance is straightforward. One can define a specific area (e.g., a location), a specific period (e.g., March-May, the usual long rains months in the region), a specific outcome variable(s) for the area (e.g., the area average livestock mortality rate, forage availability, or rainfall), and a specific level of the outcome variable that triggers the program intervention (e.g., greater than 25% average mortality within the insured area and period). Using a data source that is promptly, reliably and inexpensively available (and not manipulable by either the insurer or the insured), the program makes the agreed indemnity compensation payment to insured beneficiaries whenever the data source indicates that the variable level reaches the intervention activation level.

IBLI mechanisms have several advantages beneficial to a PSN program. First, because triggers are based on easily verifiable indexes, as opposed to individual risk experience, transactions costs are relatively cheap. It also eliminates the common incentive problems of moral hazard and adverse selection that undercut efforts to provide individual-based insurance in isolated agricultural and pastoral economies. Consequently, an IBLI scheme can be sustainably supported by a commercial market.

For all its benefits, index insurance also has certain limitations:

- *Designing an Effective Product that Minimizes 'Basis Risk'*
  First, index insurance products are only suited to underwrite risks that are highly

covariate (i.e., common to many individuals, such as excessive or insufficient rainfall, very high or low prices, disease epidemics). Fortunately, preliminary analysis shows that while individual animal losses are commonly relatively household-specific, by contrast, high, drought-induced livestock mortality rates, the main risk we target with the PSN, are highly covariate, affecting large numbers of ASAL residents concurrently. There is, of course, the possibility that certain individuals experience mortality loss when average mortality losses are below the trigger and no payouts are made. Alternatively, a fortunate household that escapes the brunt of substantial average losses that trigger PSN indemnity payments may benefit undeservedly. Known as 'basis' risk, this imperfect correspondence between individuals' experience and any index variable is a non-trivial issue that we are investigating rigorously and can accommodate in the final index insurance product design.

- *Solving the Fixed Costs of Innovation and Outreach*
  Second, insurers incur significant fixed costs to design a product – which involves collecting and analyzing historical data series for candidate index variables, estimating the relevant probability distributions for the index variable(s) and the associated basis risk, etc. – and to deliver the PSN to spatially dispersed households. The design costs are essentially a public good. Once designed, the basic parameters of contracts and the source information can be shared at negligible cost. Index insurance product development is therefore often underwritten in low income areas by donors. Fixed delivery costs are not public goods, however, and therefore may require subsidization in order to ensure adequate market size to justify fielding the product(s).

- *Making the Product Comprehensible to the Never-Before-Insured*
  Insurance is an unusual commodity (we buy it and hope to get nothing in return). Index insurance, with its problem of basis risk, is even more complicated than standard insurance. Unless households really understand the IBLI product, demand for it will be low and the expected behavioral responses (by households and financial markets) will not take place. The mixed success of recent efforts to implement index insurance products in low income agricultural settings make clear that we need to devise methods to ensure an informed clientele for the product.

3. Innovative Solutions to Challenges in PSN Design and Implementation

While an IBLI scheme holds out promise of providing a sustainable and effective productive safety net, realizing that promises requires creative solutions to the challenges outlined above. We propose several different strategies to enhance the potential of a PSN complement to the HSNP.

3.1 Designing Asset Protection and Asset Replacement Insurance

The BASIS/Cornell/ILRI research team is currently analyzing a series of potential indexes that alone or in combination can be used to provide the best possible IBLI in terms of low basis risk, desirable data characteristics (timeliness, cost, non-manipulability, etc.), and product pricing and

performance for vulnerable ASAL populations. Candidate indexes can be crudely divided into two complementary mechanisms.

- *Asset Replacement Insurance*
  An IBLI asset replacement product indexed to average mortality (or a closely related proxy) is an ex post product that offers compensation for livestock losses. If based on a rainfall index, it would pay out in the case of a major drought, flooding, or both. If based on area average mortality, it would offer all-peril insurance (i.e., it would insure against livestock deaths due to any cause). Similar to the Mongolian Index Based Livestock Insurance product, the only current program of its kind, the idea is to help affected households rapidly restock their herds, or facilitate entry into other productive livelihoods, in the wake of a major shock. Not only can one use different indices (e.g., rainfall, area average livestock mortality), but one can also offer indemnity payments either in cash or in kind – e.g., actual re-stocking of livestock.

- *Asset Protection Insurance*
  This second class of index insurance encompasses products that are triggered preemptively in anticipation of a shock. Such a product uses historically valid leading indicators – e.g., the relation between forage availability or rainfall during one period and livestock mortality in a subsequent period – to identify a trigger level of the index that generates payouts that can be used to protect the asset from loss expected in the absence of intervention. For example, using remotely sensed data on forage availability in rangelands, one can reasonably accurately predict upcoming livestock mortality. An index insurance product based on predicted mortality as a function of current forage availability could trigger indemnity payments that pastoralists could use to avoid losses. As with ex post payments, this ex ante index insurance scheme can generate payments either in cash or in kind (e.g., vouchers for supplemental feed and/or water delivery that can cost-effectively keep threatened livestock alive through a drought).

We are currently analyzing alternative indices that could be used as the foundation for IBLI. The first would rely on a survey-based livestock mortality index. IBLI based on a mortality index would be asset replacement insurance. Preliminary analysis suggests that basis risk can be kept low with this product. But there are important questions still surrounding the availability of reliable, objective, low-cost data for establishing the index and determining when indemnity payments are due. A second design under consideration is to form an index of climatic indicators (rainfall and remotely sensed forage availability indicators based on normalized differenced vegetation index, NDVI) that reliably predict average animal mortality. Because rainfall and NDVI are leading indicators of mortality (available in advance of the onset of livestock mortality), IBLI based on these indicators could provide asset protection insurance. We are still analyzing whether basis risk can be reduced to acceptable levels using these leading indicators. Preliminary results are very promising. Once we complete the analysis and determine the feasible set of products, we will interact with stakeholders to determine the best IBLI product. Analysis to date indicates that regardless of form, we currently estimate that the insurance should cost less than $20 per Tropical Livestock Unit (TLU) per-year.[2]

[2] A TLU is equivalent to one large animal, such as cattle or camel, or ten smallstock (goats or sheep). In principle, coverage could be purchased in fractions, offering coverage for families that own only a few sheep or goats.

3.2 Development Costs

The fixed costs of product development and delivery require attention for novel products like the asset protection and asset replacement insurance contracts being devised for this project. USAID through the BASIS AMA Collaborative Research Support Program has generously provided funding necessary for us to undertake initial product development research. But there must be adequate market size for insurance providers under the PSN program to be able and willing to absorb the fixed costs of product delivery. This may require a graduated subsidy scheme that would, for example, make PSN insurance available at very low cost to HSNP-eligible households, and at less generously subsidized cost to households just beyond the HSNP eligibility threshold, with better-off households paying full cost. This way, the PSN program would be available to all residents in participating locations, but with incentives to poorer households that should induce broader participation that both complements the beneficial effects of HSNP transfers for HSNP-eligible households and makes it feasible for commercial insurers to provide the PSN product(s) at all.

3.3 Insuring the Never-Before-Insured

Index insurance products are novel to the region. Especially if the possible ex ante benefits of index insurance (increased investment and improved access to credit) are to be realized, it is essential that adequate time be taken with ASAL populations to familiarize them with the concept and structure, as well as with the possibilities and (basis) risk associated with index insurance. Building on lessons learned from earlier BASIS work in Peru, we will therefore be fielding a series of field exercises in which we introduce such products and give voluntary participants an opportunity to play games with realistically-simulated index insurance.

The objectives of such games are to build understanding of the concept and of specific prospective product designs, and to refine the design of index insurance products by testing target populations' behavioral response to the availability of such contracts. We are developing games that first simulate ASAL systems as they presently exist – with considerable risk, but no insurance – then introduce index insurance options that people can choose to buy (or not), with the possibility of indemnity payments following the realization of random covariate and individual-specific shocks. Finally, the game will conclude with rounds in which we incorporate aspects of the complex herd dynamics that seem to characterize the northern Kenyan pastoral and agro-pastoral system – dynamics in which there exist critical herd sizes threshold above which herds tend to recover and below which they tend to collapse toward a low-level, sedentarized equilibrium.

4. Integrating the Index Insurance PSN and with the HSNP Delivery System

To effectively protect the target population and crowd-in productive investment, the insurance component of the HSNP^{+} program must be reliable and sustainable. While public budgets are ill-equipped to underwrite insurance, preliminary discussions with both national insurance and international reinsurance companies have identified significant private sector interest in providing the index based livestock insurance (IBLI) that will provide the PSN.

Given the poverty trap logic that empirical research suggests applies in the northern Kenyan ASAL, one would hypothesize that both the asset protection and asset replacement safety nets would be most attractive to households with herd sizes at or near the critical asset threshold and vulnerable to falling below the threshold in the event of a shock. However, the products that we envision should also offer important risk management value to individuals with large herd sizes wanting to simply protect themselves against substantial asset loss, as well as to households with herds below the threshold working to build their herd or simply protecting the critical, albeit meager, assets that they hold. In this way, the products themselves will be self-targeting – they can be offered to all wealth herd size categories and by the pattern of uptake we shall gain insight on the extent, nature and evolution of the dynamic asset threshold and the value it creates for asset protection mechanisms at different levels of herd size across various household level determinants.

There are other compelling reasons to offer both insurance products universally across herd size. First and foremost, for this program to be commercially sustainable and its benefits to extend beyond the narrow band of households around the asset threshold, it must be mediated through the market. For insurance companies and their agents to be attracted into the market, they must have access to a significant clientele base. That the majority of livestock is held in the hands of a small, relatively better-off subset of the target population means that the product must be available to them. Secondly, the growing interest in micro insurance shows that the relatively poor could also demand insurance if the mechanisms for premium receipt and indemnity payments where adequately designed.

4.1 Smart Subsidies

While the PSN logic applies most powerfully to vulnerable households in the vicinity of the dynamic poverty asset threshold, we propose an IBLI insurance that will be sold on a per-TLU basis and made available using a differentiated smart subsidy mechanism to three categories of households in the ASAL region;

1. HSNP eligible households that have fallen well below the critical threshold;
2. Vulnerable households in the vicinity of the critical asset threshold, some of whom may not be HSNP eligible; and,
3. Better off, HSNP-ineligible households that are above the critical threshold region.

While much of our discussion has focused on category 2 households, as Oxfam staff (doing the initial HSNP targeting) have argued, it is clear that category 1 households can also benefit tremendously from an IBLI that protects their savings and assets. While category 3 households are not the specific focus of either the HSNP, nor of the PSN program, including these households in the IBLI program creates a much bigger market for the provision of insurance and should thus importantly contribute to the sustainability of the HSNP^{+} scheme by allowing private sector insurance providers to reach a profitable scale. Their premium payments can also enhance the liquidity of HSNP payments distributors, thereby benefitting HSNP performance.

Given the positive wealth and productivity effects expected from the provision of insurance to these types of households, and the fact that insurance should reduce the burden on the HSNP

budget in future years, there is a strong case for subsidizing the IBLI premium for these types of households. This is especially true in the early years of the program where it is vital to have significant uptake of the insurance so that its impact can be analyzed (and the case for subsidies critically and rigorously evaluated). Given an anticipated premium of $10 per-unit of TLU coverage, we propose to offer average subsidies of 75% for category 1 (HSNP eligible households), 75% for category 2 households (the vulnerable) and 0% for category 3 households. In order to explore the amount of subsidy actually needed to induce purchase of IBLI, individual households will be randomly allocated discount coupons ranging between 10% and 90%.

The cost of the subsidy schemes over the 5-year pilot phase is just under $200,000. These figures are based on the following assumptions:

- All households in the PSN pilot areas would be offered the opportunity to purchase an amount of insurance equal to their livestock holdings registered in the baseline census to be carried out by the HSNP program;
- 20% of households have no livestock of any sort;
- 65% of households (categories 1 and 2) have modest livestock holdings that average 5 TLU;
- 10% of households (category 2) are in the vulnerable range and would be offered subsidies to cover up to 10 TLU (the critical threshold amount);
- 5% of households (category 3) are well beyond the critical threshold and would be offered no subsidies;
- 66% of households in all categories will purchase the insurance; and,
- Those households that purchase insurance will purchase insurance for only 50% of the TLUs that they posses.

While subject to a certain amount of guess work, these figures are consistent with what we have learned from other index insurance schemes.

4.3 Coordinated Implementation of HSNP and PSN

The HSNP program has the ambitious goal of initially targeting up to 70,000 households spread across the ASAL districts of Marsabit, Turkana, Msandera and Wajir. The PSN/HSNP^{+} pilot will target the Marsabit and Turkana districts only.[3] As explained in greater detail in section 5 below, the pilot will target 84 communities in these districts, 42 of which will be in 6 locations included in the HSNP treatment areas, and 42 of which will lie in 6 HSNP 'control locations' set aside for the HNSP evaluations.[4] These 84 communities will contain approximately 4000 households in total.

Implementation of the IBLI will interact importantly with the HSNP implementation in two ways. First, as currently envisioned, the HSNP program will create a census of all households in both HSNP treatment and control locations. These census data should include the information

[3] The choice of these two districts is based on the availability of relatively high quality herd history that can be used to evaluate and price insurance contracts.

[4] Locations contain on average 10 villages. Assuming that OPM follows a two-stage cluster sampling design (selection first some villages and then some households within villages), there should be no problem identifying 7 villages within control locations that are not part of the HSNP impact evaluation study.

on household well-being that will permit the PSN component to appropriately target subsidies to type 1 and type 2 households. The fact that this information will be collected independently and in advance of the PSN program by Oxfam and its partners should ensure that the collected data are not distorted by the desire of households to qualify for IBLI subsidies.

Second, the HSNP program will be implemented using electronic point of sale (POS) technology. The Financial Sector Deepening Trust (FSD) is working with Equity Bank to create and manage approximately 150 POS locations spread across the four HSNP districts.[5] Equity will also manage the funds and account transfers between HSNP beneficiaries and the merchants operating the POS devices.

FSD reports that the POS devices are already programmed to permit the sale of insurance contracts. The PSN contracts will be written by a local Kenyan insurance company (or, more likely, a consortium of companies) and underwritten by an international reinsurer.[6] As currently planned, Equity (and its POS network) will act as agents for the insurance company (consortium). Individuals interested in IBLI will simply make their insurance premium co-payments ("co-" with whatever subsidy coupon they are randomly assigned) through their local payment point system. The POS devices can issue a receipt for the contract and will also be able to verify the level of pre-qualified subsidy (and hence net insurance price) for each household. Indemnity payments due to individuals could also be deposited into the HSNP accounts maintained for each individual. It will be necessary to equip non-HSNP beneficiaries with smart cards and accounts to handle both their premium and indemnity payments. This ability to piggyback on to the HSNP financial mechanisms and databases will not only permit the implementation of a targeted subsidy scheme, it will also make the administration cost of the insurance quite modest and should enhance HSNP POS provider liquidity.

At this time, Equity has identified approximately 150 POS points. It is likely that it will be necessary to establish a few additional POS points in HSNP control locations where Equity would not likely establish payment points until the second phase of the HSNP program (starting in 2012). The budget listed below includes funds for setting up 3 additional POS points using cost information provided by Equity.

5. Integrating the PSN with the HSNP Impact Evaluation

In order to create the evidence base needed to accurately assess impact and allow mid-course changes to the HSNP program itself, as well as of the PSN component, a carefully-reasoned, ethical impact evaluation of HSNP and HSNP^{+} is needed. Currently there are strong theoretical arguments that can support claims to the superiority of either HSNP^{+} or HSNP type programs given an indicator of choice. That said, there is almost no direct evidence as to whether or not, or by how much, a well-designed cash transfer program, or safety net program (or a combination) can improve welfare outcomes. Both programs need to be evaluated in terms of

[5] Finger-print reading POS devices will be given to local merchants. Through use of smart cards, HSNP beneficiaries will be able to either withdraw cash or purchase goods from the merchant using HSNP transfer funds. Amounts withdrawn or spent will be electronically transferred to an account in the name of the merchant (or the merchant's wholesale supplier).

[6] Discussions with both national insurers and an international reinsurer indicates strong commercial interest in the PSN/IBLI product.

their ability to reduce the ranks of the poor, increase their access to sustainable livelihoods, and make improvements in key welfare indicators. Such an evaluation will require that we observe households sorted into each of the following four assistance regimes:

Assistance Regimes to be Evaluated

	Without HSNP	*With HSNP*
Without PSN	***Type 1*** (Control Locations)	***Type 2*** (HSNP Only Locations)
With PSN	***Type 3*** (PSN Only Locations)	**Type 4** (HSNP+ Locations)

Some of the most important questions can be addressed by tracking the following indicators in each of the four types of communities over the 4 year period of the pilot:

- Standard headcount and poverty gap measures
- Asset (livestock) accumulation
- Child education and health (school attendance, anthropometrics and perhaps achievement tests)
- Income and/or consumption

Comparison of, say, poverty rates between type 2, type 3 and type 4 communities will allow calculation of elasticities of poverty reduction with respect to expenditures on cash transfers versus expenditures on insurance subsidies. Similar impacts will be studied looking child indicators as well as indicators of household economic well-being.

5.1 Proposed Coordination with the OPM/IDS HSNP Evaluation

HSNP partners Oxfam and Oxford Policy Management (OPM)/Institute for Development Studies (IDS) have already made significant headway in agreeing on a procedure that will randomly identify and allocate a set of 33 locations[7] in the four ASAL districts to an impact evaluation study. Between 66 and 76 households are slated to be interviewed in each location. As currently planned, 21 of these locations will receive the HSNP treatment (the surveyed households in these locations will comprise box **2** above), and 12 will constitute 'control locations' where HSNP payments will not be rolled out until phase 2 (surveyed households in these locations comprise box **1** in the chart above). We do not yet know the sampling and clustering strategy that OPM/IDS will employ with box **1** and box **2** households. We are assuming that the box 1 and box 2 samples will be representative of the full population of communities (*i.e.*, include both HSNP eligible and HSNP-non-eligible households).

[7] Figures used in this paragraph are based on the TORs and proposals prepared for the HSNP impact evaluation work.

As currently planned, OPM/IDS will interview box **1** and box **2** households twice, once at baseline and once in year 4. The integrated HSNP/HSNP$^+$ impact evaluation will require sharing of the data on box 2 and especially box 1 households. As explained in the next sub-section, separate samples will be drawn for boxes **3** and **4** households so as not to perturb the power of the OPM sample to evaluate HSNP. The data required for the HSNP and PSN evaluations are fundamentally the same, so we anticipate close coordination and cooperation between that effort and ours, indeed we anticipate employing the OPM/IDS instrument for the box 3/4 surveys. We also hope to employ the same trained enumerator teams.

5.2 Power Calculations and Sampling Strategy for the PSN Treatment

The appendix summarizes the sample design calculations for the evaluation of the PSN/HSNP$^+$ program. The proposed sample design is one that should allow us at 80% power[8] to detect impacts of PSN on income and livestock that are no smaller than 10% of the initial levels of these variables.[9] The underlying calculations were carried out using variance and other parameters estimated from the USAID Pastoral Risk Management (PARIMA) project data that covers sites in both Turkana and Marsabit districts. In designing samples to yield 'minimum detectable effects' of this magnitude, we are assuming that increases smaller than 10% in these key indicators are tantamount to no impact.

For the PSN evaluation, we attain statistical power by either increasing total sample size, increasing the number of village clusters across which a given sample size is spread, or by increasing the take-up rate of the IBLI product. As discussed above, we propose to offer a high average subsidy rate to less well-off households in the hope of achieving a 66% take up rate of the insurance. This number is an ambitious target, but given as the MDE analysis shows, there are large statistical returns to money invested in increasing uptake. In addition, these funds of course directly benefit low income households (as opposed to a larger sample size which would simply increase survey costs). Given that 66% take-up rate we can achieve our power/minimum detectable effect goals by surveying 630 households in each of boxes **3** and **4** in the diagram above. We propose to cluster these 630 box **4** households into 42 village clusters (located in 3 locations each in Marsabit and Turkana). An identical sample will be prepared for box **3** households (given that statistical power is optimized for treatment sub-samples that are balanced).

For box **4** households, it should be easy to locate the needed HSNP clusters in these districts that are not already part of the OPM/IDS impact study. Box **3** locations (where there are no HSNP treated households) will be a bit more difficult given ethical concerns about minimizing the number of control locations. However, given reasonable assumptions about the OPM/IDS survey strategy (i.e., assuming that they will employ some village-level clustering), it should be straightforward to find sufficient unused village clusters within control locations. Should that strategy fail, we propose to incorporate communities that are marginally over the border of the 'no-go' areas which are also being excluded from the HSNP program.[10] The former strategy is much to be preferred on safety and statistical grounds.

[8] The power of a test is the probability that it correctly accepts (does not reject) a hypothesis when it is true (i.e., one minus the Type II error probability).
[9] We unfortunately lack data with which to calculate statistical power with respect to child outcome indicators.
[10] The HSNP program is ruling certain areas of the ASAL districts off-limits for safety reasons.

Finally, it appears that the box **1** control sample to be collected by OPM/IDS in Turkana and Marsabit will be too small to give the power needed for the PSN analysis. Our budget therefore includes funds for building up the size of the sample in this box 1. Further discussions with OPM/IDS will be needed to determine how best to expand sample size given their cluster design.

Once the samples are determined, we propose to interview sampled households at baseline, at one year later and at the end of the phase 1 of the HSNP program. OPM/IDS are currently not planning a year 2 survey. It is important for the PSN evaluation as it will allow us to get information on insurance take-up and functioning. Our budget therefore includes funds for a complete re-interview of box **1** households in year 2. As mentioned earlier, we hope to work with the same enumerator teams employed by OPM/IDS. The addition of an additional survey year will presumably improve enumerator retention rate and improve the overall quality of the combined impact evaluation work.

6. Timing of the Pilot and Surveys

Rollout of the PSN IBLI product will be shaped by two factors. First, the insurance can only be sold during a specified window (as individuals cannot be allowed to purchase the insurance after the random events that determine payoff are already partially or fully known). Possible windows for selling an annual insurance product are thus either January-February (before the initiation of the long rains) or August-September (before the initiation of the short rains). The insurance would cover losses in the 12 month period following the close of the purchase window.

In addition to these sales window considerations, the product also cannot be sold until Equity has established its POS network. Based on discussions with FSD and Equity, we consider it unlikely that the POS network will be sufficiently widely available until July 2009, at the earliest. We are thus proposing that the IBLI produce be first rolled out and sold in the August-September 2009 window. The education games described above would thus be offered in the pilot communities during the two months preceding that rollout.[11]

The timing of the household surveys will need to be coordinated with the OPM/IDS group. Other things equal, we would propose to survey households in the March-May period each year.

Putting all this together, we are looking at the following timeline for field activities under the PSN/HSNP$^+$ project:

May-August, 2008

- Design of insurance
- Design and pre-testing of insurance game
- Establish insurance and reinsurance partnerships

[11] We propose to randomly invite 15 families from each of the 84 IBLI pilot communities to participate in the simulation games. To simplify logistics, the game will be offered in 42 places, with transport provided to bring participants from more distant communities to the game site. Insurance discount coupons (of randomly varying values) will be offered to all category 1 and category 2 households in the pilot communities.

- Finalize study and rollout design in conjunction with Oxfam and OPM/IDS

March-May 2009
- Baseline surveys of box **3** and **4** households

June-September 2009
- Insurance games played in 42 pilot locations
- Encouragement incentives distributed
- Insurance sold with subsidies

March-May 2010/2012
- Resurvey of box **1**, **3** and **4** households

June-September 2010-12 (annually)
- Encouragement incentives distributed
- Insurance sold with subsidies

7. Risks and Concerns

As the above narrative makes clear, the complexity of this project requires substantial coordination. This exposes the project to risks beyond those usually expected with a research project. To minimize these additional risks, we will need to work closely with DfID and its partners along the following dimensions:

Coordination with FSD/Equity
- Assuring the timely availability of the POS network to box **3** and **4** villages, well in advance of the IBLI rollout date of August 2009.
- Supply smart cards and accounts in box 3 communities and for non-HSNP eligible households in box 4 communities.

Coordination with Oxfam
- Community censuses need to be prioritized in both treatment and control locations so that the baseline surveys can be undertaken in March 2009.

Coordination with OPM/IDS
- Sharing of data on box **1** (and ultimately box **4**) households.
- Coordination of sampling strategies to insure adequate statistical power.
- Coordination on survey instruments, enumerator training and field data collection protocols.

Coordination with Private Sector Actors
- Coordination between Equity and the insurance company (consortium)
- Coordination with actors in market for supplemental feed (if we implement an asset protection IBLI scheme)

Note that we are not worried about coordination with insurance and reinsurance partners.

Appendix

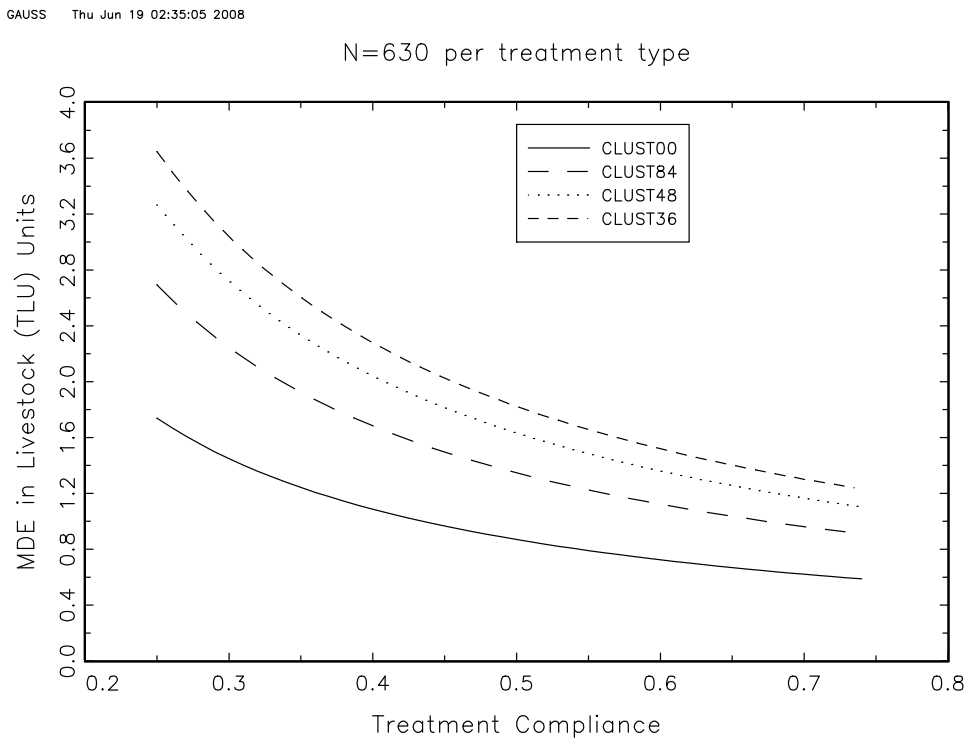
For a study design such as our's, the minimum detectable effect, β_e, is given by:

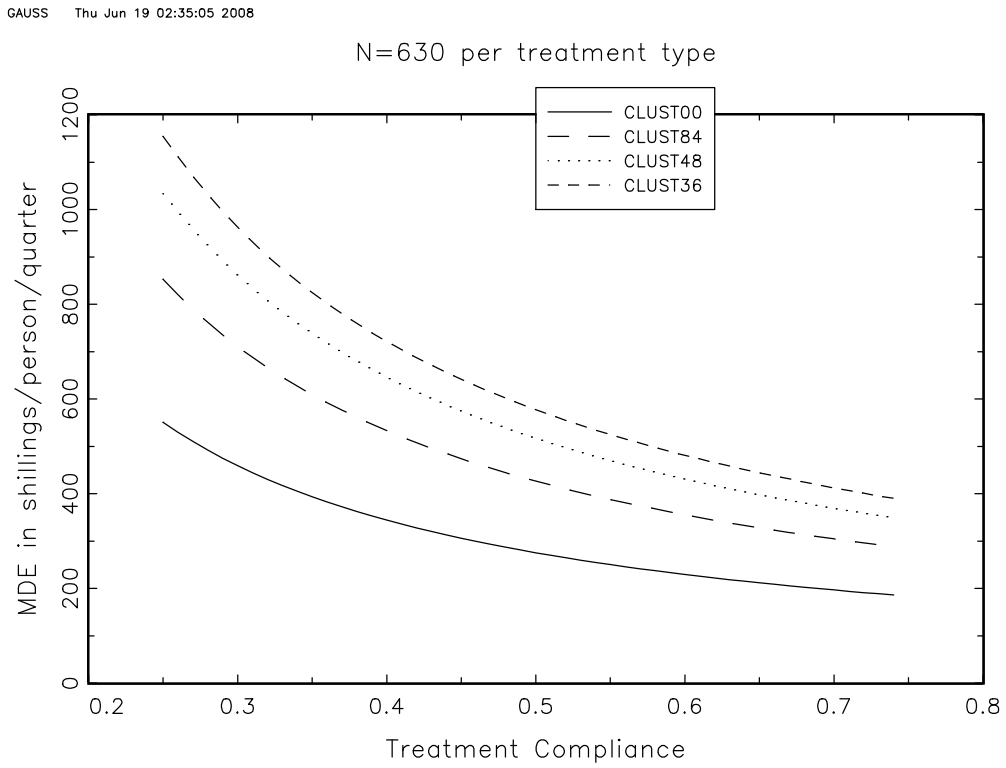
$$\beta_e = (t_\alpha + t_{1-d})\sqrt{\frac{\sigma^2}{N}} \times \sqrt{\frac{1}{p(1-p)}} \times \left(\frac{1}{c-s}\right) \times \sqrt{1+(\frac{N}{J}-1)\rho}\,,$$

where

- t_α is the critical t-value for the desired level of significance (alpha =5% for our calculations)
- t_{1-d} where *d* is the desired level of power
- σ^2 is the (conditional) variance of the outcome indicator of interest (e.g., income and TLU in our analysis
- *N* is the total sample size (i.e., total number of households interviewed in two boxes)
- *p* is the fraction of the N households that are treated (compared to the comparison group)
- *c-s* is the net compliance ratio (*c* is the fraction of households in PSN treatment locations that purchase the insurance, while *s* is the fraction of households in the control locations that take-up the insurance, despite not being targeted)
- *J* is the number of clusters (note that without clustering, *J=N*.
- ρ is the fraction of the total variance σ^2 that is due to cluster effects.

Using information from the PARIMA data, we arrive at the following MDE calculations for livestock and income:





As can be seen, the dashed 84 cluster line gives adequate statistical power assuming that our subsidy scheme buys us a net compliance rate of 40-50%. Note that the average TLU in the sample is 16 units, while average income is 2400 schillings per-person, per-quarter. Full details are available on request.