THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

# Livelihood Empowerment Against Poverty Program Impact Evaluation

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## Executive Summary

Inconsistent implementation: Implementation of the Livelihood Empowerment Against Poverty Program (LEAP) has been inconsistent. Over this 24-month evaluation period households received only 20 months' worth of payments. There was a long gap in cash payments to households in 2011, followed by a triple payment in February 2012 to settle arrears. Thus, LEAP households did not receive a steady flow of predictable cash with which to smooth their consumption. However the implementation of the National Health Insurance Scheme (NHIS) coverage among LEAP households was impressive, with 90 percent of LEAP households having at least one member enrolled in NHIS at the follow-up.

Positive impacts on children's schooling: LEAP has increased school enrollment among secondary school aged children by 7percentage points (pp), and reduced grade repetition among both primary and secondary aged children. Among primary aged children LEAP has reduced absenteeism by 10 percentage points.

Despite increased NHIS coverage mixed results on health utilization and morbidity: Despite the large increase in NHIS coverage, LEAP has not had an impact on curative care seeking but has increased preventive care for children age 0-5 in male headed households. Results on morbidity are mixed, increasing for children 0-5 but decreasing for children 6-17.

Gender impacts on children: There are some gender differentiated impacts of LEAP on children. Secondary school enrollment impacts are limited to boys, but attendance impacts are bigger for girls. At the household level, impacts on food security and happiness are larger among female headed households.

No impacts on consumption: The impact of LEAP on household consumption is essentially zero, likely due to the irregular payments, the lumpy nature of payments when made, and the low level of benefits.

Positive impacts on non-consumption: LEAP has led to a significant increase in the likelihood of holding savings (11 pp) and a significant increase in gifts received. LEAP has also had an impact on debt repayments and reduced loan holdings, particularly among female headed households.

There are some productivity impacts of LEAP. Among households with four members or less there are positive impacts of own labor supplied to the farm by men and women, and on expenditure on seeds. On the other hand, there are reductions in labor hired in by households though this reduction is lower than the increase in own labor.

LEAP appears to be strengthening social networks: The pattern of impacts of LEAP suggests that the program is allowing beneficiaries to re-establish or strengthen social networks. LEAP has had a positive impact on both the value of gifts received and the amount of credit extended to others.

LEAP household heads are happier: LEAP has led to a 16 pp increase in household heads who feel happy about their life, especially among female-headed and smaller households.

Alignment of results with qualitative study: The qualitative study by OPM (2013) corroborates the positive impacts of LEAP that we find from the quantitative study. These include the findings on increased consumption of fats (palm oil), strengthening of social networks through gifts and transfers, debt repayment, savings, and overall self-esteem, aspirations and happiness.

The pattern of impacts revealed here is consistent with the implementation of LEAP. The overall low level of LEAP benefits coupled with sporadic payments and the large lump-sum in February 2012 explains the lack of impacts on consumption and the increase in non-consumption activities such as savings and reductions in debt. These activities appear to have strengthened the social networks of LEAP households.

Implication of results: There are three key issues that arise from the results presented here. First is the low value of the LEAP transfer—this issue has been partially resolved by a tripling of the transfer level from January 2012. Second is the irregular payment cycles which do not allow households to smooth their permanent consumption. This is a key operational bottleneck for LEAP. The third issue is the somewhat inconsistent finding of a strong increase in NHIS coverage among LEAP households but no commensurable impact on utilization of health services or reductions in out-of-pocket health expenditure. This suggests there are weaknesses in linking LEAP beneficiaries to health services which requires further attention.

Next steps for the evaluation: The Institute for Statistical, Social and Economic Research of the University of Ghana-Legon (ISSER) is preparing to undertake a follow-up round of data collection on its national sample, which includes the 914 households used as a comparison group for this evaluation. It would be interesting to also follow-up the 699 LEAP households to understand the medium term effects of the program. However the benefit of continuing the study depends on whether payments to the households have been made on a regular basis.

## Acronyms

| | |
|---|---|
| AE | Adult equivalent |
| C | Comparison Group |
| DD | Difference-in-differences |
| DFID | Department for International Development, United Kingdom |
| DSW | Department of Social Welfare |
| FHH | Female headed households |
| GHc | Ghanaian Cedis (GH¢) |
| GoG | Government of Ghana |
| IPW | Inverse Probability Weighting |
| ISSER | Institute for Statistical, Social and Economic Research of the University of Ghana-Legon |
| LEAP | Livelihood Empowerment Against Poverty (LEAP) |
| MoGCSP | Ministry of Gender, Children and Social Protection |
| NHIS | National Health Insurance Scheme |
| PC | Per capita |
| PP | Percentage points |
| PSM | Propensity score matching |
| PWD | Persons with disabilities |
| T | Treatment Groups |
| UNC | University of North Carolina |
| USD | United States Dollar |

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## 1. Introduction and purpose

This document constitutes the quantitative impact evaluation report of the Livelihood Empowerment Against Poverty (LEAP) Program of the Ministry of Gender, Children and Social Protection (MoGCSP), Government of Ghana (GoG). The impact evaluation is implemented by a consortium of partners including the Institute for Statistical, Social and Economic Research of the University of Ghana-Legon (ISSER) and the University of North Carolina (UNC) under contract to the Government of Ghana and the International Initiative for Impact Evaluation (3IE). This report should be read in conjunction with the LEAP Evaluation Baseline Report (2011) and the LEAP Operations Evaluation Report (2012) (Handa and Park 2011; Park and Handa 2012).

LEAP is a social cash transfer program which provides cash and health insurance to extremely poor households across Ghana. The program's objectives are to alleviate short-term poverty and encourage long-term human capital development. LEAP started a trial phase in March 2008 and then began expanding gradually in 2009 and 2010, and currently reaches over 70,000 households across Ghana with an annual expenditure of approximately USD 20 million. The program is funded from general revenues of the Government of Ghana (50 percent), donations from the Department for International Development, United Kingdom (DFID) and a loan from the World Bank, and is the flagship program of its National Social Protection Strategy. It is implemented by the Department of Social Welfare (DSW) in the Ministry of Gender, Children and Social Protection.

LEAP eligibility is based on poverty and having a household member in at least one of three demographic categories: households with orphan or vulnerable child (OVC), elderly poor, or person with extreme disability unable to work (PWD). Initial selection of households is done through a community-based process and is verified centrally with a proxy means test. An exciting feature of LEAP, unique in the world, is that aside from direct cash payments, beneficiaries are provided free health insurance through the National Health Insurance Scheme (NHIS), which began in 2004-2005. This is facilitated through a Memorandum of Understanding between the MoGCSP and Ministry of Health, where funds to cover enrollment in health insurance are transferred directly to the local health authority, who then issues cards to LEAP households. During the 24-month period of this evaluation from April 2010 to April 2012, LEAP households received between 8-15 Ghanaian Cedis (GH¢) per month depending on eligible beneficiaries per household. The payment structure was tripled in 2012 but the first payment at these new levels did not commence until after the follow-up survey for the evaluation was conducted, hence for the purposes of this evaluation the transfer payment structure based on the number of household beneficiaries was GH¢ 8 (1 beneficiary), GH¢ 10 (2), GH¢ 12 (3) and GH¢ 15 (4+).

The purpose of this report is to provide impact estimates of LEAP on a range of household and child level outcomes. The primary outcomes of interest at the household level are

consumption and non-consumption expenditure and enrollment in the NHIS. At the child level, the primary outcomes are school access and health access. The Conceptual Framework for the study is presented in Appendix 1. The results of this study will help to inform the implementation of the LEAP program.

### 1.1 Overview of research design and samples

The evaluation strategy for LEAP is a longitudinal propensity score matching (PSM) design. Baseline data was collected from future beneficiaries in three regions (Brong Ahafo, Central and Volta) who were part of a larger nationally representative sample of households surveyed as part of a research study conducted by ISSER and Yale University (USA) in the first quarter of 2010 (N=699). A comparison group of 'matched' households (N=699) were selected from the ISSER sample and re-interviewed after 24 months along with LEAP beneficiaries to measure changes in outcomes across treatment and comparison groups. Further details of this design and analysis of the matched comparison group are presented in the Leap Evaluation Baseline Report and are also summarized in Appendix 2.

During implementation of the follow-up survey, ISSER agreed to re-interview 'extra' households from the ISSER sample to generate additional statistical power for the study. In total 215 'extra' households were interviewed at follow-up from the ISSER sample; these were households that had similar propensity scores to the LEAP households and that were residing in the same communities that were already being visited by the ISSER enumeration team, and so could be interviewed at low additional cost. Table A3.1 in Appendix 3 provides essential information on the samples for this evaluation. There were 1,398 target households (699 in each of the LEAP and matched ISSER samples) to be followed during the 2012 exercise. A total of 1,289 of these households were actually re-interviewed for a success rate of 92 percent. With the additional 215 households from the ISSER sample, the total analysis sample consists of 1,613 households and a final longitudinal sample of 1,504 households (858 ISSER, 646 LEAP). Appendix 3 compares the characteristics of the original sample in 2010 and the sample that were followed in 2012; the two samples are very similar suggesting that there is no loss of internal validity due to the attrition.

**Table 1.1: Samples for LEAP Impact Evaluation**

| | 2010 | 2012 |
|---|---|---|
| LEAP | 699 | 646 (92%) |
| ISSER Samples | | |
| Matched | 699 | 643 (92%) |
| Unmatched (extra) | 215 | 215 |
| Total sample | 1,613 | 1,504 (93%) |

## 2. Approach and comparison of samples

### 2.1. Difference-in-differences approach

The statistical approach we take to derive average treatment effects of LEAP is the difference-in-differences (DD) estimator. This entails calculating the change in an indicator such as food consumption between baseline (prior to program initiation—2010) and post intervention (2012) for treatment and comparison group units, and comparing the magnitude of these changes. Figure 2.1 illustrates how the estimate of difference-in-differences between treatment (T) and comparison groups (C) is computed. The top row shows the baseline and post-intervention values of the indicator and the last cell in that row depicts the change or difference in the value of the outcome for treatment units. The second row shows the value of the indicator at baseline and post-intervention for the comparison group units and the last cell illustrates the change, or difference, in the value of this indicator over time. The difference between these two differences, shown in the shaded cell in Figure 2.1, is the difference-in-differences or double-difference estimator.

**Figure 2.1: The Difference-in-differences (DD) estimator**

| | Baseline (2010) | Post (2012) | 1st difference |
|---|---|---|---|
| Treatment (T) | $T_{2010}$ | $T_{2012}$ | $\Delta T=(T_{2012}-T_{2010})$ |
| Comparison (C) | $C_{2010}$ | $C_{2012}$ | $\Delta C=(C_{2012}-C_{2010})$ |
| | | | Difference-in-differences $DD = (\Delta T - \Delta C)$ |

The DD is one of the strongest estimators available of causal impact in the evaluation literature (Shadish, Cook, and Temple 2002). There are two critical features of this design that are particularly attractive for deriving unbiased program impacts. First, using pre- and post-treatment measures allows us to 'difference' out unmeasured fixed (i.e. time-invariant) characteristics of the family or individual which may affect outcomes, such as motivation, health endowment, mental capacity or unobserved productivity. It also allows us to 'benchmark' the change in the indicator against its value in the absence of treatment. Second, using the change in a comparison group allows us to account for general trends in the value of the outcome. For example if there is a general increase in school enrollment due to expansion of school access, deriving treatment effects based only on the treatment group will confound program impacts on schooling with the general trend increase in schooling. The critical assumption behind the DD is that these general trends are common across the intervention and comparison households. In this evaluation, because the comparison group comes from different districts and regions, the 'common trends' assumption may not hold perfectly.

## 2.2. Selection of comparison group

An ideal evaluation would randomize a set of LEAP-eligible households into T and C arms but this is often not possible in large-scale programs that are ongoing. In the present study the comparison units are selected from a national household survey using PSM. The PSM approach within the context of the DD has been shown to perform extremely well at replicating the experimental benchmark in social experiments (Heckman, Ichimura, and Todd 1997). Assessments of the PSM techniques in the context of cash transfer programs are quite positive under certain conditions and these conditions are met in this evaluation—data from the two samples is collected using the same survey instrument, field teams and at the same time (Diaz and Handa 2006; Handa and Maluccio 2010).

The details of the PSM application in this evaluation are summarized in Appendix 2. As we mentioned earlier, during the follow-up survey ISSER interviewed an additional 215 households who were in communities that were already being visited, and who had 'similar' characteristics to LEAP households. The additional cost of interviewing these households was relatively low (no additional transportation costs were incurred) while the addition raises the sample size and thus the statistical power of the study. Table 2.2 shows mean characteristics (at baseline) of the LEAP sample, the 'matched' ISSER sample and the matched ISSER sample including the 215 extra households. Numbers in bold indicate statistically significant differences from LEAP. As reported in the Baseline Report, there are a few differences between the ISSER matched sample (unweighted) and LEAP. In particular, we could not perfectly balance all the characteristics of the matched sample with LEAP households because LEAP households are very unique and the ISSER survey was a national survey and so did not have enough households that were exactly similar to LEAP households. As expected given the eligibility criteria, the LEAP sample has more households with orphans than the matched sample; LEAP household heads are also more likely to be women, widowed and have no schooling. The extra households are somewhat less similar to LEAP as we would expect, since had they been more similar, they would have been part of the original matched sample.

The inverse probability weighting (IPW) (Soares, Ribas, and Hirata 2010; Imbens and Wooldridge 2009; Wooldridge 2007; Hirano et al. 2003) technique uses the propensity score for each household as a 'weight' in the statistical analysis to reflect how similar it is to a LEAP household (the higher the score, the more similar, and the greater the weight). The last two columns of Table 2.2 show the weighted means for the original matched sample and the full ISSER sample that was interviewed at follow-up. With the weighting, the characteristics among the two groups are fully balanced. For example, 62 percent of LEAP households contain an orphan compared to only 34 and29 percent in the two ISSER comparison groups; but with the IPW the means for the two ISSER comparison groups are now 65 and 59 percent and no longer statistically different from the LEAP group. Thus the weighting provides for a further way to adjust the comparison sample to make it more similar to LEAP; we employ the IPW technique in our analysis of program impacts using the full 914 households from the ISSER sample.

**Table 2.2: Mean baseline characteristics of LEAP and ISSER samples**

| | | Unweighted | | Weighted | |
|---|---|---|---|---|---|
| **Indicator Variables** | **LEAP N=699** | **ISSER N=699** | **ISSER N=914** | **ISSER N=699** | **ISSER N=914** |
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| **Demographics** | | | | | |
| Household size | 3.83 | 3.69 | 3.76 | 3.83 | 3.83 |
| Children under 5 | 0.44 | 0.45 | 0.51 | 0.46 | 0.48 |
| Children 6-12 | 0.77 | 0.76 | 0.78 | 0.83 | 0.82 |
| Children 13-17 | 0.54 | 0.50 | 0.50 | 0.52 | 0.51 |
| Elderly (>64) | 0.76 | 0.65 | **0.56** | 0.83 | 0.77 |
| Number of orphans | 0.62 | **0.34** | **0.29** | 0.65 | 0.59 |
| Orphan living in hhld | 0.27 | **0.19** | **0.17** | 0.28 | 0.25 |
| **Head characteristics** | | | | | |
| Female Household | 0.59 | 0.54 | **0.50** | 0.64 | 0.61 |
| Age of Head | 60.92 | 59.42 | **56.87** | 62.97 | 61.38 |
| Widowed | 0.39 | **0.30** | **0.26** | 0.41 | 0.38 |
| Head has schooling | 0.30 | **0.47** | **0.50** | 0.31 | 0.34 |
| **Household characteristics** | | | | | |
| No kitchen | 0.09 | 0.07 | 0.06 | 0.08 | 0.08 |
| No toilet | 0.31 | 0.31 | 0.31 | 0.34 | 0.34 |
| Pit latrine | 0.30 | **0.42** | **0.43** | 0.31 | 0.32 |
| Thatch roof | 0.31 | **0.23** | 0.23 | 0.29 | 0.28 |
| Crowd | 0.69 | 0.71 | 0.70 | 0.69 | 0.68 |
| Shared dwelling | 0.29 | 0.27 | 0.25 | 0.29 | 0.28 |
| Unprotected Water | 0.21 | 0.23 | 0.23 | 0.24 | 0.24 |
| Per capita spending (GHc) | 55.46 | 60.06 | 50.68 | 47.47 | 48.34 |
| Livestock owned | 0.41 | 0.44 | 0.44 | 0.42 | 0.42 |
| | N=699 | N=699 | N=914 | N=699 | N=914 |

Bold indicates mean is statistically different from LEAP mean at 5 percent level. Columns 2 and 4 are means from the original matched sample while columns 3 and 5 include the 215 extra households that were interviewed in 2012.

## 2.3. Multivariate analysis

When treatment and comparison units are selected randomly and their characteristics are perfectly balanced, then simple mean differences as shown in Figure 2.1 are usually sufficient to derive unbiased estimates of program impact. However when the C group is selected through non-experimental means, as it was for this study, it is typical to estimate the DD in a multivariate framework, controlling for other potential intervening factors that might not be perfectly balanced across T and C units and/or are strong predictors of the outcome. Not only does this allow us to control for possible confounders, it also increases the efficiency of our estimates by reducing the residual variance in the model. In our case, because LEAP and ISSER households come from different communities it is especially important to control for differences in community characteristics which might affect

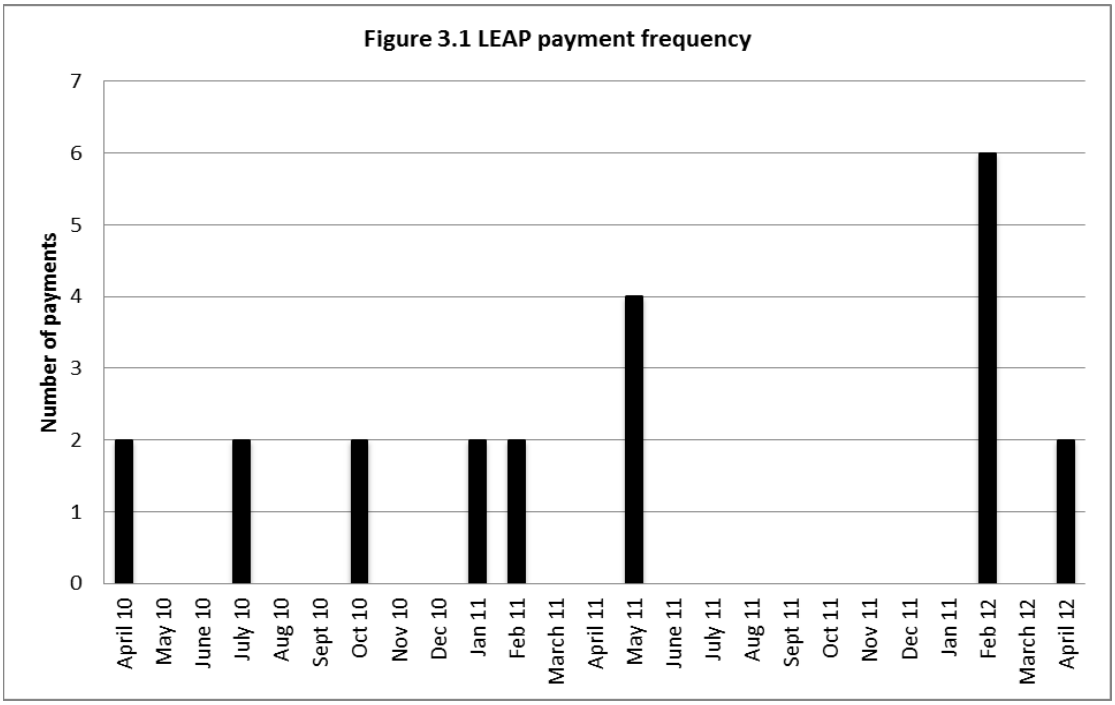
household welfare and their responses to economic constraints. Details on the multivariate models are presented in Appendix 4. In the tables we present in the text, we only report the coefficient of the DD variable as described in Figure 2.1. The DD is the primary parameter of interest in that it directly estimates the difference in the change in outcome variables over time between the treatment and control group.

## 3. LEAP implementation and implications for evaluation

There are two main aspects of LEAP, a cash transfer and 'free' enrollment into the NHIS. Here we discuss the implementation of these two aspects of the program and how they will affect our expected evaluation results.

### 3.1. Cash transfer payments

Figure 3.1 shows the payment of LEAP transfers during the period of this assessment as provided by the implementing agency. Payments are scheduled bimonthly so the y-axis shows the number of 'months' of payment made at each period. Ideally, two payments would be made every two months. Payment of grants was fairly regular during the first year of the study period up to May 2011, but then no payments were made for eight months. A triple payment was made in February 2012 which covered May – October 2011, and a regular payment was made in April 2012 which covered November-December 2011. The follow-up survey was conducted in May 2012 which was 24 months after program initiation, but households had only received 20 months' worth of cash during the study period, and eight of these months were provided in the three month period just prior to the follow-up survey. Given the gap in payments during 2011 and the large lump sum payments, it is unclear how households would respond to the triple payment in February 2012 and the regular payment in April 2012. The large lump-sum in February 2012 may have provided an opportunity for investment or spending on 'lumpy' items or savings rather than an opportunity to smooth current consumption.




The second issue with the LEAP payments is the overall low value of the transfer. The median transfer level given the demographic structure of beneficiary households is GHc 15. With a median household size of 3.8 this is 7 percent of the upper poverty line and 11 percent of the lower poverty line. Figure 3.2 illustrates that the transfer level is about 11 percent of consumption among the target group at baseline, while most successful programs transfer at least 20 percent of consumption to beneficiaries. In addition, the cumulative inflation rate over the study period was 19 percent, so an already low transfer level was further eroded by inflation such that, by the time of the follow-up in 2012, the value of the transfer was about 7 percent of beneficiary consumption. Table 3.1 shows the mean value of the transfer per adult equivalent (AE) per month and as the share of monthly consumption in 2010 and 2012. The Government of Ghana subsequently tripled the transfer level as of January 2012 but that payment level did not come into effect during the period of this study. Moreover, due to the general inflation rate, the new transfer value would now only represent 21 percent of mean consumption, underscoring the need to peg the transfer value to the inflation rate in order to maintain its real value.

The Operations Evaluations Report also indicated that about 10 percent of LEAP households had not heard of LEAP and a further 10 percent had never received a LEAP payment, so a total of 20 percent of households may have not actually received any payments. This list of households has been given to MoGCSP to confirm enrollment status.

**Figure 3.2: Transfer as share of participant consumption**

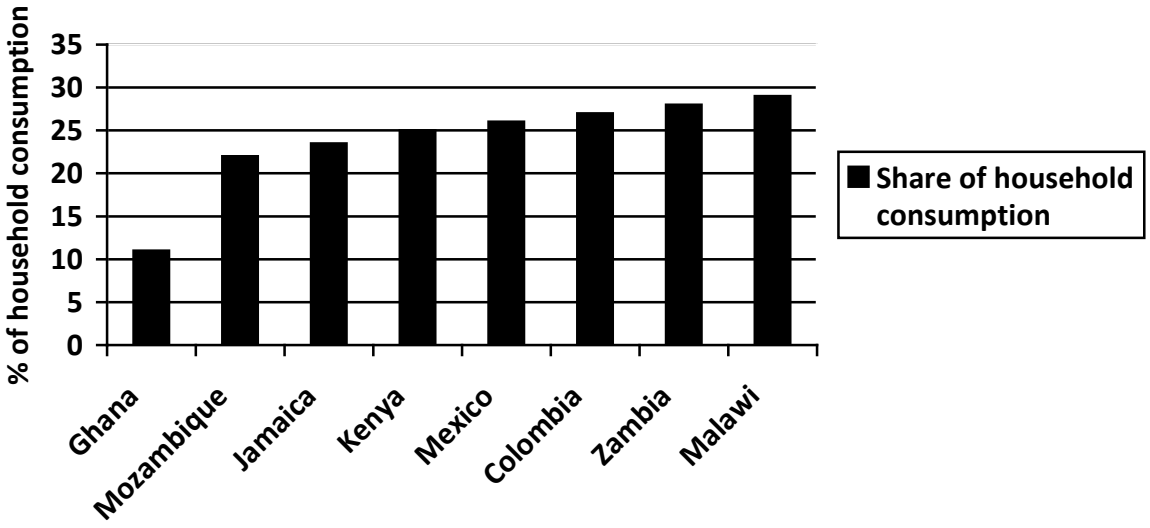



**Table 3.1: Average value of LEAP transfer**

| Monthly value per AE (GHc) | Share of consumption 2010 | Share of consumption 2012 |
|---|---|---|
| 5.06 | 0.11 | 0.07 |

## 3.2. Enrollment in NHIS

LEAP beneficiaries are to be enrolled automatically into the NHIS and have their fee waived through a Memorandum of Understanding with the Ministry of Health. Indeed it is the intention of the Government of Ghana to achieve universal coverage of NHIS so including this component in LEAP effectively accelerates this process among the eligible group. Table 3.2 shows that this aspect of program implementation was extremely successful, with 90 percent of LEAP households enrolled in NHIS by 2012, an increase of 25 percentage points. In contrast, the increase in NHIS enrollment among the comparison group was only 18 percentage points, so there was a net increase of 7 percentage points (the difference-in-differences or DD) in NHIS enrollment, a difference which is statistically significant.

**Table 3.2: Enrollment in NHIS by sample and year (% and pp)**

| Year: | 2010 | 2012 | 1st difference (pp) |
|---|---|---|---|
| LEAP | 65 | 90 | 25 |
| Comparison Group | 58 | 76 | 18 |

### 3.3. Implications for impact results

The actual implementation of LEAP has implications for potential impacts of the program. Traditionally the link between cash transfer programs and consumption expenditures is predicated on steady, predictable transfers which households perceive as an increase in their permanent income, and which allows them to increase their consumption over time. In the case of LEAP, transfers have not been predictable so it is unlikely that households would perceive an increase in their permanent income, a necessary condition to increase consumption. Rather it is likely that households viewed payments, particularly at the end of 2011 and early 2012, as occasional (rather than predictable) lump-sum payments, and used these funds for lumpy spending on investment activities, loan pay-off or savings rather than to raise permanent consumption. On the other hand, the implementation of the NHIS component of the program was relatively successful so we might expect to see impacts on outcomes related to NHIS such as use of services and declines in out-of-pocket costs.

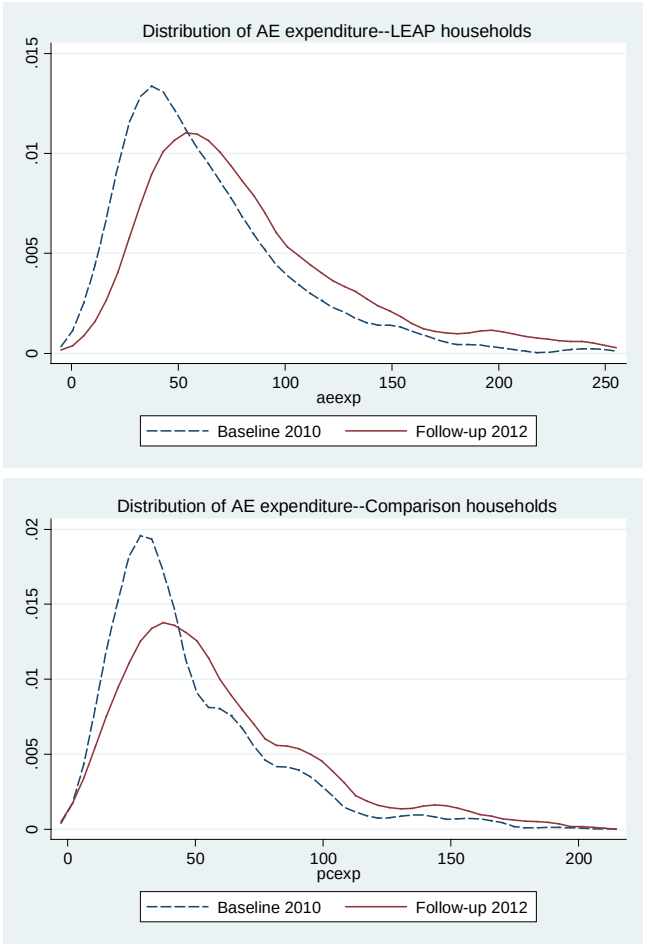
## 4. Impact results for consumption expenditures

### 4.1. Consumption expenditure

We aggregate all spending on consumption items and express in per adult equivalent (AE) terms, inflating 2010 values to 2012 new GHc values using the cumulative inflation rate during this period of 19 percent. In addition, we adjust for spatial differences in prices across LEAP and ISSER communities by comparing the cost of a bundle of consumption goods for which we have community prices; details of the construction of the spatial price index is provided in Appendix 5.

Figure 4.1 shows the density graphs for AE consumption expenditure by sample and year—the further to the right the distribution, the better off the households. The top graph is for LEAP households and the bottom graph for the 914 ISSER households used in the study—both groups appear to have improved over this time period. The DD estimates compare the change in the LEAP households to the change in ISSER households. Graphically the change looks about the same, and our statistical estimates show that actually the change among LEAP households is about GHc 4.4 smaller than among ISSER households, but this difference is not statistically significant. This result is presented in the top left cell of Table 4.1.

**Figure 4.1: Distribution of AE consumption 2010 and 2012**




The top left panel of Table 4.1 shows the DD impact estimates for food and non-food; GHc 2.53 of the total GHc 4.4 difference in total consumption derives from non-food spending, but again none of these differences are statistically significant, implying essentially that there is difference in consumption spending between LEAP and ISSER households over this time period.

To check the sensitivity of these results we estimate these impacts on several different samples. First we exclude the 215 'extra' ISSER households that were sampled—these results are shown in columns 4-6 of the top panel and show essentially the same results as in the full sample. We then restrict our sample to only the panel households, that is, those households that appeared in both waves of the survey, and again we find no difference in the results. Finally we restrict the comparison to ISSER households that come from the same three regions as the LEAP sample and again we find no difference in total, food or non-food consumption.

The bottom two panels of Table 4.1 show estimates by household size and gender of the household head. Since there is a cap on the LEAP transfer at four eligible members, larger households will receive a smaller transfer per person and we thus might expect impacts to be smaller among larger households. The third panel of Table 4.1 shows estimates for households with four or fewer members and larger households; again we see no impact of LEAP on consumption by household size.

The last panel of Table 4.1 breaks the sample by gender of head since nearly 60 percent of LEAP households are female-headed households (FHH). Again we see no differential impact of the program on consumption by gender of head.

**Table 4.1: Impacts on total consumption, food and non-food by samples**

| Adult Equivalent Consumption: | Total | Food | Non-food | Total | Food | Non-food |
|---|---|---|---|---|---|---|
| | | Full Sample | | | Original Matched Sample[1] | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Impact | -4.37 | -1.84 | -2.53 | -4.68 | -2.10 | -2.59 |
| | (0.88) | (0.47) | (1.00) | (0.86) | (0.49) | (0.94) |
| Observations | 2,979 | 2,979 | 2,979 | 2,566 | 2,566 | 2,566 |
| LEAP Baseline Mean | 63.29 | 44.83 | 18.46 | 63.29 | 44.83 | 18.46 |
| ISSER Baseline Mean | 61.62 | 43.36 | 18.26 | 60.52 | 42.43 | 18.09 |
| | | Panel[2] | | | Three Regions[3] | |
| Impact | -4.67 | -2.13 | -2.54 | -0.43 | 1.38 | -1.82 |
| | (0.86) | (0.50) | (0.92) | (0.07) | (0.39) | (0.46) |
| Observations | 2,467 | 2,467 | 2,467 | 2,093 | 2,093 | 2,093 |
| LEAP Baseline Mean | 62.44 | 44.24 | 18.20 | 63.29 | 44.83 | 18.46 |
| ISSER Baseline Mean | 60.57 | 42.29 | 18.29 | 58.05 | 39.77 | 18.28 |
| | | Size≤4 | | | Size≥5 | |
| Impact | -6.60 | -4.34 | -2.26 | -0.42 | 2.33 | -2.75 |
| | (0.92) | (0.71) | (0.64) | (0.08) | (0.60) | (1.09) |
| Observations | 1,881 | 1,881 | 1,881 | 1,098 | 1,098 | 1,098 |
| LEAP Baseline Mean | 72.79 | 53.77 | 19.02 | 47.24 | 29.72 | 17.52 |
| ISSER Baseline Mean | 71.66 | 51.37 | 20.29 | 43.48 | 28.88 | 14.59 |
| | Female Headed Households | | | Male Headed Households | | |
| Impact | -1.27 | 1.87 | -3.13 | -8.96 | -7.51 | -1.45 |
| | (0.21) | (0.41) | (0.81) | (1.34) | (1.40) | (0.63) |
| Observations | 1,593 | 1,593 | 1,593 | 1,386 | 1,386 | 1,386 |
| LEAP Baseline Mean | 68.21 | 48.89 | 19.32 | 56.16 | 38.94 | 17.22 |
| ISSER Baseline Mean | 67.11 | 47.57 | 19.54 | 53.15 | 36.86 | 16.30 |

The highlighted row shows the DD impact estimate of LEAP derived from equation (1) in Appendix 4. Cluster-robust t-statistics are below each estimate. The dependent variables are shown in the top row and are total expenditure, food expenditure and non-food expenditure all measured in 2012 GHc adult equivalents (AE). The impacts are estimated over eight different samples which are labeled above each set of estimates. The mean value of the dependent variable at baseline is shown below each set of estimates. 1/ This does not include the extra 215 households from the ISSER sample; 2/ Only households observed in both waves; 3/ Only households from Brong Ahafo, Central and Volta.

### 4.2 Expenditure groups

Although there is no impact of LEAP on overall food and non-food expenditures, we investigated whether there were any impacts on consumption patterns within these broad groups. Impact estimates for six non-food groups are presented in Appendix 6 and these show no statistically significant differences either for the full sample or the subgroups defined by household size or gender of head.

We also investigated impacts on ten specific food groups and these results are also presented in Appendix 6. Here we do uncover some statistically significant differences despite the fact that there is no overall change in food consumption between LEAP and ISSER households. We find, for example, a significant decline in starches (GHc 2.58) and meats (GHc 1.99) and an increase in fats (GHc 0.88) and food eaten out (GHc 4.12). These patterns are particularly noticeable among smaller households, where we also see a statistical decline in alcohol and tobacco (GHc 0.52). Aside from the decline in alcohol and tobacco among smaller households, it is difficult to make a value judgment on these changes in food consumption patterns. The decline in starches, typically inferior goods, is probably good but the decline in meats is bad; on the other hand the increase in food eaten out may signify increased consumption of meats and protein. And for these very poor households, the increase in fats is likely a positive shift, and in fact, the ability to use more cooking oil and 'good Magi' was cited in the qualitative report as a benefit of LEAP (Oxford Policy Management (henceforth OPM) 2013, p.29).

### 4.3 Food security and happiness

Food insecurity: A special module on food security as included in the LEAP questionnaire only at baseline since this was an important indicator for the program. At the household level two questions were asked about whether anyone went a whole day without food due to money and whether the main respondent lost weight because s/he did not have enough to eat. We sum the responses from these questions to create a scale ranging from 0-2, with higher values indicating higher food insecurity. A set of four questions is asked about children's food security in the household. These include whether meals were ever cut, whether entire meals were skipped, whether children went hungry due to lack of food, and whether any child did not eat for an entire day due to shortage of money. We sum these questions to create a score ranging from 0-4, with higher values indicating higher food insecurity. Since this module was only included in the LEAP questionnaire at baseline (it was not part of the larger ISSER survey but rather included as a special request by MoGCSP), we can only compare changes in this indicator among LEAP households.

Happiness: The survey instrument asked each main respondent if s/he was happy with her/his life (1=yes, 0=no). This question is included in both the LEAP and ISSER surveys so we can construct the DD estimator.

Table 4.2 shows the change in the value of these two food insecurity indicators among LEAP households over time, as well as the single indicator of whether or not any child ever missed an entire day of eating due to lack of cash, which we consider an extreme indicator of food insecurity (this ranges from 0 (no) to 1 (yes)). In all three cases, the food security situation of LEAP households has improved dramatically, and the improvements appear to be stronger among female-headed households (FHH). Thus, while there is no impact on the overall level of food and non-food consumption, overall food security has improved.

However, the overall food security of all households in Ghana may have improved over this time period, so the improvements observed in Table 4.2 cannot be interpreted to be due to participation in LEAP alone.

Table 4.3 shows DD impact estimates on self-reported happiness and shows that there is an increase of 16 percentage points in the likelihood of feeling happy with one's life among LEAP households relative to ISSER households; this impact is driven primarily in female-headed households and smaller households. This may seem at odds with the lack of significant impacts on consumption, but as we will see below, LEAP has, in fact, had a significant positive impact on several other dimensions of household welfare, which explains this increase in self-reported happiness. Moreover, in the qualitative focus group assessment LEAP beneficiaries spoke about the important effect on 'self-esteem' and 'hope' that the program had brought about, and how it contributed to an increase in overall happiness (OPM 2013, p.39-40); this was viewed as a strong impact of the program by beneficiaries and is corroborated by the household survey.

**Table 4.2: Impacts on food security (cross sectional results)**

| | Household Food Insecurity[1] | Child Food Insecurity[1] | Child Missed Entire Day of Eating[1] |
|---|---|---|---|
| | | Full Sample | |
| | (1) | (2) | (3) |
| Impact | **-0.245** | **-0.702** | **-0.096** |
| | (4.30) | (8.05) | (5.27) |
| Observations | 1,305 | 901 | 888 |
| LEAP Baseline Mean | 0.630 | 1.396 | 0.133 |
| ISSER Baseline Mean | 0.395 | 0.682 | 0.0322 |
| | | FHH | |
| Impact | **-0.321** | **-0.786** | **-0.105** |
| | (4.39) | (5.82) | (3.34) |
| Observations | 769 | 524 | 518 |
| LEAP Baseline Mean | 0.703 | 1.550 | 0.146 |
| ISSER Baseline Mean | 0.398 | 0.691 | 0.0368 |
| | | MHH | |
| Impact | -0.132 | **-0.536** | **-0.089** |
| | (1.48) | (3.62) | (2.79) |
| Observations | 536 | 377 | 370 |
| LEAP Baseline Mean | 0.524 | 1.183 | 0.114 |
| ISSER Baseline Mean | 0.39 | 0.668 | 0.0258 |
| | | Size≤4 | |
| Impact | **-0.237** | **-0.599** | **-0.11** |
| | (3.41) | (3.73) | (3.81) |
| Observations | 816 | 432 | 425 |
| LEAP Baseline Mean | 0.662 | 1.365 | 0.151 |
| ISSER Baseline Mean | 0.44 | 0.625 | 0.0208 |
| | | Size≥5 | |
| Impact | **-0.221** | **-0.624** | **-0.073** |
| | (3.11) | (4.68) | (2.56) |
| Observations | 489 | 469 | 463 |
| LEAP Baseline Mean | 0.576 | 1.419 | 0.118 |
| ISSER Baseline Mean | 0.32 | 0.742 | 0.0442 |

The highlighted row shows the impact estimate of LEAP on the indicator listed at the top of the column. In Columns 1-3 this impact is the change among LEAP households between 2010 and 2012. Cluster-robust t-statistics are below each estimate. The impacts are estimated over five different samples which are labeled above each set of estimates. The mean value of the dependent variable at baseline shown below each set of estimates. Statistical significance at 5 percent or better is shown in bold. 1/ Higher values indicate higher food insecurity.

**Table 4.3: Impact of LEAP on happiness**

| | Full Sample | FHH | MHH | Size≤4 | Size≥5 |
|---|---|---|---|---|---|
| Impact | **0.158** | **0.233** | 0.041 | **0.206** | 0.088 |
| | (2.20) | (2.28) | (0.54) | (2.30) | (0.73) |
| Observations | 3,036 | 1,634 | 1,402 | 1,937 | 1,099 |
| LEAP Baseline Mean | 0.395 | 0.357 | 0.451 | 0.382 | 0.418 |
| ISSER Baseline Mean | 0.597 | 0.589 | 0.608 | 0.587 | 0.614 |

The highlighted row shows the impact estimate of LEAP on the whether or not the respondent as happy. This is the DD estimate. Cluster-robust t-statistics are below each estimate. The impacts are estimated over five different samples which are labeled above each set of estimates. The mean value of the dependent variable at baseline shown below each set of estimates. Statistical significance at 5 percent or better is shown in bold.

## 5. Impacts on non-consumption expenditures

Table 5.1 explores other non-consumption expenditures as well as remittances to see if they help us understand the circumstances of LEAP households during the study period. The specific indicators we look at are whether or not the household had any savings, whether the households received transfers from individuals and the amount received (as a share of AE consumption), and the total value of gifts given in the past month (in 2012 AE GHc). Column 1 shows that LEAP households are 11 percentage points more likely to save money relative to ISSER households, and while there is no impact on the prevalence of receiving remittances, there is a significant increase in the value of remittances received as a share of AE consumption.

These results indicate that while LEAP has not had an impact on consumption it has had an effect on non-consumption spending, which is quite consistent with the results from the qualitative work. The focus group discussions indicated that LEAP plays an important function in helping households 're-enter' social networks by contributing to funerals, naming ceremonies and other social events, but at the same time the value of the LEAP transfer is not so large that it would displace existing networks. This is consistent with Table 5.1, which shows a significant increase in the value of gifts received. The increase in savings shown in Table 5.1 is also consistent with the qualitative work suggesting that LEAP enables households to withstand shocks and to gather working capital (OPM 2013, pp. 41-42).

**Table 5.1: Impacts on savings, remittances received and gifts given**

| | Any Savings | Received Remittance | Amount Received (Share)[1] | Gifts Given (GHc)[2] |
|---|---|---|---|---|
| | | Full Sample | | |
| | (1) | (2) | (3) | (4) |
| Impact | 0.108 | -0.020 | **2.234** | -0.149 |
| | (1.73) | (-0.38) | (2.04) | (-0.26) |
| Observations | 2,978 | 2,978 | 2,978 | 2,978 |
| LEAP Baseline Mean | 0.207 | 0.500 | 3.391 | 2.390 |
| ISSER Baseline Mean | 0.352 | 0.498 | 4.868 | 3.161 |
| | | FHH | | |
| Impact | 0.070 | -0.098 | 1.012 | 0.432 |
| | (1.10) | (-1.53) | (1.05) | (0.66) |
| Observations | 1,608 | 1,608 | 1,608 | 1,608 |
| LEAP Baseline Mean | 0.182 | 0.574 | 3.476 | 2.196 |
| ISSER Baseline Mean | 0.338 | 0.553 | 4.653 | 2.792 |
| | | MHH | | |
| Impact | 0.147 | 0.032 | 1.526 | -0.552 |
| | (1.79) | (0.51) | (1.19) | (-0.59) |
| Observations | 1,370 | 1,370 | 1,370 | 1,370 |
| LEAP Baseline Mean | 0.244 | 0.395 | 3.269 | 2.666 |
| ISSER Baseline Mean | 0.369 | 0.432 | 5.124 | 3.603 |
| | | Size≤4 | | |
| Impact | 0.093 | -0.088 | 0.232 | 0.438 |
| | (1.59) | (-1.46) | (0.31) | (0.54) |
| Observations | 1,888 | 1,888 | 1,888 | 1,888 |
| LEAP Baseline Mean | 0.169 | 0.592 | 3.517 | 2.723 |
| ISSER Baseline Mean | 0.286 | 0.579 | 4.654 | 3.942 |
| | | Size≥5 | | |
| Impact | 0.089 | 0.086 | **5.264** | **-1.041** |
| | (1.02) | (1.49) | (2.72) | (-2.14) |
| Observations | 1,090 | 1,090 | 1,090 | 1,090 |
| LEAP Baseline Mean | 0.270 | 0.348 | 3.183 | 1.841 |
| ISSER Baseline Mean | 0.460 | 0.364 | 5.220 | 1.875 |

The highlighted row shows the impact estimate of LEAP on the indicator listed at the top of the column. See notes to Table 4.1 for further explanations. 1/ Measured as share of total AE consumption expenditure. 2/ Measured in adult equivalents.

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## 6. Impacts on household productive activity

This chapter investigates the impact of LEAP on other 'non-welfare' dimensions of household behavior, such as labor supply, productive activity and credit market behavior. Part of the objective of LEAP is provide an avenue for poor households to 'empower' their way out of poverty so looking at these indicators can shed some light on the extent to which the program might be fulfilling this objective.

### 6.1 Labor supply

We begin by estimating the impact of LEAP on labor supply, both paid wage labor and unpaid family labor. Table 6.1 shows impacts on paid labor, whether or not anyone in the household engaged in paid labor in the last seven days and the total number of weeks worked for pay in the last year by all household members. LEAP households are actually more likely to participate in paid work relative to ISSER households (9 percent versus 7 percent), and the difference is particularly big among large households (16 versus 9 percent). However LEAP itself has had no impact on paid work, nor has it had an impact on the average number of weeks worked in the last year. Column 3 of Table 6.1 looks at the impact on weeks worked for only those households who had some positive paid employment at baseline and again there are no impacts of the program.

**Table 6.1: Impacts on paid work in last 7 days and weeks worked in last year**

| | Did Paid Work Last 7 Days | Weeks Worked Last Year | Weeks Worked if Did Paid Work |
|---|---|---|---|
| | | Full Sample | |
| | (1) | (2) | (3) |
| Impact | 0.014 | 0.494 | 2.441 |
| | (0.58) | (0.53) | (0.32) |
| Observations | 2,970 | 2,970 | 318 |
| LEAP Baseline Mean | 0.091 | 3.161 | 33.85 |
| ISSER Baseline Mean | 0.0714 | 2.686 | 37.63 |
| | | FHH | |
| Impact | 0.037 | 1.401 | 10.473 |
| | (1.17) | (1.15) | (0.62) |
| Observations | 1,587 | 1,587 | 151 |
| LEAP Baseline Mean | 0.0821 | 2.619 | 31.92 |
| ISSER Baseline Mean | 0.0508 | 1.854 | 36.5 |
| | | MHH | |
| Impact | -0.02 | -0.726 | 1.476 |
| | (0.48) | (0.43) | (0.11) |
| Observations | 1,383 | 1,383 | 167 |
| LEAP Baseline Mean | 0.104 | 3.946 | 36.05 |
| ISSER Baseline Mean | 0.103 | 3.969 | 38.49 |
| | | Size≤4 | |
| Impact | 0.028 | 1.215 | 17.09 |
| | (1.01) | (1.13) | (1.01) |
| Observations | 1,872 | 1,872 | 157 |
| LEAP Baseline Mean | 0.0531 | 1.803 | 31.56 |
| ISSER Baseline Mean | 0.0637 | 2.295 | 36.04 |
| | | Size≥5 | |
| Impact | -0.012 | -0.701 | -6.606 |
| | (0.28) | (0.41) | (0.44) |
| Observations | 1,098 | 1,098 | 161 |
| LEAP Baseline Mean | 0.155 | 5.456 | 35.17 |
| ISSER Baseline Mean | 0.0853 | 3.392 | 39.78 |

The highlighted row shows the difference-in-differences impact estimate of LEAP derived from equation (1) in the text. Cluster-robust t-statistics are below each estimate. The impacts are estimated over five different samples which are labeled above each set of estimates. The mean value of the dependent variable at baseline is shown below each set of estimates. Statistical significance at 5 percent or better is shown in bold.

We complement the analysis of paid work with an analysis of unpaid family work on the farm, broken down by males, females and children, measured in total days over the last agricultural season. We see an impact of LEAP on the total number of days of male work on the farm of 8 days over the season and this impact is especially large among small households (13 days). However among FHHs we see a significant increase in female labor to own-farm activities (9 days) which is again much larger in smaller households (13 days).

**Table 6.2: Impacts on family labor to own farm activity last season**

| | Days On-Farm Men | Days On-Farm Women | Days On-Farm Children |
|---|---|---|---|
| | | Full Sample | |
| | (1) | (2) | (3) |
| Impact | 7.7 | 6.1 | 0.8 |
| | (1.76) | (1.30) | (0.52) |
| Observations | 2,978 | 2,978 | 2,978 |
| LEAP Baseline Mean | 12.8 | 11.9 | 3.1 |
| ISSER Baseline Mean | 26.6 | 23.8 | 6.1 |
| | | FHH | |
| Impact | 2.5 | **9.4** | 0.7 |
| | (1.00) | (2.28) | (0.37) |
| Observations | 1,608 | 1,608 | 1,608 |
| LEAP Baseline Mean | 4.1 | 6.8 | 2.2 |
| ISSER Baseline Mean | 6.8 | 17.7 | 8.0 |
| | | MHH | |
| Impact | 11.1 | 1.4 | -0.8 |
| | (1.26) | (0.22) | (-0.59) |
| Observations | 1,370 | 1,370 | 1,370 |
| LEAP Baseline Mean | 25.3 | 19.3 | 4.3 |
| ISSER Baseline Mean | 50.2 | 31.2 | 3.9 |
| | | Size≤4 | |
| Impact | **12.9** | **12.9** | -0.4 |
| | (3.02) | (3.68) | (-0.50) |
| Observations | 1,888 | 1,888 | 1,888 |
| LEAP Baseline Mean | 5.4 | 5.7 | 1.5 |
| ISSER Baseline Mean | 23.8 | 23.4 | 2.1 |
| | | Size≥5 | |
| Impact | -3.9 | -4.9 | 1.9 |
| | (-0.62) | (-0.75) | (0.72) |
| Observations | 1,090 | 1,090 | 1,090 |
| LEAP Baseline Mean | 25.1 | 22.2 | 5.6 |
| ISSER Baseline Mean | 31.1 | 24.6 | 12.7 |

See notes to Table 6.1 for explanation of table.

## 6.2 Input use

We now turn our attention to productive activity and input use and investigate possible impacts on hired labor, fertilizer and see purchases, crop sales, and participation in non-farm businesses. Results are presented in Table 6.3 and the top panel shows a reduction in male labor hired (3 days) and a decrease in the proportion of households selling crops (7 points) but a significant increase in the value of seeds used. The result on crop selling and seeds is driven by FHHs, where there is also a reduction in days of child labor hired.

### 6.3 Loans and credit

We round off this section by looking at the impact of LEAP on loans held, the amount repaid in the last year and the amount of debt outstanding as a share of AE expenditure. Given the evidence above on impact of LEAP on gifts and the qualitative results which indicate that LEAP also allows households to extend credit as part of maintaining social networks, we also look at impacts on credit given— these results are shown in Table 6.4.

In the full sample we see no impact of LEAP on loans held but a strong effect on amount repaid (23 points). However we do see a significant reduction in the likelihood of holding a loan among smaller households (9 percentage points) and a corresponding significant impact on the amount paid off of 19 percentage points of AE consumption. Since the LEAP transfer in 2012 represented 7 percent of AE consumption and households received a triple and then a double payment in the six months prior to the follow-up survey, it appears as though a large part of these payments were essentially used to pay down loans.

Columns 4-6 of Table 6.4 show impacts on credit given. There is some suggestion that the amount of credit extended as a share of AE consumption has gone up, the DD estimate is 16 percentage points but this is not quite statistically significant, though it is among larger households where the impact of LEAP is to increase the amount of credit extended (as a share of AE consumption) by 54 percentage points.

### 6.4 Conclusions on productive impacts

The impact of LEAP on productive activity in the full sample is negligible but there is consistent evidence of a differential impact among smaller households and among FHHs, where naturally the AE value of the transfer is much larger due to the cap on the maximum value of the transfer (at four eligible members). Among smaller households (those with four members or less) we see significant positive impacts of own labor supplied to the farm for both men and women, and a significant reduction in loans held and in the amount of debt repaid. The results on loans are also reported in the qualitative work (OPM 2013, p.37). The overall pattern of results, no impact on consumption, significant impacts on gift-giving, continued receipt of remittances, and productive impacts and debt repayment among smaller households, appears consistent with the implementation aspects of LEAP, where the transfer level is quite low, but delivered in periodic lump-sums which allows households to engage in lumpy activities.

## Table 6.3: Impacts on hired labor, off-farm business, crop sales and fertilizer use

| | Days labor Hired Last Season | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Men | Women | Children | Non-Farm Ent. | Sold Crops | Used Fertilizer | Seeds Expenses |
| | | | | | Full Sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Impact | -2.1 | **-3.4** | -0.2 | -0.4 | 0.003 | **-0.073** | -0.024 | **24.676** |
| | (-0.80) | (-2.14) | (-0.15) | (-1.60) | (0.08) | (-1.97) | (-0.58) | (4.18) |
| Observations | 2,978 | 2,978 | 2,978 | 2,978 | 2,978 | 2,978 | 2,978 | 2,978 |
| LEAP Baseline Mean | 14.5 | 10.6 | 3.7 | 0.2 | 0.294 | 0.345 | 0.147 | 33.897 |
| ISSER Baseline Mean | 14.2 | 6.8 | 7.0 | 0.4 | 0.315 | 0.433 | 0.152 | 41.527 |
| | | | | | Female Headed Households | | | |
| Impact | -0.5 | -0.8 | 0.1 | **-0.3** | -0.022 | **-0.071** | -0.015 | **21.577** |
| | (-0.20) | (-0.51) | (0.08) | (-2.15) | (-0.44) | (-1.69) | (-0.28) | (3.34) |
| Observations | 1,608 | 1,608 | 1,608 | 1,608 | 1,608 | 1,608 | 1,608 | 1,608 |
| LEAP Baseline Mean | 8.1 | 5.2 | 2.7 | 0.2 | 0.308 | 0.242 | 0.084 | 12.553 |
| ISSER Baseline Mean | 13.3 | 4.5 | 8.5 | 0.3 | 0.401 | 0.378 | 0.119 | 27.585 |
| | | | | | Male Headed Households | | | |
| Impact | **-8.9** | **-7.6** | -2.4 | -0.8 | -0.013 | -0.068 | -0.074 | **33.810** |
| | (-1.94) | (-2.44) | (-1.15) | (-1.38) | (-0.26) | (-1.49) | (-1.32) | (3.12) |
| Observations | 1,370 | 1,370 | 1,370 | 1,370 | 1,370 | 1,370 | 1,370 | 1,370 |
| LEAP Baseline Mean | 23.7 | 18.2 | 5.2 | 0.3 | 0.274 | 0.492 | 0.237 | 64.388 |
| ISSER Baseline Mean | 15.2 | 9.5 | 5.2 | 0.5 | 0.213 | 0.499 | 0.192 | 58.229 |
| | | | | | Size<=4 | | | |
| Impact | -3.1 | -1.9 | -0.4 | -0.3 | -0.062 | **-0.119** | 0.033 | **22.398** |
| | (-1.53) | (-1.27) | (-0.39) | (-1.76) | (-1.52) | (-3.12) | (0.62) | (3.46) |
| Observations | 1,888 | 1,888 | 1,888 | 1,888 | 1,888 | 1,888 | 1,888 | 1,888 |
| LEAP Baseline Mean | 10.5 | 7.3 | 3.1 | 0.2 | 0.246 | 0.264 | 0.100 | 12.166 |
| ISSER Baseline Mean | 9.7 | 6.5 | 3.1 | 0.1 | 0.242 | 0.364 | 0.142 | 24.584 |
| | | | | | Size>=5 | | | |
| Impact | -3.9 | **-7.6** | 0.2 | -0.3 | 0.083 | -0.028 | **-0.142** | **32.918** |
| | (-0.80) | (-2.24) | (0.07) | (-0.57) | (1.56) | (-0.50) | (-2.64) | (2.84) |
| Observations | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 |
| LEAP Baseline Mean | 21.1 | 16.0 | 4.8 | 0.4 | 0.373 | 0.480 | 0.225 | 69.700 |
| ISSER Baseline Mean | 21.4 | 7.2 | 13.4 | 0.8 | 0.437 | 0.547 | 0.169 | 69.461 |

See notes to Table 6.1 for explanation.

**Table 6.4: Impacts on loans and credits**

| | Loans | | | Credits | | |
|---|---|---|---|---|---|---|
| | Hold Loan | Amount Repaid[1] | Amount Outstanding[1] | Hold Credit | Payments Received[1] | Amount Owed[1] |
| | | | Full Sample | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Impact | -0.032 | 0.234 | -0.191 | -0.007 | 0.048 | 0.157 |
| | (-0.80) | (1.73) | (-0.47) | (-0.26) | (1.35) | (1.47) |
| Observations | 2,978 | 2,978 | 2,978 | 2,978 | 2,978 | 2,978 |
| LEAP Baseline Mean | 0.240 | 0.122 | 1.281 | 0.094 | 0.024 | 0.232 |
| ISSER Baseline Mean | 0.199 | 0.168 | 0.930 | 0.102 | 0.038 | 0.348 |
| | | | Female Headed Households | | | |
| Impact | -0.065 | 0.304 | -0.280 | -0.000 | 0.019 | 0.143 |
| | (-1.35) | (1.94) | (-0.56) | (-0.00) | (0.44) | (1.09) |
| Observations | 1,608 | 1,608 | 1,608 | 1,608 | 1,608 | 1,608 |
| LEAP Baseline Mean | 0.237 | 0.102 | 0.850 | 0.095 | 0.020 | 0.188 |
| ISSER Baseline Mean | 0.158 | 0.170 | 0.511 | 0.095 | 0.027 | 0.209 |
| | | | Male Headed Households | | | |
| Impact | -0.004 | 0.022 | -1.003 | -0.009 | 0.045 | 0.306 |
| | (-0.09) | (0.12) | (-1.70) | (-0.23) | (1.66) | (1.50) |
| Observations | 1,370 | 1,370 | 1,370 | 1,370 | 1,370 | 1,370 |
| LEAP Baseline Mean | 0.244 | 0.151 | 1.896 | 0.094 | 0.029 | 0.294 |
| ISSER Baseline Mean | 0.247 | 0.167 | 1.432 | 0.109 | 0.052 | 0.513 |
| | | | Size≤4 | | | |
| Impact | -0.093 | **0.192** | -0.238 | -0.013 | 0.024 | 0.124 |
| | (-1.80) | (1.96) | (-0.81) | (-0.46) | (0.69) | (1.26) |
| Observations | 1,888 | 1,888 | 1,888 | 1,888 | 1,888 | 1,888 |
| LEAP Baseline Mean | 0.229 | 0.083 | 0.614 | 0.077 | 0.013 | 0.118 |
| ISSER Baseline Mean | 0.137 | 0.078 | 0.296 | 0.082 | 0.035 | 0.221 |
| | | | Size≥5 | | | |
| Impact | 0.012 | 0.133 | -0.909 | 0.018 | 0.068 | **0.544** |
| | (0.26) | (0.42) | (-0.85) | (0.44) | (1.93) | (2.31) |
| Observations | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 |
| LEAP Baseline Mean | 0.258 | 0.187 | 2.380 | 0.123 | 0.042 | 0.419 |
| ISSER Baseline Mean | 0.300 | 0.318 | 1.975 | 0.134 | 0.043 | 0.557 |

See notes to Table 6.1 for explanation. 1/ As share of AE expenditure.

## 7. Impact on children's health

In this section, we discuss the impact of the LEAP program on health outcomes of children using the health section from the survey. The sample includes all children ages 0-17 years from LEAP and ISSER households. Health outcomes we analyze are: 1) whether the child was sick or injured in the last four weeks; 2) whether any health care facility was used for those who were sick/injured (curative care) in the last four weeks; 3) for those who used a

health facility, whether or not the use was for preventive care; and 4) whether the individual was enrolled in NHIS. Note that we do not include vaccinations as an indicator because coverage is essentially universal. Because the disease burden and health care requirements for pre-school children is much different from older kids, we analyze children 0-5 separately from those 6-17.

Table 7.1 shows results of the impact of the LEAP program on health outcomes for children 0-5 years of age. Column 4 shows that children in LEAP households are 34 percentage points more likely to be enrolled in NHIS than children in comparison households. However, LEAP children are also more likely to be ill (9 pp) but there are no significant impacts on use of health services. The last two panels show result by gender of head—the impact of LEAP on NHIS is highest among FHHs where the effect is 44 pp, and yet counter-intuitively, MHHs are more likely to send children for preventive health check-ups.

**Table 7.1: Impact results for health outcomes, children 0-5**

| | (1) Illness | (2) Curative care | (3) Preventive care | (4) NHIS enrollment |
|---|---|---|---|---|
| Impact | **0.09** | 0.24 | -0.00 | **0.34** |
| | **(2.39)** | (0.83) | (0.22) | **(7.14)** |
| Observations | 1,337 | 193 | 1337 | 1,325 |
| | | Females Only | | |
| Impact | 0.01 | 0.79 | -0.03 | **0.34** |
| | (0.12) | (1.63) | (1.05) | **(4.80)** |
| Observations | 665 | 90 | 665 | 656 |
| | | FHH | | |
| Impact | 0.10 | -0.27 | -0.06 | **0.44** |
| | (1.52) | (0.49) | (1.90) | **(6.01)** |
| Observations | 572 | 96 | 572 | 567 |
| | | MHH | | |
| Impact | 0.07 | 0.30 | **0.05** | **0.25** |
| | (1.43) | (0.61) | **(2.08)** | **(3.79)** |
| Observations | 765 | 97 | 765 | 758 |

Bold indicates statistically significant at 5 percent or less. The highlighted row shows the DD impact of LEAP on the indicator listed at the top of the column. These estimates are based on equation 1. Clustered t-statistics are shown in parentheses below impact estimates.

When comparing the impact of LEAP on health outcomes for children ages 6-17 (Table 7.2), we find significant effects on NHIS enrollment but at 16 pp the effect is half that estimated among children 0-5. However, among this age group, children in LEAP households are 5 percentage points less likely to be ill, an important result because of the potential implications of reduced morbidity on school attendance, a topic we will turn to in the next chapter. The middle panel of table 7.2 presents the results for girls ages 6-17. For this sample we find that the LEAP program appears to increase enrollment in NHIS by 18 percentage points but there are no impacts on morbidity. The bottom two panels show impacts by gender of head—there are no differential impacts by gender of head for these outcomes among children 6-17.

**Table 7.2: Impact results for health outcomes, children 6-17**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Illness | Curative care | Preventive care | NHIS enrollment |
| Impact | **-0.05** | -0.11 | -0.01 | **0.16** |
| | **(2.65)** | (-0.39) | (0.82) | **(5.38)** |
| Observations | 3,592 | 243 | 3592 | 3,562 |
| | | Females only | | |
| Impact | -0.02 | 0.01 | -0.02 | **0.18** |
| | (0.63) | (0.03) | (1.56) | **(4.28)** |
| Observations | 1,675 | 104 | 1675 | 1,658 |
| | | FHH | | |
| Impact | -0.05 | -0.65 | **-0.02** | **0.17** |
| | (1.85) | (1.08) | **(2.08)** | **(4.10)** |
| Observations | 1,778 | 127 | 1,778 | 1,757 |
| | | MHH | | |
| Impact | **-0.05** | 0.02 | **0.02** | **0.17** |
| | **(2.29)** | (0.05) | **(2.22)** | **(4.21)** |
| Observations | 1,814 | 116 | 1,814 | 1,805 |

Bold indicates statistically significant at 5 percent. See notes to Table 7.1 for explanation.

Finally Table 7.3 shows impact results by household size, focusing only on morbidity and NHIS enrollment as we did not find differential impacts by size for the other two indicators. Among younger children, the impact on NHIS enrollment is higher among larger households but the (negative) impact on illness is also much higher (19 pp). Meanwhile among older kids, living in a larger household is a risk factor for NHIS enrollment but is protective for morbidity. It is hard to make sense of these patterns of results by household size. We note that a recent study on the impact of the NHIS finds increases in use of curative care.[1]

**Table 7.3: Impact results on illness and NHIS enrollment by age and household size**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | Age 0-5 | | | Age 6-17 | |
| | All | Small ≤4 | Large ≥5 | All | Small ≤4 | Large ≥5 |
| | | | **Illness** | | | |
| Impact | **0.09** | -0.07 | **0.19** | **-0.05** | -0.00 | **-0.05** |
| | **(2.39)** | (0.67) | **(4.21)** | **(2.65)** | (0.03) | **(2.08)** |
| Obs | 1,337 | 276 | 838 | 3,592 | 910 | 2,453 |
| | | | NHIS | | | |
| Impact | **0.34** | 0.17 | **0.39** | **0.16** | **0.24** | **0.15** |
| | **(7.14)** | (1.41) | **(6.46)** | **(5.38)** | **(4.02)** | **(4.39)** |
| Obs | 1,325 | 273 | 829 | 3,562 | 897 | 2,436 |

Bold indicates statistically significant at 5 percent. See notes to table 7.1 for explanation.

[1] Blanchet, NJ, G. Fink, I. Osei-Akoto. 2012. The effect of Ghana's National Health Insurance Scheme on health care utilization. Ghana Medical Journal. 46(2): 76-84.

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The overall results on health indicate that the LEAP program has dramatically increased the access of children to NHIS although this has not translated into actual increases in utilization of services except among children in MHHs. There are also strong reductions in morbidity among older children. Most importantly, we find the effect of the LEAP program on NHIS enrollment to be much stronger among children ages 0-5, and even higher among young children in FHHs.

## 8. Impact on children's schooling

We provide impact estimates on four aspects of children's schooling: 1) whether a child is currently enrolled in school; 2) whether a child missed any days of school in the reference period; 3) whether a child ever repeated a grade; and 4) whether a child did not attend any school in the last week. One indicator (currently enrolled) is 'good' and the remaining three are reverse coded so that higher values are 'bad', consequently we look for negative values of the DD for these three indicators and positive for enrollment.

Table 8.1 presents the DD impact estimates for the full sample of school-age children 5-17 and by younger and older age groups. In the top panel (the full age group), LEAP has no positive impact on current enrollment, likely because primary school enrollment is nearly universal in Ghana. On the other hand, LEAP has had an important impact on other dimensions of schooling, reducing the likelihood of missing any school (8 pp), reducing the chance of repeating a grade (11 pp) and reducing the chance of missing an entire week (5 pp).

**Table 8.1: Education outcomes for children by age**

| | (1) Missed any school | (2) Currently enrolled | (3) Ever repeat grade | (4) Missed entire week |
|---|---|---|---|---|
| | | Age 5-17 | | |
| Impact | **-0.08** | -0.00 | **-0.11** | **-0.05** |
| | **(4.01)** | (-0.10) | **(3.99)** | **(2.04)** |
| Observations | 3,560 | 3,809 | 3,159 | 3,558 |
| | | Age 5-13 | | |
| Impact | **-0.10** | -0.01 | **-0.15** | **-0.07** |
| | **(3.87)** | (0.89) | **(3.86)** | **(2.35)** |
| Observations | 2,524 | 2,618 | 2,074 | 2,522 |
| | | Age 13-17 | | |
| Impact | -0.05 | **0.07** | **-0.10** | -0.04 |
| | (1.53) | **(2.23)** | **(2.22)** | (0.90) |
| Observations | 1,317 | 1,483 | 1,370 | 1,316 |

Bold indicates statistically significant at 5 percent or less. See notes to Table 7.1 for explanations.

Primary school enrollment is essentially universal in Ghana and drop-out begins at the transition between primary and secondary school, around age 12 or 13 depending on school starting age. In our sample, for example, the net enrollment rate is 97 percent for children 5-13—so it is instructive to investigate impacts of LEAP among older and younger kids separately as the effects of LEAP on enrollment in particular are more probable at older ages. The next two panels of Table 8.1 shows DD impacts for children 5-13 and 13-17 respectively. Baseline figures showed the comparison group to be significantly less likely to have missed school or repeated a grade. As expected the impact on enrollment is zero among the younger age group but there continue to be impacts in the three other aspects of schooling. This shows that LEAP has an impact on 'quality' of schooling or the 'intensive' margin among younger children (school absenteeism in the last week and grade repetition).

The bottom panel of Table 8.1 presents DD impact estimates for older children 13-17. Note that we include children age 13 in both groups because the transition from primary to secondary may vary depending on age of school entrance, and may occur at slightly older ages among children with lower access to schooling. The results show strong impacts of LEAP on enrollment (7 pp) and on grade repetition. The impact on enrollment is 7 pp which is comparable to recent impact estimates for South Africa's Child Support Grant (6 pp) (Samson et al. 2011) and Kenya's Cash Transfer for Orphans and Vulnerable Children (8 pp) (Kenya CT-OVC Evaluation Team 2012). Impacts on other dimensions of schooling are equally impressive. For example, the impact on the likelihood of repeating a grade is -10 pp which represents a 63 percent change from a mean of 0.27. In Kenya the impact on the number of grades behind (a slightly different indicator but the most comparable to this one) is only 7 percent at the mean.

In Table 8.2 we focus on the impact of LEAP on older girls and find that LEAP reduces the likelihood of missing any school (11 pp at 10 percent significance) but the significant impact of LEAP on secondary school enrollment does not hold for girls. Thus for females, the effect of LEAP is to improve current attendance among those who are already enrolled in school. For males, LEAP impacts access and progression.

**Table 8.2: Education outcomes, girls age 13-17**

| | (1) Missed any school | (2) Currently enrolled | (3) Ever repeat grade | (4) Missed entire week |
|---|---|---|---|---|
| Impact | -0.11 | 0.01 | -0.02 | -0.11 |
| | (1.87) | (0.20) | (0.22) | (1.53) |
| Observations | 595 | 681 | 624 | 594 |
| R-squared | 0.36 | 0.36 | 0.31 | 0.53 |

Bold indicates statistically significant at 5percent. See notes to Table 7.1 for explanations.

As we did for health, we report impact estimates for schooling indicators by household and age group and present these in Table 8.3. Among younger children smaller households appear to be more protective, with larger impacts on missing any school and repetition in smaller households. On the other hand the significant impact on enrollment is entirely driven by larger households (who likely have more secondary school age children) while there are large impacts on reducing repetition in smaller households.

**Table 8.3: Impact results on schooling by age and household size**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | Age 5-13 | | | Age 13-17 | |
| | All | Small ≤4 | Large ≥5 | All | Small ≤4 | Large ≥5 |
| | | | Missed any School | | | |
| Impact | **-0.10** | **-0.17** | **-0.08** | -0.05 | -0.12 | -0.06 |
| | **(3.87)** | **(3.82)** | **(2.51)** | (1.53) | (1.45) | (1.25) |
| Obs | **-0.10** | **-0.17** | **-0.08** | -0.05 | -0.12 | -0.06 |
| | | | Enrollment | | | |
| Impact | -0.01 | 0.03 | -0.03 | **0.07** | -0.00 | **0.10** |
| | (0.89) | (1.08) | (1.70) | **(2.23)** | (0.03) | **(2.54)** |
| Obs | 2,618 | 651 | 1,807 | 1,483 | 407 | 967 |
| | | | Repetition | | | |
| Impact | **-0.15** | **-0.20** | **-0.15** | **-0.10** | **-0.41** | -0.04 |
| | **(3.86)** | (1.89) | **(3.43)** | **(2.22)** | **(3.98)** | (0.71) |
| Obs | 2,074 | 486 | 1,432 | 1,370 | 370 | 904 |
| | | | Missed Entire Week | | | |
| Impact | **-0.07** | -0.04 | -0.06 | -0.04 | -0.05 | -0.10 |
| | **(2.35)** | (0.68) | (1.43) | (0.90) | (0.44) | (1.60) |
| Obs | 2,522 | 622 | 1,744 | 1,316 | 350 | 870 |

Bold indicates statistically significant at 5 percent. See notes to table 7.1 for explanation.

## 9. Summary and implications

Inconsistent implementation: Implementation of LEAP has been inconsistent. Over this 24-month evaluation period households received only 20 months' worth of payments. There was a long gap in cash payments to households in 2011, followed by a triple payment in February 2012 to settle arrears. Thus, LEAP households did not receive a steady flow of predictable cash with which to smooth their consumption. However the implementation of NHIS coverage among LEAP households was impressive, with 90 percent of LEAP households having at least one member enrolled in NHIS at the follow-up.

Positive impacts on children's schooling and health: LEAP has had a strong impact on children's schooling. LEAP has increased access to schooling at the secondary level, and at all levels has improved the quality of access, with fewer days missed and less grade repetition. The magnitude of some of these impacts is in the same range as for other large scale programs in Africa. There are also strong impacts of the program on enrollment in the NHIS, an explicit objective of LEAP due to the concern that the target group under-utilizes

health services. However the increased enrollment in LEAP has not led to an increase in curative care seeking behavior, though there is some evidence that there is greater use of health facilities for preventive care among young children in MHHs. There is also a very strong decrease in morbidity among older children.

Gender impacts: There appears to be a distinct gender differentiated impact of LEAP on secondary schooling, where the impact of LEAP among males is to increase enrollment and attendance, while for females the impact is on attendance only.

No impact on consumption and more savings: The impact of LEAP on household consumption is negligible. Since consumption is driven by permanent income, and since LEAP was unlikely to have increased permanent income because of irregular payments, this result is not surprising. Indeed there is evidence of an increase in non-consumption expenditure among LEAP households, with significant declines in the number of households with outstanding loans and increases in the number of households with savings. These non-consumption spending increases tend to be more sensitive to windfall increases in income, such as those provided by the lumpy and sporadic flow of cash transfers to beneficiaries.

LEAP household heads are happier: LEAP households are now significantly happier. The analysis shows a 16 pp increase in happiness (DD impact estimate), indicating that the positive impacts on NHIS coverage and children's health and schooling and the ability to pay down loans and accrue savings outweigh the negligible impacts on consumption.

The impacts of the LEAP program on schooling are similar to cash transfer programs in sub-Saharan African. Other unconditional cash transfer programs in the region have shown strong impacts on schooling equivalent to the conditional programs in Latin America and the Caribbean (Kenya CT-OVC Evaluation Team, 2012; Samson et al., 2010). On the other hand, their impacts on health outcomes are generally weak (Miller, Tsoka, & Reichert, 2008; Ward et al., 2010), as is the case with LEAP, despite the NHIS component of the program. One major difference is that almost all cash transfer programs show strong impacts on consumption, whereas in LEAP there is no impact on consumption. On the other hand, the lumpy payment structure of LEAP has led to an increase in non-consumption spending unlike in other programs.

Limitations; The key limitation of this study is that the comparison group is not drawn from the same districts as the treated households, and so they may not have experienced the same overall trends in socioeconomic development. The assumption of 'parallel trends' underpins the DD approach for estimating impacts.

## Appendix 1: Conceptual Framework

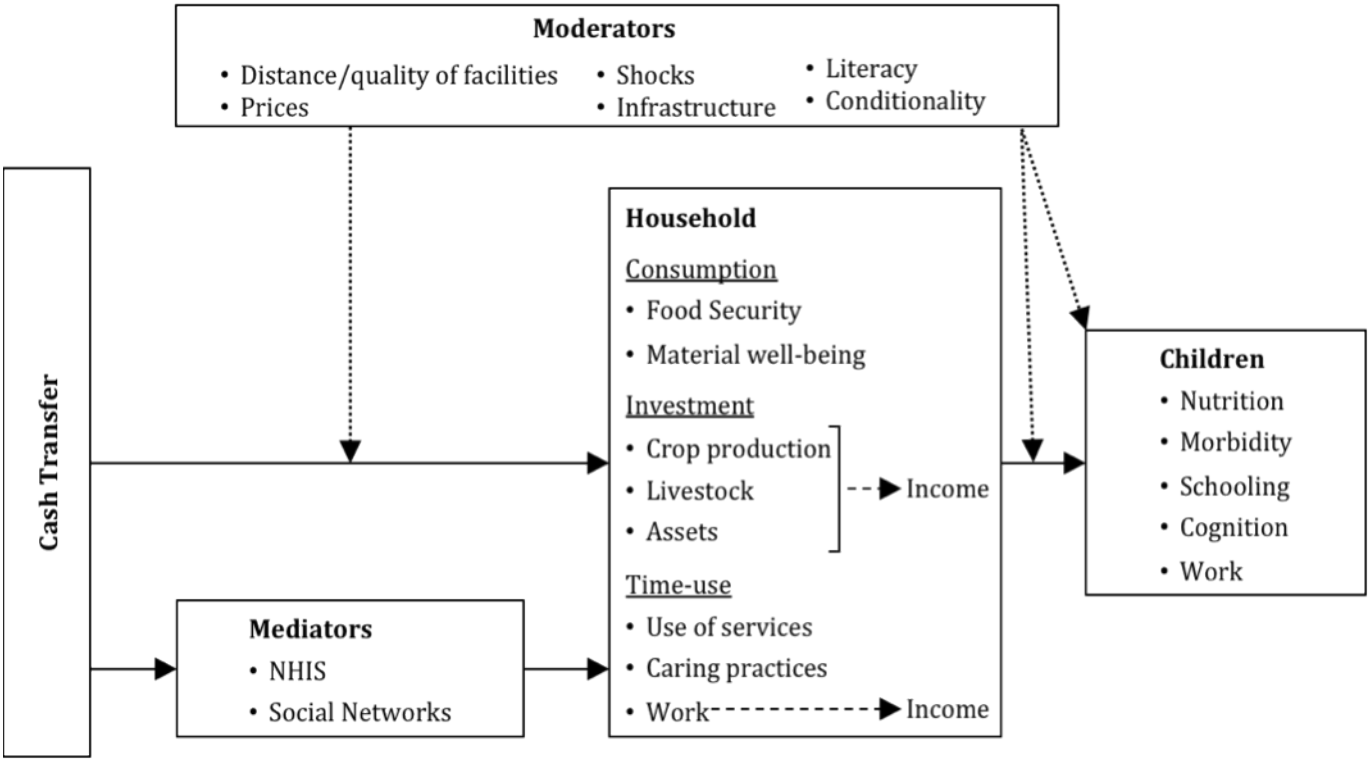
LEAP provides a cash transfer to ultra-poor households within three demographic categories: elderly, disabled, and OVC. LEAP households are poorer than the national rural average, with 51 percent falling below the national (upper) poverty line and a median per capita daily expenditure of approximately 85 US cents. The cash is conditional on enrollment in the National Health Insurance Scheme (NHIS). As in most cash transfers targeted to the ultra-poor and vulnerable, the immediate impact of the program is typically to raise spending levels, particularly basic spending needs for food, clothing, and shelter, some of which will influence children's health, nutrition, and material well-being. Once immediate basic needs are met, and possibly after a period of time, the influx of new cash may then trigger further responses within the household economy, for example, by providing room for investment and other productive activity, the use of services, and the ability to free up older children to attend school. When the transfer is conditional on schooling and health service use, these outcomes will also increase provided that there is adequate monitoring or follow-up and participants are clearly aware of program rules.

Figure A1.1 brings together these ideas into a conceptual framework that shows how LEAP can affect household activity, the causal pathways involved, and the potential moderator and mediator factors. The diagram is read from left to right. We expect a direct effect of the cash transfer on household consumption (food security, diet diversity), on the use of services, and possibly even on productive activity after some time. An important component of LEAP is the enrollment of participants in the NHIS. This enrollment may itself directly trigger potential behavior change in terms of inducing households to use health services and is thus considered a potential mediator or mechanism through which the effect of LEAP is felt at the household level. Another possible mediator is social networks—the program may encourage social interaction among participants which can facilitate the exchange of information and knowledge that could ultimately change behavior. On the other hand, the impact of the cash transfer may be weaker or stronger depending on local conditions in the community. These moderators include access to markets and other services, prices, and shocks. Moderating effects are shown with dotted lines that intersect with the solid lines to indicate that they can influence the strength of the direct effect.

The next step in the causal chain is the effect on children. It is important to recognize that any potential impact of the program on children must work through the household through spending or time allocation decisions (including use of services). The link between the household and children can also be moderated by environmental factors, such as distance to schools or health facilities, as indicated in the diagram, household-level characteristics themselves such as the mother's literacy, and the degree of follow-up from the social welfare workers. Note that from a theoretical perspective, some factors cited as mediators may actually be moderators and vice-versa (such as social networks). We can test for

moderation versus mediation through established statistical techniques,[2] and this information will be important to help us understand the actual impact of the program on behavior.[3] In Figure A1.1, we list some of the key indicators along the causal chain that we will analyze in the LEAP evaluation.

**Figure A1.1 Conceptual framework for Impact Evaluation of Ghana LEAP**




2 Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182.

[3] A mediator is a factor that can be influenced by the program and so lies directly within the causal chain. A moderator, in contrast, is not influenced by the program. Thus, service availability is a moderator, whereas NHIS participation is a mediator because it is itself changed by the program. Parental literacy is a moderator and not a program outcome, unless the program inspires caregivers to learn to read and write.

## Appendix 2: Summary of propensity score matching analysis

In 2010 ISSER agreed to incorporate 699 future LEAP beneficiary households into the field work of a national household survey they were undertaking in collaboration with Yale University (U.S.A.). The idea was to exploit the national survey to construct a non-experimental comparison group using propensity score matching (PSM). These matched households would then then followed in 2012 along with the LEAP households to create a longitudinal propensity score matching (PSM) design for the evaluation. The literature assessing PSM indicates that the technique can mimic a social experiment if data from both the treatment and comparison group are collected in the exact same way, with identical survey instruments, and if households are followed longitudinally in order to control for fixed unobservable differences across households as well as communities in which the households reside (Heckman, Ichimura & Todd 1997; Diaz & Handa 2006; Handa & Maluccio 2010). The LEAP evaluation satisfies these criteria: data from the ISSER and LEAP samples were collected by the exact same field teams using the same field procedures at the same time, using identical survey instruments (the LEAP survey instrument is actually a sub-set of the larger ISSER instrument), and followed longitudinally.

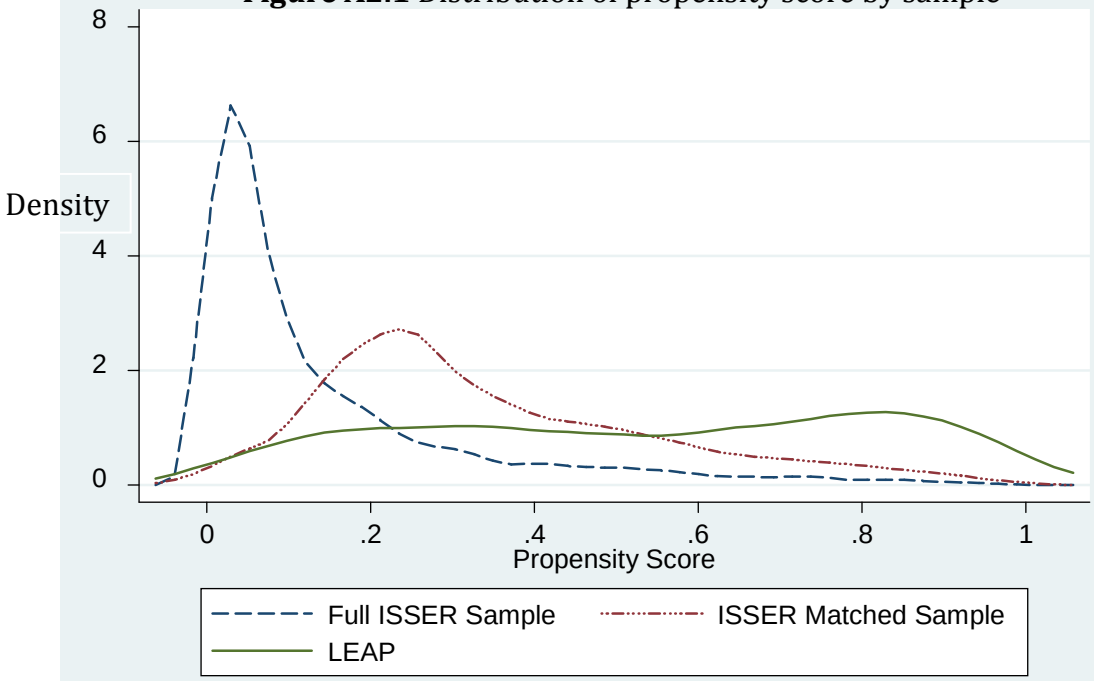
The LEAP sample for the evaluation was drawn from households that were part of the LEAP expansion in late 2009—this expansion occurred in Brong Ahafo, Volta and Central Regions of Ghana. Since the ISSER survey is national and included urban households, the matched sample of households was drawn from a sub-sample of ISSER households residing in communities and districts that were geographically close to LEAP districts or that were geographically similar. Urban households from the ISSER sample were excluded, as were households in Upper East and Upper West Regions and the Northern part of the Northern Region. The full ISSER survey comprised 5,009 households of which 3136 were from rural areas. The sample selected for the matching comprised 2,330 households and their geographical distribution is shown in the last column in Table A2.1.

**Table A2.1: Distribution of LEAP and ISSER matched households**

| | LEAP (1) | | ISSER Matched Sample (2) | | Matched Sample Plus 215 Extra HH (3) | | Full ISSER Sample (4) | |
|---|---|---|---|---|---|---|---|---|
| | N | (%) | N | (%) | N | (%) | N | (%) |
| Western | | | 84 | 12.1 | 104 | 11.4 | 329 | 14.1 |
| Central | 176 | 25.2 | 95 | 13.6 | 118 | 12.9 | 270 | 11.6 |
| Volta | 82 | 11.7 | 141 | 20.2 | 185 | 20.2 | 390 | 16.7 |
| Eastern | | | 102 | 14.6 | 134 | 14.7 | 403 | 17.3 |
| Ashanti | | | 122 | 17.5 | 169 | 18.5 | 504 | 21.6 |
| Brong Ahafo | 441 | 63.1 | 101 | 14.5 | 135 | 14.8 | 314 | 13.5 |
| Northern | | | 54 | 7.7 | 69 | 7.6 | 120 | 5.2 |
| N | 699 | 100 | 699 | 100 | 914 | 100 | 2,330 | 100 |

The propensity score was calculated for each of these 2,330 households using a probit model that included all variables used by the LEAP program in ranking households for eligibility. These variables include household demographic composition and number of orphans, age, sex and education of the household head, employment status of household members, housing quality and ownership of livestock. Since LEAP and ISSER households come from different communities we also included community variables in the model, though these are not used explicitly in LEAP targeting; these variables included the occurrence of each of shocks (flood, drought, crop disease, etc.) and the population size of the community. The distribution of the resulting propensity scores is depicted in the graph below where the ISSER matched sample is identified using one-to-one nearest neighbor without replacement in order to obtain a sample size equal to that of the LEAP sample. The scores for LEAP households are clearly to the right of those for the entire ISSER sample indicating a higher likelihood of participating in LEAP. However the matching technique manages to pull a sample of ISSER households with scores that are distributed to the right of the ISSER households, and thus closer to the LEAP households.

**Figure A2.1** Distribution of propensity score by sample




An analysis of the mean characteristics of the matched sample and LEAP households is shown in the text. With the matched sample (plus the extra 215 households that were followed-up in 2012 from the ISSER sample), we calculated new propensity scores and

used these new scores as 'weights' in the impact estimates—this technique is known as 'inverse probability weighting' and as shown in the text, this technique allows us to eliminate any remaining imbalance in baseline characteristics between the LEAP and comparison group. The two figures below show the distribution of the new weights calculated using the matched sample plus the extra 215 ISSER households. These weights are calculated using a regression model similar to the one used in the original matching analysis, but using this restricted sample. The first figure shows the distribution without the inverse probability weights (IPW) while the second figure shows the distribution of scores with the weights. The weighting leads to a distribution of scores among ISSER households that is much more similar to that of LEAP households.

**Figure A2.2** Distribution of propensity scores (unweighted)

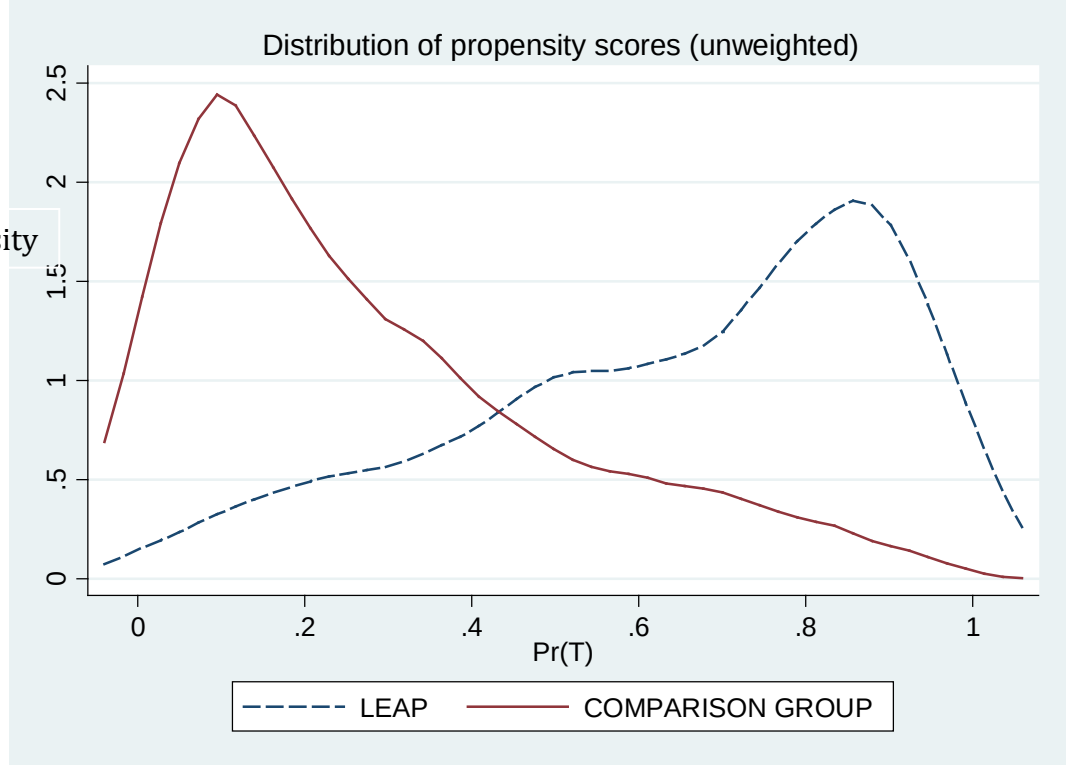
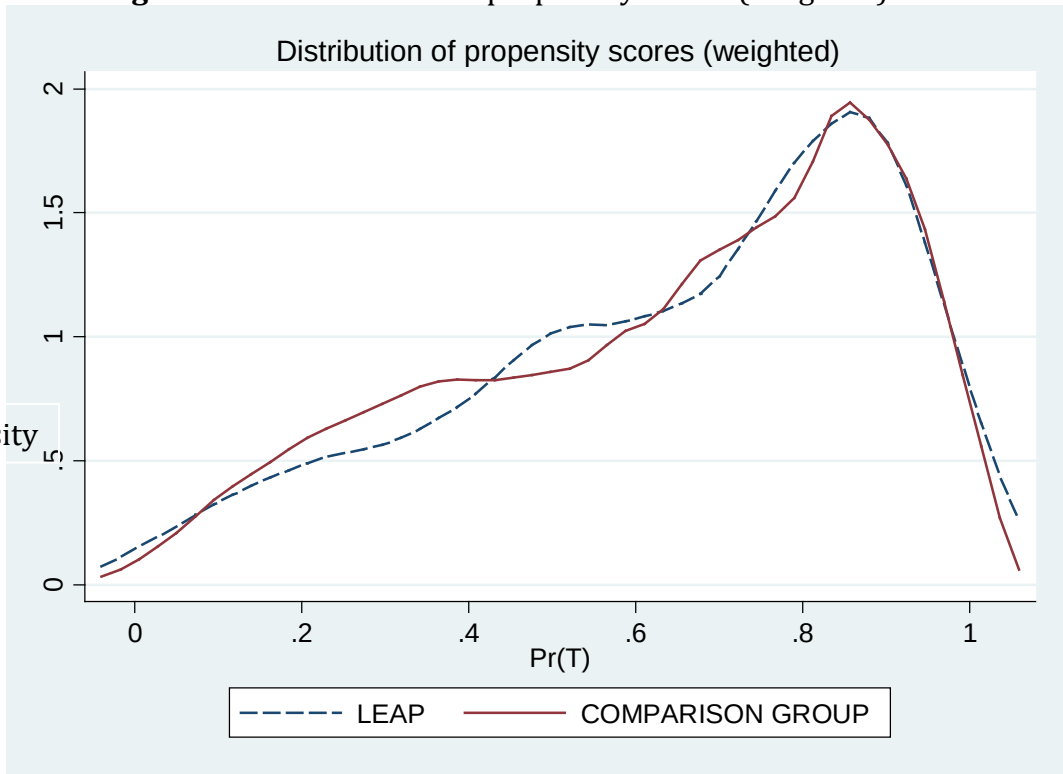


**Figure A2.3** Distribution of propensity scores (weighted)

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## Appendix 3: Attrition in the sample

Table A3.1 shows mean characteristics at baseline of the full sample and the sample of households that were followed-up in 2012. The last row shows that in the LEAP sample 43 households were lost to follow-up compared to 46 in the ISSER sample, an overall success rate of 92.2 percent. In both LEAP and ISSER there appears to be very little difference at all between the original sample and the panel sample though in both cases the panel sample has lower per capita spending and larger household size. However these differences in spending do not translate into differences in housing quality or characteristics of the head which tend to be a better correlate of chronic or structural poverty.

Table A3.2 provides information on the attrition process by showing estimates of the determinants of attrition in each sample using the household level characteristics used in the matching exercise. There are only four significant determinants of attrition in the LEAP sample and three of these are also significant in the ISSER sample (household size, livestock ownership and the household head never being married). The fact that so few of these characteristics are statistically significant indicates there is no systematic pattern to attrition. The overlap in the statistically significant determinants across the two samples plus the overall low level of attrition suggests that the loss to follow-up is not likely to affect the internal validity of our results.

**Table A3.1: Comparison of full original sample and panel sample**

| | LEAP | | ISSER | |
|---|---|---|---|---|
| **Indicator Variables** | **Full Sample** | **Panel** | **Full Sample** | **Panel** |
| Household size | 3.83 | 3.94 | 3.69 | 3.77 |
| Children under 5 | 0.44 | 0.45 | 0.45 | 0.46 |
| Children 6-12 | 0.77 | 0.80 | 0.76 | 0.79 |
| Children 13-17 | 0.54 | 0.56 | 0.50 | 0.53 |
| Elderly (>64) | 0.76 | 0.77 | 0.65 | **0.65** |
| Number of orphans | 0.62 | 0.62 | 0.34 | **0.34** |
| Orphan living in hhld | 0.27 | 0.27 | 0.19 | **0.20** |
| **Head characteristics** | | | | |
| Female Household | 0.59 | 0.59 | 0.54 | 0.55 |
| Age of Head | 60.92 | 60.43 | 59.42 | 59.08 |
| Widowed | 0.39 | 0.37 | 0.30 | **0.30** |
| Head schooling | 0.30 | 0.31 | 0.47 | **0.47** |
| | | | | |
| No kitchen | 0.09 | 0.08 | 0.07 | 0.06 |
| No toilet | 0.31 | 0.31 | 0.31 | 0.31 |
| Pit latrine | 0.30 | 0.29 | 0.42 | **0.41** |
| Thatch roof | 0.31 | 0.31 | 0.23 | **0.22** |
| Crowd | 0.69 | 0.67 | 0.71 | 0.70 |
| Shared dwelling | 0.29 | 0.29 | 0.27 | 0.26 |
| Unprotected water | 0.21 | 0.21 | 0.23 | 0.22 |
| Per capita spending (GH) | 55.46 | 48.93 | 60.06 | 50.44 |
| Livestock owned | 0.41 | 0.42 | 0.44 | 0.45 |
| | 699 | 646 | 699 | 643 |

Bold indicates statistically significant difference (5 percent) between ISSER panel and LEAP panel.

**Table A3.2: Determinants of attrition in LEAP and ISSER sample**

| | LEAP | | ISSER | |
|---|---|---|---|---|
| | (1) | | (2) | |
| | Coefficient | t-statistic | Coefficient | t-statistic |
| Log AE expenditure | 0.01 | (0.53) | -0.01 | (-0.67) |
| No kitchen | 0.08 | (1.45) | -0.05 | (-0.91) |
| No toilet | -0.02 | (-0.75) | 0.01 | (0.23) |
| Pit latrine | -0.01 | (-0.44) | 0.03 | (1.19) |
| Walls cement | 0.01 | (0.23) | 0.02 | (0.85) |
| Floor cement | 0.00 | (0.12) | **-0.06** | (-2.39) |
| Thatch roof | 0.01 | (0.25) | 0.04 | (1.22) |
| Number of rooms (log) | 0.01 | (0.42) | 0.01 | (0.41) |
| Shared dwelling | -0.03 | (-1.53) | 0.03 | (1.06) |
| Exclusive kitchen | -0.00 | (-0.13) | 0.02 | (0.83) |
| Unprotected water | 0.02 | (0.86) | 0.03 | (1.11) |
| Log of household size | **-0.10** | (-2.39) | **-0.07** | (-2.05) |
| Household has orphan | 0.02 | (0.80) | 0.00 | (0.00) |
| Head's age | 0.00 | (0.41) | 0.00 | (1.53) |
| Female head | -0.04 | (-1.15) | **-0.07** | (-1.92) |
| Children under 5 | **0.04** | (2.93) | 0.01 | (0.78) |
| Children 6-12 | 0.02 | (1.58) | 0.01 | (0.94) |
| Children 13-17 | 0.03 | (1.99) | 0.01 | (0.54) |
| Elderly (>64) | 0.01 | (0.34) | -0.02 | (-1.06) |
| Head is widow | 0.06 | (1.56) | 0.03 | (0.88) |
| Head never married | **0.08** | (3.16) | **0.08** | (2.34) |
| Log # of livestock | **-0.01** | (-1.77) | **-0.01** | (-1.98) |
| Community population | 0.00 | (0.62) | 0.00 | (1.02) |
| Fire, floor or wind shock in community | -0.01 | (-0.36) | -0.00 | (-0.20) |
| Western Region | | | -0.07 | (-1.09) |
| Central | 0.02 | (0.29) | 0.02 | (0.28) |
| Volta | | | -0.02 | (-0.37) |
| Eastern | | | -0.02 | (-0.26) |
| Ashanti | | | 0.00 | (0.08) |
| Brong Ahafo | -0.07 | (-1.53) | -0.06 | (-0.96) |
| Observations | 699 | | 699 | |
| R-squared | 0.11 | | 0.08 | |
| Mean Attrition | 0.0758 | | 0.0801 | |

Dependent variable is 1 if household attrited and 0 otherwise. Coefficients give the change in the probability of attriting given a unit change in the variable in the first column. T-statistics clustered at the community level. Bold indicates statistically significant at 10 percent or less.

## Appendix 4: Multivariate analysis

We estimate the DD impact estimator in a multivariate context, controlling for baseline characteristics of the sample households in order to account for differences across samples that might account for some of the observed treatment effects.

The control variables used are demographic composition, age, school, sex and marital status of the head, and log of total household size; when dealing with individual outcomes, we also control for age and sex of the individual. We emphasize that all these measures are from the baseline data set only. Because C households are pulled from a national survey and therefore come from geographically different areas than T households, we also control for community level effects in our statistical model ('community fixed effects') in order to strengthen the internal validity of the analysis. For the consumption expenditure estimates only, we also include a set of interactions between head's schooling and eleven prices of common consumption items, and head's age and the presence in the community of each of ten shocks (illness, theft, fire, water, electricity, drought, etc.). In the multivariate analysis, the basic setup of the estimation model is shown in equation (1):

$$(1) \quad Y_{it} = \alpha + \beta_1(2012)_t + \beta_2(T)_{it} + \beta_3(T * 2012)_t + \beta_4 X_{it} + c_i + \varepsilon_{it}$$

In this framework '2012' is a dummy (indicator) variable equal to 1 if the observation pertains to the post-intervention period (2012), T is a dummy variable if the observation receives the treatment, and the DD estimate of impact is given by $\beta_3$—the interaction between the two variables. The X vector captures control variables described above, c is the community level control variable, and t and i indicate year of survey and individual observation respectively. The units of observation may be individuals or households depending on the outcome. The coefficient $\beta_2$ is a measure of the pre-treatment mean difference in Y between T and C while $\beta_1$ measures general changes over time which will be important to control when outcomes are influenced by time trends (such as school enrollment). In the tables we present in the text we only report the coefficient of the DD variable. The regression is weighted using the IPW (LEAP observations are given a weight of 1).

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## Appendix 5: Calculation of spatial price index in LEAP Evaluation

**Table A5.1: Calculation of Laspeyres Price Index using important foods in consumption bundle: trimmed means**

| | | maize | cassava | tomato | onion | Rice | beans | plantain | Yam | palm oil | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2010 | | | | | | | |
| Weight | | 0.22 | 0.15 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.06 | 0.02 | | |
| Price per KG | T | 1.16 | 1.16 | 1.31 | 1.61 | 0.84 | 0.66 | 0.88 | 0.58 | 0.85 | | |
| | C | 1.20 | 1.18 | 1.02 | 2.05 | 1.06 | 1.17 | 0.41 | 0.78 | 1.15 | Total | INDEX |
| Contribution | T | 0.26 | 0.17 | 0.04 | 0.05 | 0.03 | 0.02 | 0.03 | 0.03 | 0.02 | 0.65 | **0.936** |
| | C | 0.26 | 0.18 | 0.03 | 0.06 | 0.04 | 0.04 | 0.01 | 0.05 | 0.02 | 0.69 | 1 |
| | | | | | 2012 | | | | | | | |
| Weight | | 0.22 | 0.15 | 0.03 | 0.03 | 0.04 | 0.03 | | 0.06 | 0.02 | | |
| Price per KG | T | 1.08 | 0.42 | 1.97 | 1.2 | 1.53 | 2.45 | | 0.65 | 2.61 | | |
| | C | 1.43 | 0.37 | 2.56 | 2.15 | 1.84 | 2.41 | | 1.11 | 2.9 | Total | INDEX |
| Contribution | T | 0.24 | 0.06 | 0.06 | 0.04 | 0.06 | 0.07 | | 0.04 | 0.05 | 0.62 | **0.795** |
| | C | 0.31 | 0.06 | 0.08 | 0.06 | 0.07 | 0.07 | | 0.07 | 0.06 | 0.78 | 1.00 |

Mean excludes top and bottom 5% of values. T indicates LEAP communities and C indicates ISSER communities.

The table above shows the average community price per kilogram for agricultural items consumed by households in the sample. Each price is multiplied by the weight (which reflects the importance of that item in the consumption bundle) and then summed across all items to obtain the total cost of the consumption basket. In 2010 the cost of the consumption basket in LEAP communities was 94 percent that in ISSER communities; in 2012 the relative cost had declined to 80 percent. Food comprises 70 percent of the consumption basket for these households. We assumed that the relative cost of non-food followed the same pattern as foods and deflate the entire value of consumption (food and non-food) by the implied deflators. We experimented with only deflating the food portion of the consumption but this did not change the overall results, though it did result in a larger relative decline in non-food consumption among LEAP households in 2012. However this decline assumes no relative price change across the two sets of communities

## Appendix 6: Impacts on broad consumption groups and food groups

**Table A6.1: Impacts on broad consumption expenditure groups by samples**

| Expenditure Group: | Food | Health | Clothing | Education | Fuels | Housing | Other |
|---|---|---|---|---|---|---|---|
| | | | Full Sample | | | | |
| Impact | -1.84 | -1.62 | -0.69 | -0.14 | 0.40 | -0.28 | -0.21 |
| | (0.47) | (1.29) | (1.08) | (0.17) | (0.40) | (0.33) | (0.59) |
| Observations | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 |
| LEAP Baseline Mean | 44.83 | 5.640 | 2.229 | 2.890 | 3.749 | 2.262 | 1.692 |
| ISSER Baseline Mean | 43.36 | 4.532 | 2.832 | 3.722 | 3.833 | 1.762 | 1.582 |
| | | | Female Headed Households | | | | |
| Impact | 1.87 | -2.11 | -1.34 | 0.9 | 0.27 | -0.6 | -0.25 |
| | (0.41) | (1.07) | (1.42) | (0.84) | (0.18) | (0.45) | (0.50) |
| Observations | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 |
| LEAP Baseline Mean | 48.89 | 5.896 | 2.171 | 2.941 | 4.165 | 2.379 | 1.771 |
| ISSER Baseline Mean | 47.57 | 5.357 | 2.1 | 4.621 | 4.114 | 1.702 | 1.644 |
| | | | Male Headed Households | | | | |
| Impact | -7.51 | -0.59 | 0.09 | -1.65 | 0.59 | 0.35 | -0.23 |
| | (1.40) | (0.46) | (0.12) | (1.38) | (0.75) | (0.57) | (0.47) |
| Observations | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 |
| LEAP Baseline Mean | 38.94 | 5.269 | 2.314 | 2.817 | 3.146 | 2.093 | 1.577 |
| ISSER Baseline Mean | 36.86 | 3.259 | 3.96 | 2.338 | 3.401 | 1.853 | 1.486 |
| | | | Size≤4 | | | | |
| Impact | -4.34 | -1.41 | -1.11 | 0.07 | 0.84 | -0.37 | -0.28 |
| | (0.71) | (0.78) | (1.19) | (0.07) | (0.60) | (0.30) | (0.54) |
| Observations | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 |
| LEAP Baseline Mean | 53.77 | 6.666 | 2.12 | 1.795 | 4.031 | 2.581 | 1.831 |
| ISSER Baseline Mean | 51.37 | 5.944 | 3.016 | 2.704 | 4.613 | 2.216 | 1.801 |
| | | | Size≥5 | | | | |
| Impact | 2.33 | -1.96 | -0.01 | -0.32 | -0.35 | -0.01 | -0.09 |
| | (0.60) | (1.26) | (0.02) | (0.22) | (0.35) | (0.03) | (0.31) |
| Observations | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 |
| LEAP Baseline Mean | 29.72 | 3.906 | 2.415 | 4.741 | 3.273 | 1.724 | 1.456 |
| ISSER Baseline Mean | 28.88 | 1.980 | 2.499 | 5.562 | 2.425 | 0.940 | 1.186 |

The highlighted row shows the DD impact estimate of LEAP derived from equation (1) in the text. Cluster-robust t-statistics are below each estimate. The dependent variables are shown in the top row and are measured in 2012 GHc adult equivalents. The impacts are estimated over five different samples which are labeled above each set of estimates. The mean value of the dependent variable at baseline is shown below each set of estimates. Statistical significance at 10 percent or better is shown in bold.

**Table A6.2: Impacts on food groups by samples**

| | Cereal | Starches | Pulses | Dairy | Meats | Fruits, Veg | Fats | Alcohol, Tobacco | Food Out | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Full Sample | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Impact | -1.71 | **-2.58** | -0.34 | -0.32 | **-1.99** | 0.62 | **0.82** | -0.30 | **4.12** | -0.16 |
| | (0.92) | (1.71) | (0.82) | (1.60) | (1.84) | (0.67) | (2.79) | (1.53) | (2.00) | (0.50) |
| Observations | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 | 2,979 |
| LEAP Baseline Mean | 9.076 | 10.63 | 2.783 | 0.628 | 9.704 | 7.684 | 1.525 | 0.512 | 1.090 | 1.193 |
| ISSER Baseline Mean | 8.795 | 8.433 | 1.936 | 0.893 | 7.996 | 7.555 | 1.977 | 0.428 | 4.000 | 1.342 |
| | | | | | FHH | | | | | |
| Impact | -2.78 | -1.58 | -0.38 | -0.35 | -1.33 | 1.83 | **1.29** | -0.14 | **5.57** | -0.25 |
| | (1.09) | (0.83) | (0.68) | (1.27) | (1.04) | (1.54) | (3.16) | (0.72) | (1.82) | (0.50) |
| Observations | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 | 1,593 |
| LEAP Baseline Mean | 9.981 | 11.6 | 2.997 | 0.738 | 10.31 | 8.555 | 1.629 | 0.348 | 1.316 | 1.409 |
| ISSER Baseline Mean | 9.864 | 8.885 | 2.103 | 1.061 | 7.895 | 8.394 | 2.273 | 0.183 | 5.374 | 1.539 |
| | | | | | MHH | | | | | |
| Impact | 0.06 | -3.9 | -0.3 | -0.34 | **-3.18** | -1.3 | 0.09 | -0.54 | 1.95 | -0.05 |
| | (0.03) | (2.12) | (0.59) | (1.27) | (1.88) | (1.26) | (0.26) | (1.31) | (1.34) | (0.18) |
| Observations | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 | 1,386 |
| LEAP Baseline Mean | 7.764 | 9.236 | 2.473 | 0.468 | 8.819 | 6.421 | 1.373 | 0.749 | 0.761 | 0.881 |
| ISSER Baseline Mean | 7.148 | 7.736 | 1.678 | 0.633 | 8.152 | 6.263 | 1.521 | 0.806 | 1.882 | 1.038 |
| | | | | | Size≤4 | | | | | |
| Impact | -3.39 | **-3.91** | -0.24 | **-0.65** | **-3.15** | 0.79 | 1.08 | **-0.52** | **5.95** | -0.31 |
| | (1.20) | (1.80) | (0.46) | (2.19) | (1.71) | (0.54) | (2.29) | (1.70) | (2.05) | (0.59) |
| Observations | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 | 1,881 |
| LEAP Baseline Mean | 10.6 | 12.48 | 3.187 | 0.751 | 11.85 | 9.487 | 1.774 | 0.621 | 1.522 | 1.491 |
| ISSER Baseline Mean | 10.3 | 9.196 | 2.218 | 1.094 | 9.368 | 9.337 | 2.394 | 0.442 | 5.313 | 1.7 |
| | | | | | Size≥5 | | | | | |
| Impact | 0.62 | -0.24 | -0.38 | 0.21 | -0.15 | 0.45 | **0.53** | -0.01 | 1.22 | 0.07 |
| | (0.32) | (0.14) | (0.55) | (1.00) | (0.12) | (0.61) | (1.72) | (0.03) | (1.06) | (0.36) |
| Observations | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 |
| LEAP Baseline Mean | 6.506 | 7.506 | 2.1 | 0.42 | 6.071 | 4.637 | 1.104 | 0.327 | 0.359 | 0.69 |
| ISSER Baseline Mean | 6.069 | 7.056 | 1.425 | 0.529 | 5.519 | 4.338 | 1.224 | 0.402 | 1.628 | 0.695 |

See notes to Table A6.1.

## Appendix 7:Unweighted versus weighted impact estimates

**Table A7.1: Comparison of weighted and unweighted estimates on adult equivalent consumption**

| | Unweighted | Weighted | |
|---|---|---|---|
| | w/o covariates | w/o covariates | w/ covariates |
| | (1) | (2) | (3) |
| | | Total | |
| Impact | -3.53 | -4.54 | -4.37 |
| | (-0.91) | (-0.96) | (-0.88) |
| | | Food | |
| Impact | -0.33 | -1.70 | -1.84 |
| | (-0.11) | (-0.45) | (-0.47) |
| | | Non-Food | |
| Impact | -3.20 | -2.85 | -2.53 |
| | (-1.87) | (-1.21) | (-1.00) |
| Observations | 2,979 | 2,979 | 2,979 |

Column 1 shows unweighted DD impact estimates without covariates. Column 2 replicates Column (1) but adds the IPW. Column 3 adds the full set of covariates to Column 2. The estimates in Column 3 are the same as those shown in the first row columns 1-3 of Table 4.1 in the main text. T-statistics in parenthesis below coefficient estimates.

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