

Increasing Food Security by Asset Transfer

Evidence of a Pro-Ultra-Poor Intervention in Bangladesh

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Abstract

Addressing the severity of poverty is a major challenge requiring new pathways: The NGO *NETZ* in its project IFSUP uses promotional (asset transfer and training), protective (savings and asset insurance) and transformative measures (lobbying and organization) as a combined intervention to lift ultra-poor households in northern Bangladesh above the poverty line. This paper uses difference-in-difference estimation on control- and target-group-data before and after the intervention to provide credible evidence on the impact of the project on food security of 4800 households. Average meals per day increased significantly for project participants, a result very robust after the inclusion of various controls. Developments of the households' asset base indicate a sustainable impact. Additionally, the project effect for subgroups is reported: While the expected lower effect of female headedness and lower poverty strata could be counteracted, the project is significantly less effective for ethnic minorities – despite explicit intervention on their socio-political context. Additionally, correlates of ultra-poverty for the sample are noted: Remarkable is especially the non-disadvantaged situation of female headed households amongst the group of ultra-poor.

1 Introduction

The reduction of the depth and severity of poverty remains a major challenge in many developing countries. Additionally, regional pockets of poverty persist even in countries on track for MDG1. Innovative poverty reduction mechanisms need to tackle these problems, as conventional strategies usually fall short of reaching the poorest section of society, the ultra-poor², or even use mechanisms that shut them out. Various project setups follow the pathways developed with the revival of social protection as a strategy for reaching the poorest households in developing countries, taking note of their especially deprived situation.

This paper focuses on evidence generated by the project ‘Income and Food Security for Ultra-Poor’ (IFSUP) in three districts of northern Bangladesh concerning the effectiveness of using the transfer of productive assets to ultra-poor households in combination with capacity building, risk management and social enhancement processes as means to reduce vulnerability to hunger. The project, with financial support of the European Commission, was implemented by the German NGO *NETZ Partnership for Development and Justice* together with its Bangladeshi partner organizations (PNGOs) *ASHRAI*, *Jagorani Chakra Foundation* (JCF) and *Sabalambay Unnayan Samity* (SUS).

² Many names are used to describe the bottom section of society in Bangladesh: the ultra-poor, the hardcore poor, extreme poor, poorest of the poor, the destitute, etc. The term ultra-poor in the present paper is related to the working definition of the NGO *NETZ*, focussing especially on calorie intake: Ultra poverty is defined by an threshold of 1,800 kcal/day/person and (functional) landlessness, as described in detail in chapter 3.

Major development means fail to reach those poor, especially micro-credit (Amin et al. 2003, Dietzel 2006). Its regularly used group collateral, while it may serve its purpose in circumventing moral hazard and adverse selection problems on financial markets for the poor (Armendáriz & Morduch 2010, Banerjee et al. 2003), produces e.g. implicitly this effect: On group or village level, the group collateral system prevents the inclusion of individuals or groups of ultra-poor, as actual or perceived default chances inhibit their acceptance by other participants (Rudolph 2010). This leads not only to an inefficient but also inequitable distribution of investment opportunities and in particular of the potential income gains thereof. The ability of the ultra-poor to increase their standard of living on their own is thus seriously constrained. Nonetheless the ultra-poor have worthwhile investment projects if given the capital base needed to start them (Rudolph 2010).³

As of today, only few projects focus on the long-term needs of this section. Too often they are only addressed by food or emergency aid, if not left alone. But it is crucial that their vulnerability⁴ is tackled. While food aid is nonetheless necessary in many circumstances, a change in policy is needed – and could be emerging at present (Barrientos & Hulme 2008) – that would shift their focus beyond current deprivation to their long-term prospects of freeing themselves of poverty. In Bangladesh and beyond, pilot projects within such a framework are underway (Brocklesby & Hopley 2003, Ellis et al. 2009, Emran et al. 2009, Khandker, et al. 2010, Matin & Hulme 2003, Sabates-Wheeler & Devereux 2008)⁵.

In the following, the geographical context of the IFSUP project will be described in Chapter 2, before outlining in detail project design with its three pillars in Chapter 3. Chapter 4 will describe core characteristics of the beneficiary and control group population, Chapter 5 then assess the project impact in detail: An impact regression of IFSUP concerning food security as measured in meals per day following a difference-in-difference estimation is outlined in Chapter 5.1. Mean developments of indicators of vulnerability are pointed out in Chapter 5.2. It is found that IFSUP has generated an impressive effect on reducing hunger – additional indicators point furthermore to a reduced vulnerability of households. Nonetheless it is too early to draw conclusion on the sustainability of this success, especially as methodological issues prevent a clear-cut interpretation of the impact.

³ Some innovative micro-credit projects address these issues (Khandker et al. 2010).

⁴ Understood in this paper, if not noted otherwise, broadly as “the likelihood of being in poverty in the future” (Barrientos & Hulme 2008: 4).

⁵ For an overview see as well Barrientos et. al. (2010).

2 The Context: Bangladesh and Its Northern Regions

The project intervenes in one of the least developed countries with a per capita income of US\$ 652 in 2009. Still, Bangladesh experienced considerable economic and social progress in the last decade. Supported by steady growth rates of per capita GDP around 4.3%, poverty levels declined significantly and main health and education indicators improved: Infant and child mortality halved over the last 20 years, while closing the gender gap that had existed before; education indicators improved to almost universal gross enrolment. On the other hand, maternal mortality remains high and the quality of formal education poor (with primary drop out rates of up to 50%). A major problem is malnourishment: About 40% of the population still lives in poverty⁶ and about 25-33% of the population in extreme poverty⁷. Additionally, large parts of the population live close to the poverty line and thus are highly vulnerable to being impoverished by small shocks. In this respect, the susceptibility of Bangladesh to natural disasters with its dense population and 80% of its area consisting of flood plains is especially noteworthy. For the project region, this concerns in particular abnormal monsoon floods and flash floods (Dietzel 2006, Rahman et al. 2009, World Bank 2010).

Rural northwestern Bangladesh, the main project region⁸, is an especially deprived part of the country, politically neglected, with low industrialization, lacking off-farm employment and weak infrastructure (Zug 2006). Following statistics of the Government of Bangladesh (GOB), poverty headcount rates are at 40% for whole Bangladesh, while the northwestern region stands out with 57%. Concerning extreme poverty⁹, the 25% nationwide are to be compared to 47% in the region (Chowdhury et al. 2009). This matches findings of NETZ selecting working areas with up to 43% ultra-poor household as well as observations of other donors¹⁰. The northwestern region is additionally prone by a seasonal pattern of chronic food shortages, called *monga*, prevalent especially in the Rangpur and to a lesser extent in the Joypurhat area of the project, leading to a vicious cycle of second-best coping strategies and increased vulnerability for the next hunger season (Zug 2006). Wood (2003: 468) in this respect refers to a “Faustian bargain”, where the poor and poorest, faced with life threatening distress, are forced to discount the future in favor of short term security “whatever the longer term costs”.

⁶ As defined by a direct calorie intake (DCI) of less than 2,122 kcal/day.

⁷ As measured by a DCI of less than 1,805 kcal/day

⁸ See Appendix 2 for a map.

⁹ Measured as part of the population not able to intake 2,122 kcal/day even if spending all income on nutrition.

¹⁰ The World Bank (2010: 61) e.g. notes, that Government efforts to improve completion rates for primary education failed – rates remained “very low” – in the northwestern region and especially in the local *monga*-prone areas.

3 Project Intervention

The IFSUP project aims at generating sustainable livelihoods for 4,800 ultra-poor households with approximately 19,000 family members in six *upazilas*¹¹ of three Bangladeshi districts (Rangpur, Joypurhat and Netrakona), intending to lift about 10% of the ultra-poor population in these *upazilas* over the upper poverty line of 2,122 kcal/day/person. In each district, a different PNGO¹² of NETZ is responsible for the implementation. The project explicitly targets the senior women of households and pays attention to the inclusion of local ethnic minorities, termed *Adibasis*¹³, who are to make up 50% of the project beneficiaries. The ultra-poor are disaggregated into subgroups – group I, II and III. The main distinction between these groups lies in their capacity to work. Group I, the most marginalized ultra-poor, not embedded in supporting family structures and not capable of physical labor (e.g. elderly, physically or mentally ill, orphans), are not targeted by the project, as they cannot respond to self-employment schemes. Group II and III differ mainly by their degree of poverty. In the project, this distinction is operationalized by defining group II as households with a food intake of less than 1,600 kcal/day, a maximum of two meals in minimum nine months, a monthly income of less than 400 BDT per capita, being completely without land and/or assets. Group III is characterized by a food intake of less than 1,805 kcal/day, a maximum of two meals in minimum six months, a monthly income of less than 500 BDT per capita and being functionally landless. Skepticisms prevail concerning the work with especially the group II ultra-poor: The European Commission sees income generating activities by group II possible only “[s]poradic by highly motivated and capable beneficiaries” (EC 2001: Annex 1).

The overarching project-aim, increasing self-employment for the ultra-poor to a level preventing hunger and distress and at the same time mitigating their vulnerability to an extent that future fallback into poverty become unlikely, has its background in four major problems the ultra-poor are facing: They are suffering from hunger at least 6-9 months per year. Their state is vulnerable to an extent that they are at high risk of being locked in their situation and would slide back even if faced with a positive shock. To the social and political aspects of their vulnerability – social exclusion especially of female-headed and indigenous *Adibasi* households together with a government largely unable to include their needs to its agenda –

¹¹ Administration in Bangladesh follows the levels national – division – district – *upazila* – union – *mouza*. The six *upazilas* are Durgapur, Gangachara, Kalmakanda, Kaunia, Joypurhat and Panchibi (see Appendix 2 for an overview).

¹² ‘ASHRAI’ in Rangpur, ‘Jagorani Chakra Foundation (JCF)’ in Joypurhat and ‘Sabalamby Unnayan Samity (SUS)’ in Netrakona.

¹³ *Adibasi* is used as an umbrella term for the various different indigenous minorities of especially India and Bangladesh.

adds the risk of various natural disasters and unfavorable macroeconomic conditions, as well as market forces¹⁴. This leaves many households incapable to invest in human or physical capital and prevents emancipation from their status: Thus, Rahman et. al. (2009: Chapter 1.2) find in their assessment of chronic poverty in Bangladesh that a large majority of the chronically poor (72%) inherited their status over generations and are likely to pass it on. Sinha et. al. (2002: 186), using the concept of ‘damaging fluctuations’¹⁵, similarly note how this vulnerability is likely to influence the ultra-poor:

“Such fluctuations cause immediate damage and may trigger responses leading to chronic poverty or intergenerational continuities of poverty. Moreover, just the possibility of [damaging fluctuations], even if they do not occur, may generate more risk-averse behavior, which hampers growth and (because it is likely to be more common among poorer people) increases inequality.”

These poor are found to be trapped in poverty, as noted in similar contexts (Carter et al. 2008).

3.1 Social Protection as Concept for Intervention

The ultra-poor need special targeting for successfully supporting their livelihoods – new forms of social protection are emerging as means to achieve this. Following the conceptualization of Ellis (2009: 8), social protection includes all initiatives aiming at the poorest and pursuing the aim of reducing economic and social vulnerability by the protection of livelihoods, transfers with the goal of improved consumption and the reduction of social marginalization¹⁶.

Adopting the typology of Sabates-Wheeler and Devereux (2008: 70, e.i.o.),

“social protection includes four categories of instruments: *‘provision’ measures*, which provide relief from deprivation; *preventive measures* which attempt to prevent deprivation; *promotive measures*, which aim to enhance incomes and capabilities; and *transformative measures*, which seek to address concerns of social justice and exclusion.”

The IFSUP project uses a threefold approach combining prevention, promotion and transformation, by this establishing a “springboard” for the poor with a “safety net” beneath (Sabates-Wheeler & Devereux 2008: 73). This combination of approaches is not uncontested: While a focus on vulnerability and its *ex ante* reduction is acknowledged (ESCAP 2002), a wide range of donors see no promotive elements in social protection interventions (World Bank 2000), even if linkages are recognized (e.g. BMZ 2009). A combination of approaches

¹⁴ Much noted is especially their inability to get access to credit or savings facilities (Armendáriz & Morduch 2010, Banerjee, et al. 2003, Rudolph 2010).

¹⁵ The commonly used concepts of ‘risks’ and/or ‘shocks’ are subsets of ‘damaging fluctuations’, as the latter include as well largely or wholly predictable changes, e.g. seasons, the (ultra-) poor are vulnerable to. Additionally, the authors argue, the concept of ‘damaging fluctuations’ brings to light four central dimensions of shocks usually unnoted for in the literature: the source, the stress it imposes on systems, the resulting strain on persons, and the resulting damage. This paper will still speak of shocks and risks, though broadly understood.

¹⁶ Social protection can be this widely defined, although this somehow “straddles the conceptual divide between welfare payments and development policy” (Ellis, et al. 2009).

is necessary, though, to do the multidimensionality of poverty justice: Just as cash transfers can be shown to induce the building of asset stocks and contribute to livelihood protection and promotion at the same time (Devereux 2007), productive asset transfers can be used as a mean to protect livelihoods by promoting income generation – with the advantage of explicitly raising the long term productive potential of households. Opposed to moderately poor households, where temporary safety-net measures allow them to mitigate a temporary crisis and bounce back to their original development trajectories, the chronically poor need protection against imminent deprivation simultaneous to support for their productive capacity (Farrington et al. 2004). It is in this light that Farrington et. al. (2004) call for an incorporation of protection mechanisms in promotive action and vice versa.

3.2 Promotion, Prevention and Transformation as Core Project Elements

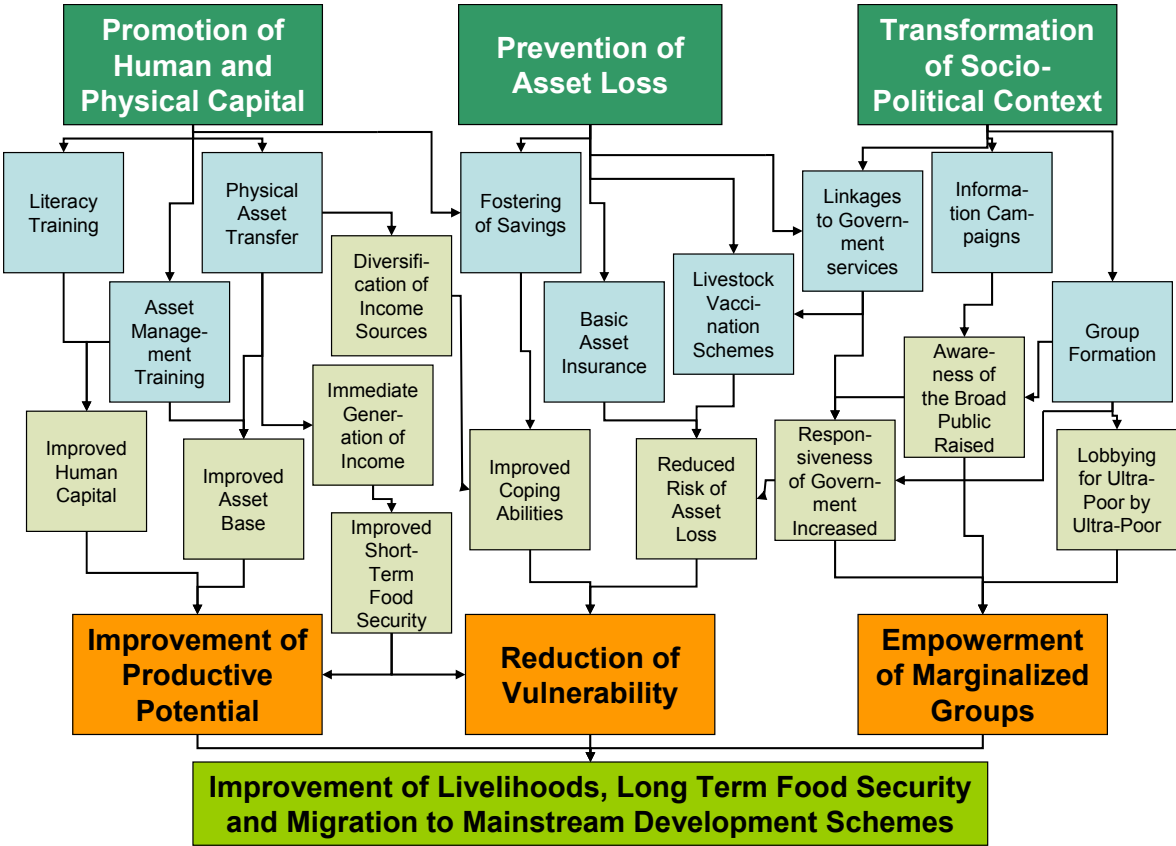


Figure 1: Conception of intervention strategy and envisioned outcomes by the IFSUP project.

Figure 1 conceptualizes the project approach and its envisioned impact trajectories. The project’s main component, the promotion of the respective household’s asset base, is combined with mechanisms aimed at preventing asset loss and building up liquid assets as well as transformative intervention into the socio-political context of the project. The

overarching aim, substantially improving the livelihoods of the ultra-poor households, especially lifting their year round DCI above 2,122 kcal/person/day and migrating them to mainstream development programs is addressed through the three interwoven branches of the project with their subgoals of directly raising the productive potential of the poor, reducing their vulnerability to future shocks and socially empowering them.

Concerning the first branch on the left hand side of *figure 1*, the human capital and physical capital base of the households is strengthened. On the one hand, trainings in asset management and basic literacy for the senior female household member is undertaken. Women are for this offered a range of training courses related to the Income Generating Activities (IGAs) they later get capital transferred for. While the functional literacy training is supposed to in general increase the confidence and market participation ability of the ultra-poor households, the courses are supporting the productivity of the following transfer of physical assets. This transfer of working capital is the major development mean of the IFSUP project, leading to a substantial increase in the asset base of households with a total transfer of 11,500 BDT¹⁷ per household for the purchase of at least two assets, including the subsequent running costs, in several tranches. Following baseline data, the transfer thus amounts to 75% of the average annual wage income of households (see Appendix 1, *table 1*). The women choose from a range of IGAs, in large majority livestock related (beef fattening, raising of heifer, poultry, etc.) but as well including small trade, small businesses (e.g. tea stalls), land purchase or services (e.g. rickshaw pulling). The IGAs shall on the one hand establish a lasting and growing base of physical capital for the household and help in diversifying their income source, and on the other hand are supposed to quickly generate a steady income stream, contributing to the short term food security of households. 20% of this working capital received is supposed to be paid back, increasing the responsibility for the assets transferred and reducing incentive problems.¹⁸ By this, the repayment scheme as well familiarizes the households with the procedure of regular savings and conventional micro-credit, enhancing their financial competency. The 20% payback is additionally constituting a revolving credit fund that is accessible for the households similar to the procedure in rotating savings and credit associations (Armendáriz & Morduch 2010: Chapter 3).

¹⁷ About 120 € at market exchange rates or 1200 € at Purchasing Power Parity (PPP) adjusted exchange rates. PPP exchange rate: 1\$ = 12.7 BDT (World Bank 2006); Interbank rate: 1 Euro = 93.6919 BDT, 1 Euro = 1,34187 \$ as of 24.09.2010.

¹⁸ But exceptions apply: To prevent the material destruction of families in case of failure of the respective IGA, women are not to repay their 20% share in case of asset loss and only parts of it in case of low productivity of the asset.

Concerning the second branch, the project established a security fund of 1% of the working capital that serves as basic insurance against asset loss through natural disasters and diseases of livestock. Loss of livestock is additionally prevented through vaccination schemes: The project uses the innovative idea to train ultra-poor women as para-veterinaries providing service to their neighborhood as independent IGA. Indirectly, prevention of asset loss is addressed by encouraging women for saving in small but regular installments. For this, the selected women form self-help groups of 10-20 women opening a collective bank account, generating a save storage place for their liquid capital. By this, not only do they broaden their income base by the IGAs, but they as well generate a small stock of liquid assets for emergency needs, enabling them to cope with minor shocks without selling their productive potential. Additionally, the project creates links to government offices, amongst others government veterinary services, and the PNGOs are lobbying for the inclusion of ultra-poor in existing social protection schemes of the GOB, such as cash or food transfers where corruption has regularly prevented their inclusion (TIB 2008). Thus the transferred productive capacity of households is hoped to be kept and their vulnerability to asset loss and following downward spirals mitigated: While they may still be exposed to risks, their potential for coping without reliance to distortive measures is improved.

The self-help groups serve not only as coordinative device between women and PNGOs and to facilitate savings but additionally form the core of the third branch, the transformation of the socio-political context. On top of the general marginalization of the poorest in Bangladeshi society, a majority of the target group belongs to especially excluded sections: female headed and *Adibasi* households. As empowerment device the group formation allows the raising of awareness of the participating women through training, generating room for discussions and networking, including the formation of ultra-poor group federations at *upazila* level for political lobbying. Additionally, the respective PNGOs run public awareness raising campaigns. This aims at transforming the socio-political context the IFSUP project is embedded in, to not only give the ultra-poor the means for sustaining their livelihoods but as well tackle the reasons that brought them in deprivation in the first place. This is an aspect oftentimes neglected (Sabates-Wheeler & Devereux 2008), but important for project success: As Bastiaensen et. al. (2005: 990) outlined, the political processes around poverty and capital markets have to be taken into consideration: The poor are deprived of opportunities for shaping the institutional landscape and thus cannot (co)determine the rules of the game they have to play. Neglecting these political forces can lead to “[poverty]

interventions that converge with local elite networks with the effect that the [...] flow of funds destined to the poor ultimately reproduce[s] the local structures of poverty.”

By this threefold combination of approaches, the livelihoods of the project participants are hoped to increase substantially: Enhancing the capital base of households, but as well the range of activities available to them and the general access of ultra-poor households to society. It can thus be classified as integrated poverty reduction program following a multidimensional understanding of poverty (Barrientos, et al. 2010).

4 The Project Population

The data gathered for the monitoring of the project allows for a detailed description of the project population, already hinting at constraints they face. For further statistical analysis (Chapter 5), divergences between target and control group will be especially noted. Data was gathered in two phases. In 2007 a baseline was conducted in six *upazilas* of the three districts in question, in 2009 a follow up study conducted¹⁹. *Upazilas* with high incidence of ultra-poverty and *Adibasi* settlements were selected where possible. Households were then chosen to match required amounts of at least 50% belonging to group II of ultra-poverty and 40% to *Adibasi* ethnicity. Preference was as well supposed to be given to female-headed households²⁰, households with disabled member(s) and beggars. Four fifth of the 6,000 interviewed were assigned to the beneficiary group, one fifth to the control group – all participants had at the time of the baseline survey a chance of being chosen for inclusion in the beneficiary group, determined by the PNGOs following the mentioned targeting criteria as well as practical aspects such as the formation of adequate self-help groups afterwards. The survey was set up by NETZ in cooperation with the PNGOs as well as an external consultant and conducted by field workers of the respective PNGO.

Table 1 in Appendix 1 summarizes key characteristics of the sampled population²¹. The sampled population of the six *upazilas* shows the characteristics of the selection process: 61% belong to group II of ultra-poverty, the rest to group III, almost 50% are of *Adibasi* ethnicity. The severe poverty the families are living in is represented by the hunger they face with an average amount 1.95²² meals per day. Households are landless or functionally landless, as indicated by a mean homestead size of 4.344 *decimal*²³. 45% of households own this land. The average household size²⁴ amounts to 3.9 family members.²⁵ Mean savings amount to 33

¹⁹ Information was collected on the location of households, household members including sex, marital status and education, health information, house, land and asset ownership and value, savings and credit, NGO support, nutritional status, social awareness/status as well as in 2009 information on trainings and assets received.

²⁰ Divorced, widowed, deserted, or with no primary male earning member.

²¹ Mean and standard deviation (sd) in columns (1) and (2) as well as differences between beneficiary group (mean in column (3)) and control group (absolute deviation of means with significance stars as well as t-statistics in columns (4)).

²² Households reported the amount of months with one, two or three meals per family member over the last 12 months from the point of interviewing.

²³ One *decimal* is about 1/100th of an acre.

²⁴ A household is defined as all members eating from the same cooking.

²⁵ This size seems at first sight surprisingly small compared to the 2005 national average of 5.0²⁵ (BBS 2009) but with female headed households (22% of the sample) being overrepresented in the sample (national average: 11 %, BBS 2009), they draw the average household size down: They oftentimes are nuclear families²⁵, with the female household head being deserted or widowed. This is in line with findings of the Bangladesh Bureau of

taka, mean credit per household to 310 taka. Those low figures are, as indicated by the high standard deviations, due to many families neither taking credit (n=3078) nor saving (n=3991). Among the households who do save, mean savings amount to 409 taka, while among households taking credit, mean credit amounts to 637 taka. Concerning the (formal) education level of the household, the maximum education of household head or its spouse is used as an indicator. The marginalization of the ultra-poor concerning education comes to light by 22% of household heads without any formal education, 52% being only able to sign their name, 8% having dropped out of school after class one or two, 9% having dropped out after class 3-5 and only 10% having started or completed secondary education. The severe poverty of these households manifests itself in a yearly mean income of 15,790 taka, translating into a yearly mean per capita income of 4,277 taka²⁶. Only 2% of households are covered by any sort of GO/NGO intervention²⁷.

The groups of selected beneficiaries differs statistically significant on a couple of variables. It is especially important that significant differences in poverty status, homestead size and yearly per capita income are in a direction that would lead to the expectation of project impact underestimation in case of direct comparison without controls. On the other hand, beneficiary households are larger, less likely to be female headed, richer in total, better educated and more likely to benefit already of an NGO program. These differences therefore have to be taken into account when assessing the project impact.

Statistics (BBS 2009), reporting much smaller average household sizes for female (3.48) compared to male headed households (4.98) in Bangladesh.

²⁶ 169 € and respectively 46 € at market exchange rates or about 1,700 €, respectively 460 € Euro at PPP adjusted exchange rates, see FN 14 for calculating figures.

²⁷ Examples of assistance include old age allowance or food aid from the GOB/UN WFP, or health education through NGOs like World Vision or CARE Bangladesh

5 Evidence of the Project Impact

The core question of this paper is what a subsidized asset transfer project such as IFSUP can achieve – is there a measurable project impact and can hunger be mitigated by self-employment?

At the heart of project impact evaluation is the question: “How have outcomes changed with the intervention *relative to what would have occurred without the intervention*” (Armendáriz & Morduch 2010: 267, e.i.o). To answer this question, the treatment group will be compared to a control group that is assumed to have been in a similar situation, allowing for an estimation of the treatment impact (Duflo & Kremer 2003: 4). For doing this, the very special set-up of the project will be exploited in order to treat it as a quasi-randomized evaluation of a natural experiment: The specific set-up as an unconditional transfer can justify this procedure – treatment and control group are both eligible, controlling for eligibility is therefore not necessary. Additionally, households offered with inclusion can be expected to have participated, making self-selection (e.g. of those especially motivated) unlikely. Additionally, core criteria of inclusion and potential baseline difference are controllable. The usual problem of impact evaluations, separating project impact and the mere (adjusted) preexisting differences is hoped to be circumvented in this context. Other central problems cited in the literature could as well be of minor relevance here: The specific location of program vs. treatment groups, e.g. separate villages (Duflo & Kremer 2003), is adjusted for by having treatment and control households in most locations. A core problem for this impact assessment are developments in the control group though: For unknown reasons²⁸, it shrank from 1,200 households in 2007 to 982 in 2009.

5.1 *Impact regression*

The method of a difference-in-difference estimation will be applied, with additional regressors in order to control for possible randomization problems and to evaluate the correlation of variables of interest with the project outcome.

²⁸ Mentioned by program officials in this respect is especially migration. Some of these migrated households were, without possibility to identify them though, replaced by “similar” ultra-poor household. Households that have migrated are supposed to have been relatively poorer ones, as migration pressure has only been relieved for the beneficiary group of which apparently no member migrated.

Impact will be measured following a regression with linear specification²⁹,

$$Y_i = \beta_0 + \beta_1 treatment + \beta_2 year + \beta_3 treatment \times year + X_i \alpha + Z_i \gamma + W_i \mu + Q_i \lambda + \varepsilon_i,$$

with Y_i as an indicator for the food security of household i ,

β_0 as constant,

$treatment$ as a dummy variable indicating the status of project beneficiary or control group,

$year$ as a dummy variable indicating the year of the baseline (2007) or impact survey (2009),

$treatment \times year$ as interaction term for the actual project impact,

X_i being a vector of geographical controls on county level,

Z_i as a variables-vector introducing household characteristics such as ethnicity or gender,

W_i as a vector of dummies controlling for household i 's education status,

Q_i as a vector controlling for household i 's outside options (labor market, other support).

The dependent variable Y_i measures for an average household member the average daily meal intake over the last twelve months³⁰. In aggregating, gender and status of household members as well as meal quantities were weighted equally.³¹ The project impact regression is reported in *Appendix 1, table 2* in different specifications: In *est1.1* to *est1.5*, one of the above mentioned vectors is added each time.

Additionally, *Appendix 1, table 3* and *4* report a difference estimation only on the 2009 data in order to control for interaction effects of control variables with participation. *Table 3* looks specifically at the influence of interaction terms of the Z_i vector with $treatment$ ³², *table 4* at

²⁹ It remains a question for further research, what insights different model specifications can generate. A first test with probit regressions, treating the impact indicator as dummy variable (3 meals per day as "1", less than 3 as "0"), provided similarly consistent results.

³⁰ For the 2009 dataset, it was constructed following gender- and age differentiated information on the quantities of meals in the last twelve months from the point of interviewing. This information was weighted equally for all household members. Answers by households could include X months with one, Y months with two and Z months with three meals and were counted, if the total amount of months accounted for (X+Y+Z) equaled to twelve. Valid information exists on 5722 of 5785 households. Direct comparability of the two cross-sections is somewhat impaired, as monthly food intake was not interrogated gender- and age-specifically in 2007, but only as household average. Otherwise the same method of calculation for daily meal intake was used. Valid information exists on 5919 of 6000 households.

³¹ In its interpretation, the impact of an additional meal per day in a lean season month with persistent hunger (one meal per day) will therefore be treated as equally benefitting compared to an additional meal in a mediocre month with two meals per day. Though this approach is questionable, given the decreasing marginal utility of an additional meal for a given individual, this specification focuses on the directly measurable project impact. A more differentiated approach with weighted impacts is beyond the scope of this paper but an open field for future research.

³² It follows the regression $Y_i = \beta_0 + \beta_1 treatment + X_i \alpha + \varepsilon_i$ including the variables *ethnicity*, *2007 poverty status*, *female headedness* and *household size* and their interaction term respectively throughout *est2.1* to *est2.4* as well as the compilation of them in *est2.5*.

the influence of the interaction terms of the W_i and Q_i vector with *treatment*³³, to gain insights on the project effect on population sub groups. All regressions use robust standard errors, geographical controls are included if not noted otherwise.

5.1.1 Overall Project Impact

As *est1.1* of *table 2* indicates, a direct project impact of almost half a meal per day (0.448) can be deduced, significant at the 1%-level. This is a substantial increase in food security and points to a successful intervention strategy³⁴. By including additional regressors in the subsequent *est1.2* to *est1.5*, tests for selection bias or reverse causation was implicitly included: As the estimation of about half a meal per day remains at nearly the same level (range 0.424 to 0.454) with similarly high significance, this finding seems to be very consistent. The constant of 1.957 implies that an average ultra-poor household member could be lifted with the project effect of 0.448 and the year effect of 0.574 to nearly 2.979 meals per day – nearly to the target level of three meals per day for all beneficiaries all year through.

It is especially important to note that group status per se makes no relevant difference for food security – only in *est1.4* and *est1.5* a significant difference, on the 10% and 5% level, of 0.015 meals per day can be noted. But as it is in negative direction, it would rather lead to an underestimation of project results and can thus be neglected. Furthermore, the inclusion of additional regressors are influencing project impact and t-values of the *treatment* × *year* interaction only very slightly, which strongly hints at a successful randomization process in the project design. The strongest change of the treatment effect occurs by including log wage income and GO/NGO membership into the regression while additionally controlling for the explicit selection criteria and geographical location, which could be a hint that the selection process was slightly biased towards better off households – this is in line with findings from the baseline survey that total yearly per capita income from wage labor and GO/NGO coverage was slightly, but significantly (1% level), higher for the target group (see *table 1*). But it has to be recalled that treatment and control group differed significantly on a number of other characteristics. Contrary to expectations, these differences, especially ethnicity and female headedness as explicit selection criteria, seem not to have a relevant influence on the project impact coefficient. This effect might be due to the low

³³ It follows in *est6.1* the regression $Y_i = \beta_0 + \beta_1 \textit{treatment} + X_i \alpha + \varepsilon_i$, including the variables on education, outside income and GO/NGO support as well as their respective interaction terms.

³⁴ Results are for an average ultra-poor family member of the beneficiary group on an average day in an average month.

absolute value of differences, but a note of caution has to be included as it could as well be related to drop-outs from the control group.

A great question mark has to be put behind the year effect: By time alone, food security of households improved substantially in the project regions. With an absolute increase of about 0.57 meals per day, the time effect is even surpassing the project effect. Control households thus could improve their food security from an average of about two meals per day in 2007 to about 2.5 meals per day in 2009. This is contrary to expectations: On the one hand, it puts a question mark behind the theoretical assumption that ultra-poor households are locked in their situation, are rather faced with a downward spiral and have on average no means of freeing themselves out of poverty. On the other hand, this positive year effect is contrary to expectations given the severe price hike of rice, main nutritional source for ultra-poor households, in the respective periods. *Figure 2* documents the development of rice prices from 2006 to 2011, red bars indicating approximately the recall periods for the obtaining of average meals per day values. While the rising food prices should have counteracted the positive year effect, the recall periods fall both in times of rising prices, making measurement errors as explanation more unlikely. It is of course possible, though, that the positive year effect is again an effect of drop-outs from the project.

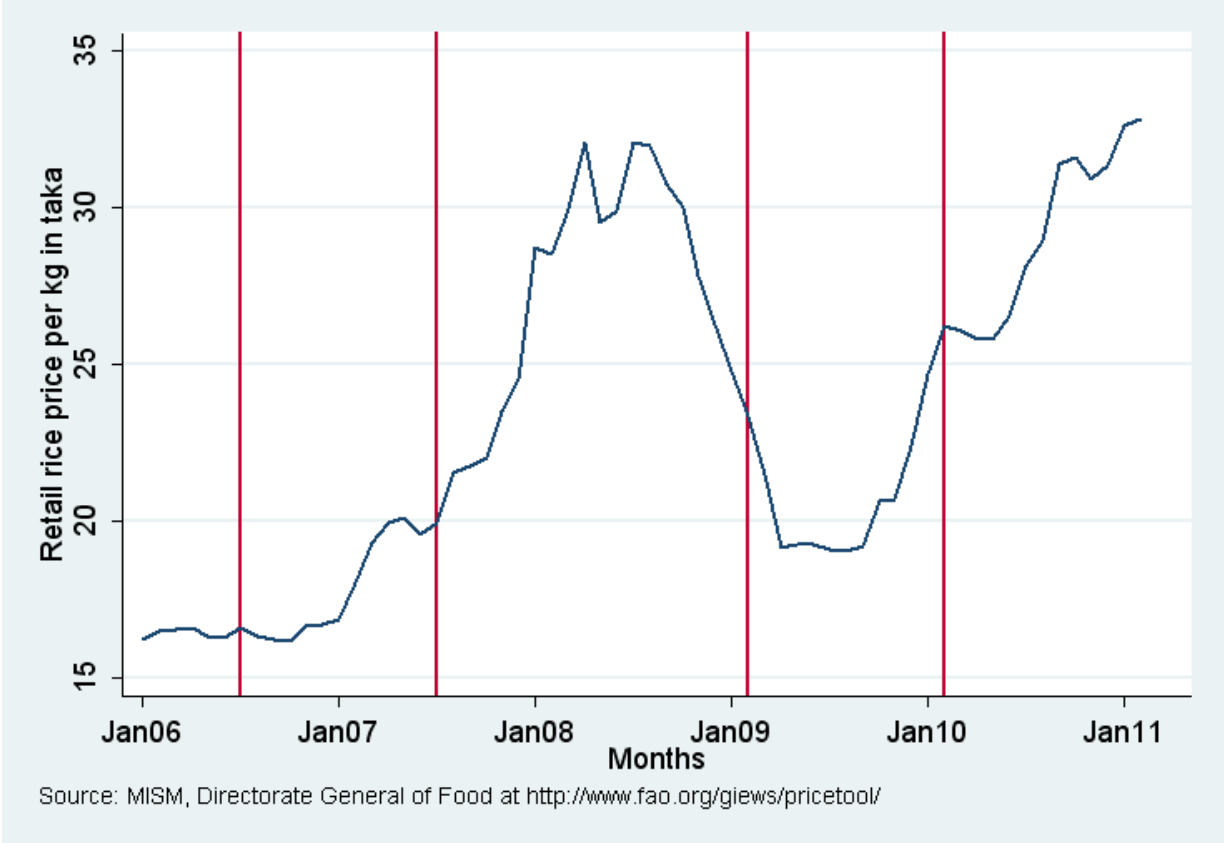


Figure 2: Development of Bangladeshi retail rice prices per kg in taka (national average).

5.1.2 Factors Correlated with Food Security and Determinants of Project Success

The variables included in the above impact regression are not only useful in controlling for the actual project impact but as well imply insights in characteristics of food security for the respective ultra-poor households. These are interpreted together with impacts of the interaction regressions of *table 3* and *4*.

5.1.2.1 Effect of Fixed Household Characteristics

Est1.3 introduces further fixed household characteristics: female headedness, household size and ethnicity.

As can be seen from *table 2*, *est1.3ff.*, female headedness seems, at least if controlling for education, not to play a significantly negative role for food security – despite their relatively more disadvantaged situation (no male earners, social stigmas).³⁵ This is counterintuitive as female headedness is generally thought to be a constituent of higher vulnerability³⁶. Typical conclusions in the literature that female-headedness is a main determinant of being chronically poor (Meenakshi & Ray 2002, Rahman, et al. 2009: Chapter 1) notwithstanding, the female-headed might not be especially disadvantaged concerning relative food security among the group of ultra-poor. This could explain why female-headedness is insignificantly (*est1.3*, *table 3*) or even positively correlated with average meals per day, when controlling for education levels and outside options. Therefore, if the ultra-poor are determined following asset levels, food intake, social status etc., female headedness can be one important indicator. As soon as these ultra-poor are identified, though, female headedness does not need to be a household characterization implying different treatment. In line with this finding, there is no significant interaction effect of project participation and female headedness for the 2009 data as can be seen from *table 3*: The female headed ultra-poor households do not seem to profit less from the project intervention. It is unclear, though, to what extent this latter finding has to be attributed to the especially empowering set up of the project with e.g. the formation of women groups.

The positive correlation of household size with food security in *est1.3* and *est1.4* (significant at 1% level) is in line with theory, suggesting that larger households can better diversify and spread risk (Ellis 2000) or that economies of scale (Townsend 1994) are relevant in improving their food intake. As the effect of household size is turning in direction

³⁵ This is consistent with findings from the baseline survey, a t-test of the meals indicator conditional on female-headedness providing no statistically significant (10% level) differences.

³⁶ Amin et. al. (2003) find some evidence in this direction for northern Bangladesh.

with *est1.5*, though insignificant, this hypothesis finds further support – larger households, even if they are ultra-poor, seem to find better access to labor markets, therefore earning more in average. But on the other side of the coin, household size has negative effects as well – e.g. in expenditure for children – that come to light if controlling for outside wage income.³⁷ Concerning the project outcomes, the introduction of an interaction term is insignificant (*table 3*). As asset transfers and trainings were organized on household-level, households with more members received relatively lower support per capita. It could have been expected that household size was therefore negatively correlated with per capita project effects. One possibility in explaining this points to the just mentioned risk diversification or economies of scale: Larger households might not have had to give up second-best income opportunities. As well, the capacity to manage the transferred asset and the traditional income possibilities of the household can be expected to be increasing with household size, offsetting the effect of a relatively lower transfer – as additional investments in the asset become possible more easily with additional wage income.

Puzzling are results on ethnicity: On the one hand *Adibasi* ethnicity is, highly significant, associated with lower food security in *est1.3* to *est1.5*. This confirms findings in the literature (Meenakshi & Ray 2002): A structural disadvantage for members of the ethnic minority seems to be evident. This is especially relevant as the effect of female headed households, as noted, is nullified among the group of ultra-poor, whereas the disadvantages of *Adibasi* households seem to last. This points as well to the project not being equally effective for *Adibasi* members – entry points of difference could e.g. display in asset marketing or victimization process, as noticed by Miah (2008)³⁸ – despite the transformative elements of the project aiming at exactly these disadvantages. The introduction of an interaction term in *table 3, est2.3*, confirms this finding: *Adibasi* beneficiaries had a 0.15 lower increase in meals per day, significant at the 1%-level, diminishing their project return in term of meals per day by about 30%. The detailed reasons for their structurally weaker position need to be examined further to be able to better adjust the project to these effects. This disadvantage points furthermore to two insights: The transformative aspects of the project have not (yet) succeeded in lifting *Adibasi* livelihoods to the level of non-minority households. Projects neglecting the transformative element might fall short of addressing the needs of their clients. Results have to be treated with caution, though, as ethnicity as such, for the non-project participants, is after the introduction of the interaction term positively correlated with food

³⁷ Results therefore reflect the inconclusive discussion in the literature (Lanjouw & Ravallion 1995, Meenakshi & Ray 2002).

³⁸ For a first overview see as well Lehmann (2006).

security. Though significant only on the 5%-level this result is puzzling – it might be possible that drop-outs in the control group are related to this finding. Matching could be a way to solve this issue in further research (Stuart 2010).

5.1.2.2 Effects of Education, Wages, Outside Options and 2007 Poverty

Est1.4 controls for the education levels of household heads, the reference group being household heads without education. The positive correlation (significant at the 1%-level) of all educational dummies with food security, the reference group being *no education*, is not surprising. It stands out that relative to the no-education-group, the step to an education level of ‘signature only’ already induces a significantly higher food security, pointing to high returns of just very basic education training. Higher education levels are, relative to the no-education-group, related with ever higher food security. This is in line with estimations of Asadullah (2005) concerning the education-wage relation in Bangladesh, finding evidence of up to 7% higher wages with one additional year of education – he estimated increasing returns to rising education levels, which is not apparent from the IFSUP data. But as Asadullah (2005: 8) noted, this non-linearity must not hold if taking into account the household production context, informal sector and self-employment in farm and non-farm activities. A note of caution concerns simultaneity in this respect, as the first project pillar has included signature training.³⁹ If introducing interaction terms between group beneficiary status and education variables as in *table 4, est3.1*, the coefficients of education change slightly: A non-linear tendency might become apparent.⁴⁰ It is as well noteworthy that contrary to expectations beneficiary households with higher education levels did not profit more concerning food security compared to beneficiary households with no education: In fact, the positive effect of education is almost leveled out for group members by the interaction term. This is especially surprising as asset management skills could have been supposed to be positively related to education and therefore as well to food security. The question then is whether the signature training introduced by the project serves a purpose after all: In this respect, even if the direct effect on food security for project participants does not become apparent it might well show its benefits in other fields relevant for the ultra-poor. Garikipati

³⁹ The percentage of non-signature-able household heads consequently dropped of roughly 37% in 2007 to about 9% in 2009, while the combined amount of household heads able to only sign or without any reading/writing skills remained the same with 76% and 74% respectively.

⁴⁰ The coefficients on education additionally do not depend on the inclusion of other household characteristics.

(2008) finds evidence that education of senior females is significantly positively related to influence in household decision making⁴¹.

Est1.5 of *table 2* finally controls the project impact for total log outside wage income per year of the respective household and support by any additional government⁴² and non-government programs⁴³ benefitting control or target group. Both variables are (highly) significant (at the 1%- and 5%-level) and are positively correlated to the household's food security, as would be expected. The control for outside wage income is controversial, as changes in wage income might be itself an outcome of the treatment if project participants now have less time for wage income as they are caring more for their assets. Still its inclusion can control for selection bias between target and control group as discussed above. Finally, control for other GO/NGO programs, especially the small size of the influence, indicates that the treatment effect is indeed due to the IFSUP project and not to some other interventions that might be relevant in the area. Here again simultaneity might be an issue as better access to especially government services is a core aim of the group formation and lobbying. Both variables are, as expected⁴⁴, after all related to an increase in food security. This effect is confirmed for the 2009 data as well following the inclusion of interaction terms in *est3.2* of *table 4* – again, the interaction of beneficiary status and log occupational income dampens the effect of occupational income on food security for project participants – the same observation is repeated for the GO/NGO interaction.⁴⁵

Finally, includable only in the interaction regression for simultaneity reasons, a time dimension with controls for the ultra-poor poverty strata of households in 2007 was included. Concerning the poverty status in 2007, being part of the relatively better-off poverty strata III in 2007 is as seen from *est2.1* in *table 3* associated with a significantly higher food intake at the end of the period. As expected, ultra-poverty therefore seems to be static to some extent. In this respect, it is interesting though that the influence of 2007 poverty strata is dampened significantly by the asset transfer: As *table 3*, *est2.1* and *est2.5* show the effect of 2007 poverty status is significantly (at 10% and 1% level respectively) lower for project-participants. Fears, the poorer strata II cannot be aided without massive interventions of

⁴¹ But not concerning asset ownership, financial management, chore allocation, working hours and overall “empowerment”.

⁴² Such as the UN WFP and GOB's vulnerable group development program, aiming to “reduce chronic food insecurity of millions of extremely poor households by providing them with 31.25 kg of wheat each month for a two-year period“ (Matin & Hulme 2003: 653).

⁴³ Such as mosquito net distribution programs or savings account provision.

⁴⁴ While concerning GO/NGO support it might have been that only the poorest members receive benefits, leading to a negative correlation with food security, among a sample of ultra-poor this might not play a role. Additionally, many poverty alleviation programs are directed at higher stratas of the poor. GO/NGO support therefore can only imply a correlation.

⁴⁵ The exclusion of controls for household characteristics does not change these results.

livelihood protection (EC 2001), can be dismissed in the context of IFSUP. Read the other way around, the project, as envisaged, successfully enhanced the livelihoods of both stratas of the workable ultra-poor to a quantitatively similarly secure food status – it has to be taken into account, though, that further controls especially concerning the quality of meals would have to be included before finally adhering to this finding.

5.1.3 Discussion and Methodological Issues

The above evidence seems to confirm a significant effect on food security of project beneficiaries. Additionally, correlates of ultra-poverty like marginalized minority status, low education, low income, lacking social assistance or a bad start off point are confirmed – others are inconclusive, like female headedness or household size. Most troubling is the year effect in the impact regression – it runs contrary to theoretical and empirical expectations. Further research into its causes is needed, as it could as well shed light on the poverty dynamics surrounding the ultra-poor. The question of control group drop-outs is especially problematic in this respect.

Problematic as well is the lack in variance of the dependent variable. For the 2009 data, it effectively ranges from 1.33 to 3, with a mean of 2.898 meals (sd 0.242) and the 25th, 50th and 75th percentile at 2.944, 3 and 3 meals respectively⁴⁶. This leads to ceiling effects where especially the interaction of control variables with group status is not conclusive for the overall project impact. While the project indeed seems to have managed to lift almost all ultra-poor to three meals per day, the relative success of the intervention in terms of reduced long term vulnerability might well differ by the respective subgroups, although this effect is hidden behind the ceiling of three meals per day.

5.2 Impact on mean asset status and cash flows

The crucial question regarding the success of the project is the sustainability of the project participant's asset base. *Figure 3* shows the development of mean asset levels (livestock and other assets⁴⁷) for the control and beneficiary group. The start-off point in 2007 was barely differing, but project beneficiaries arrived at much higher mean asset levels in 2009. While the increase in livestock values is remarkable only in respect that beneficiaries seem to not have sold their transferred assets for quick wins, the increase in value of other assets indicates substantial build up of wealth over the two years. It is as well remarkable, that the mean value

⁴⁶ By group status, the 25th, 50th and 75th percentiles are differing considerably: 3, 3, 3 [range 2 to 3] for beneficiaries, against 2.25, 2.83 and 3 [range 1.33 to 3] for the control group.

⁴⁷ „Other assets“ include a variety of assets from productive ones to hut interior or valuables.

of livestock surpasses the mean value of other assets over all groups⁴⁸, hinting at the relative importance of livestock for the survival of ultra-poor households. It is important to note as well, that the increase in asset values for the control group, almost tripling in means, is hardly explicable from the data⁴⁹ – similar to the year effect in the impact regression, it could be an effect of circumstances just as well as an effect of the drop-out process. The interpretation of the year effect is additionally complicated, as positive spill-overs of the project on the control group can be expected, from the promotion of vaccination, increasing access to veterinaries as well as decreasing livestock disease prevalence, to the transformative impacts especially on government responsiveness to general equilibrium effects – wage rates could e.g. have increased by a reduction of labor supply from project beneficiary households.

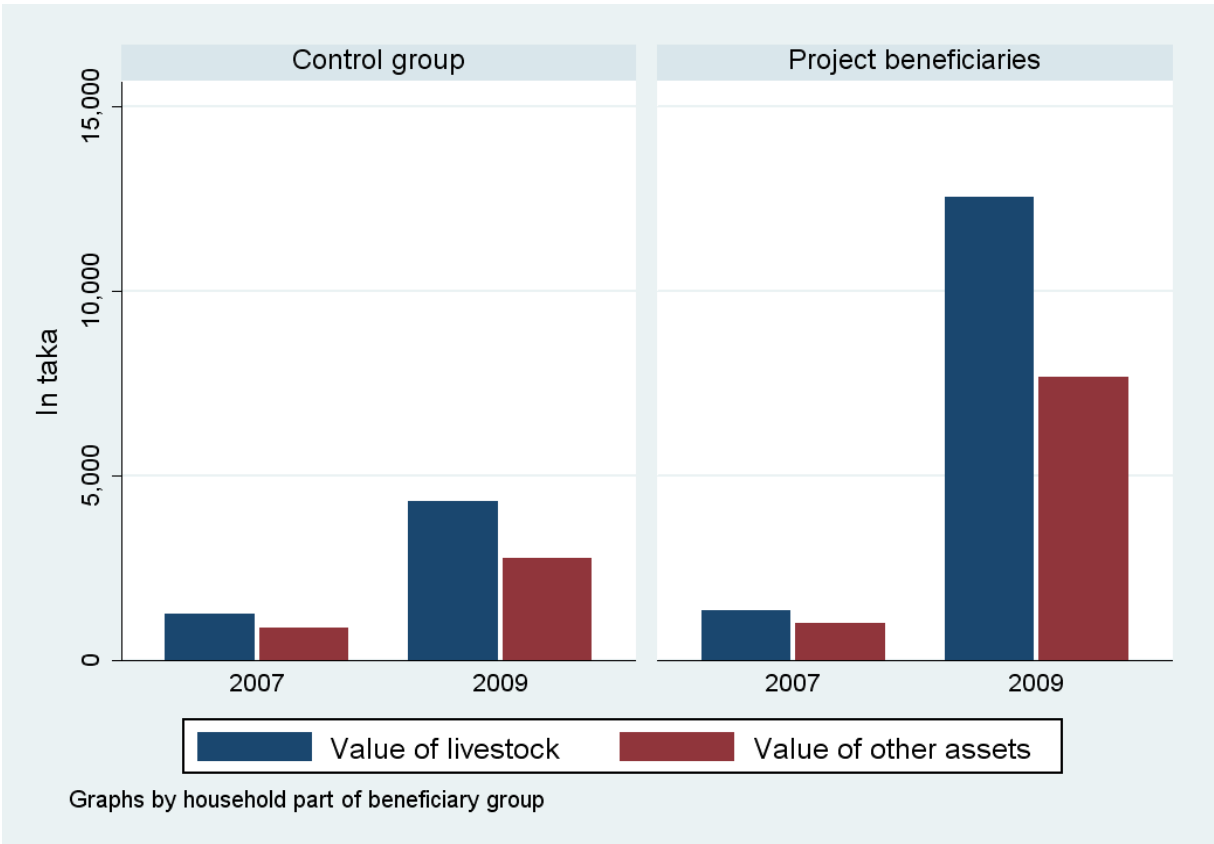


Figure 3: Mean values of livestock and other assets per household in both years by group status.

Nonetheless, in the short run, beneficiary households seem to have a buffer of assets to sell in case of crisis – the crucial question, whether they would as well be able to regain it without external support in case of loss is not directly answerable. But in this respect, *figure 4* gives some insights. It shows the development of mean credit and mean savings for the two groups over the years.

⁴⁸ Although landholdings and the value of homesteads is excluded in asset value determination.
⁴⁹ As potential explanation could e.g. serve the increase in mean credit for the control group in 2009 (*figure 4*).

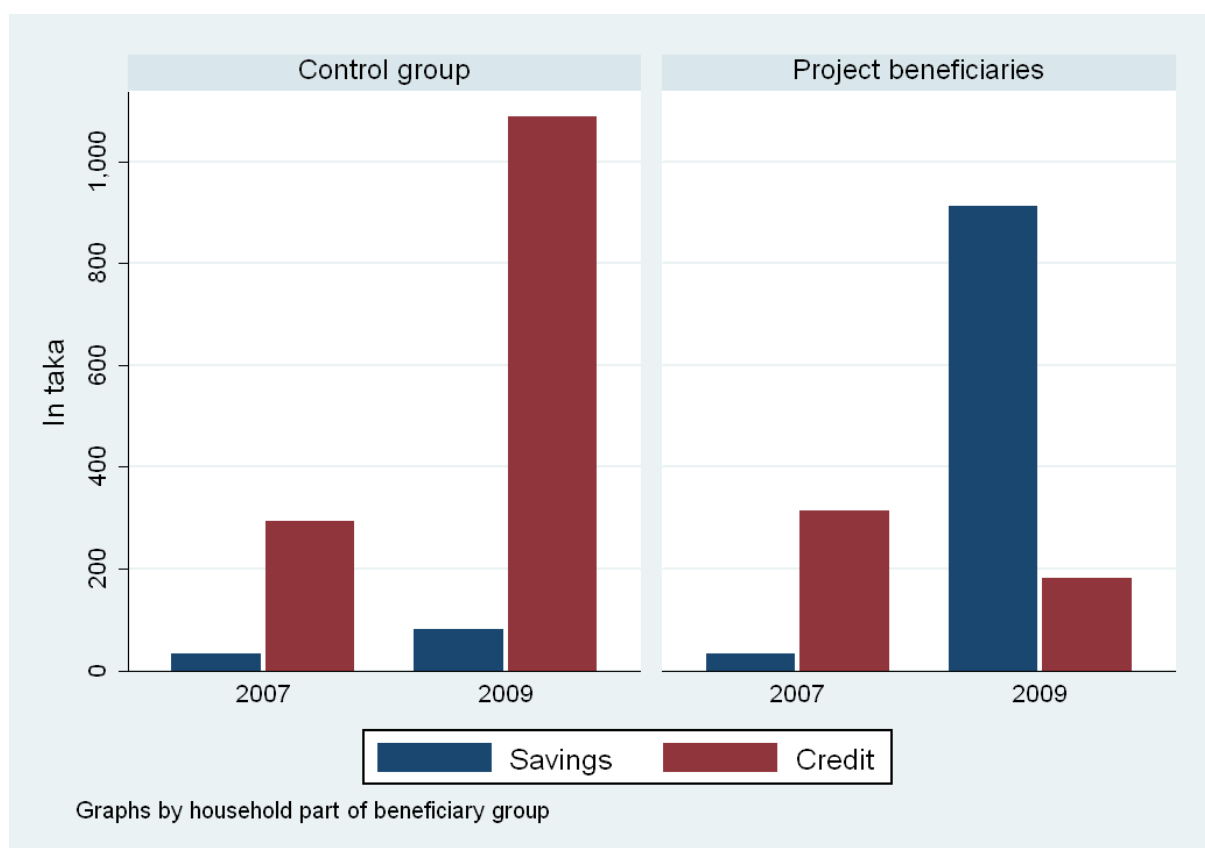


Figure 4: Mean saving and credit levels of households in both years by group status.

Again, the start-off point in 2007 is similar, but a reversal of trends occurred for the two groups: While for the control group, mean credit expanded by about four times, it reduced for the project beneficiaries. At the same time, for the group of project beneficiaries a significant increase in mean savings per household can be observed, to a total of just about 900 taka. Beneficiary households thus seem to have established with their group savings accounts a buffer of formal savings usable for coping with stress. This is especially important as it prevents the need to sell productive assets with each stress occurring – with prudential management, only shocks exceeding the savings base are threatening to throw households back into ultra-poverty.

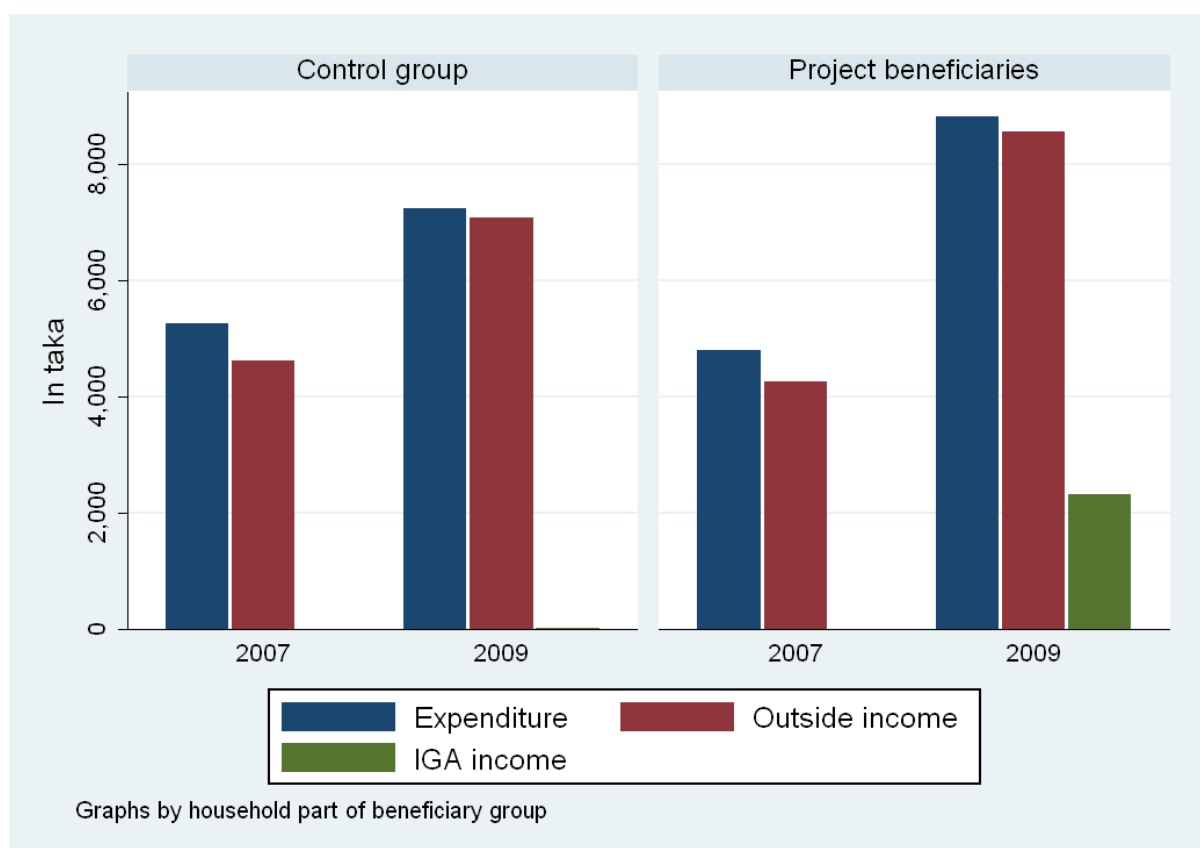


Figure 5: Mean per capita expenditures, per capita overall income and per capita income by IGAs in both years by group status.

In building up assets, the IGAs seem to have played a crucial role. The reported annual expenditure and annual income of households seems to follow a clear pattern: Households struggle to make ends meet, expenditure is in general tending to exceed income. This pattern seems to have reversed for project beneficiaries: The mean income in this group in 2009 over both IGAs and outside income exceeds mean expenditure. Households are only then able to save up, build assets and upturn the downward spiral of stress, second-best-coping-strategies and asset depletion.

While the presented figures are only indicative for mean developments, relying on adequate assessment of asset values by the respondents and their interviewers, they nonetheless add credibility to the claim that the project impact on food security was generated by successful self-employment and not by factors such as the sell of transferred assets or borrowing.

6 Conclusion

Overall, the gathered evidence suggests that an integrated poverty reduction strategy such as IFSUP provides a viable intervention for ultra-poor households in Bangladesh. A one-time subsidization of human and physical capital of households flanked by improving coping abilities and social enhancement can unleash the substantial productive potential of the most deprived section of society, the ultra-poor, where conventional poverty reduction programs fail. A combination of different pillars of social protection – promotion, prevention and transformation – can thus successfully overturn the tendencies locking the ultra-poor in their status. It has to be emphasized that different strata of the ultra-poor have profited similarly of the project: The especially hunger prone families of 2007 as well as female headed households. This finding is limited concerning ethnic minorities: Although their especially deprived situation was taken note of already in the planning process, the transformative aspects have not sufficed to offset their marginalization compared to other ultra-poor.

IFSUP still provides a positive example of pro-ultra-poor poverty reduction. Costs per unit of the IFSUP program amount to 245 € per household assisted, of which about 50% are direct asset transfer. This relates to 4,082 households per million € invested. But especially if taking into consideration the small scale of this project, with a total of 4,800 households supported, substantial economies of scale could be assumed in case of scaling-up of the scheme. Nonetheless, to reliably convince donor organizations – and in the end the taxpayers of European countries who are subsidizing the ultra-poor of northern Bangladesh in this case – the sustainability of results after several years has to be proven. It is therefore suggested to continue with the monitoring of both control and target group of the sample.

A design such as given with the positive example of IFSUP provides not the only viable pathway. Other innovative projects put even more focus on the preventional pillar in order to relief the ultra-poor of concerns for short-term food security (Emran, et al. 2009, Hulme & Moore 2008). They have in common that they use the productive potential of the ultra-poor to achieve security for their livelihoods and at the same time show how successful social protection and fostering of economic development can go hand in hand, combining enhanced efficiency and equity, and thus making it a viable strategy for achieving MDG1. For the respective project *upazilas*, 10% of ultra-poor households can be expected to have been lifted above the upper poverty line – an approach open for replication elsewhere.

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Appendix

Appendix 1: Tables

Table 1: Description of the ultra-poor project population, beneficiary and control group in 2007.

	(1) Overall population		(3) Partici- pants	(4) Deviation of control group	t-statistics
	mean	sd	mean	deviation	
Group II Poverty status	0.612	0.487	0.626	-0.070***	(-4.46)
<i>Adibasi</i> Ethnicity	0.496	0.500	0.498	-0.013	(-0.81)
Average meals per month	1.948	0.264	1.946	0.115	(1.34)
Homestead size (in <i>decimal</i>)	4.344	3.281	4.275	0.342***	(3.23)
Household size	3.907	1.505	3.953	-0.230***	(-4.75)
Female headed household	0.224	0.417	0.215	0.044***	(3.29)
Amount of households's credit at point of interview	310.250	728.898	314.583	-21.667	(-0.92)
Amount of households yearly savings	32.875	140.474	32.883	-0.041	(-0.01)
Secondary+ education of household head	0.096	0.295	0.098	-0.007	(-0.72)
Class 3-5 education of household head	0.087	0.282	0.090	-0.014	(-1.58)
Class 1-2 education of household head	0.076	0.266	0.078	-0.006	(-0.70)
Signature-only education of household head	0.521	0.500	0.526	-0.026	(-1.59)
No formal education of household head	0.219	0.413	0.208	0.053***	(3.97)
Total household's yearly wage income	15790.0	5836.3	15950.2	-800.8***	(-4.26)
Household's per capita yearly wage income	4277.6	1533.4	4208.8	343.6***	(6.97)
Membership of household in any GO/NGO program	0.020	0.141	0.023	-0.014***	(-3.03)
<i>N</i>	6000		4800	1200	

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Difference-in-difference estimation of the impact of the IFSUP project on food security measured as average meals per day with different specifications.

	est1.1	est1.2	est1.3	est1.4	est1.5
Household part of beneficiary group	-0.0115 (-1.34)	-0.0119 (-1.50)	-0.0122 (-1.54)	-0.0148* (-1.88)	-0.0168** (-2.12)
Year 2009	0.574*** (40.24)	0.570*** (40.31)	0.569*** (40.31)	0.570*** (40.47)	0.538*** (37.22)
Project Impact (interaction year & beneficiary status)	0.448*** (30.12)	0.453*** (31.02)	0.454*** (30.99)	0.445*** (30.49)	0.424*** (29.38)
Household size			0.00490*** (3.35)	0.00449*** (3.09)	-0.000613 (-0.41)
<i>Adibasi</i> Ethnicity			-0.0485*** (-5.82)	-0.0560*** (-6.64)	-0.0648*** (-7.68)
Female headed household			0.00394 (0.67)	0.0150** (2.51)	0.0266*** (4.40)
Secondary+ education of household head				0.0835*** (8.72)	0.0826*** (8.68)
Class 3-5 education of household head				0.0669*** (7.32)	0.0640*** (7.02)
Class 1-2 education of household head				0.0577*** (8.21)	0.0550*** (7.88)
Signature-only education of household head				0.0408*** (3.75)	0.0385*** (3.56)
Log total wage income					0.0500*** (9.72)
Membership of household in any GO/NGO program					0.0361*** (6.45)
Geographical controls	<i>Not included</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
Constant	1.957*** (256.39)	2.011*** (222.72)	2.009*** (178.68)	1.965*** (160.25)	1.508*** (30.89)
<i>N</i>	11638	11638	11632	11632	11572
<i>R</i> ²	0.822	0.832	0.833	0.835	0.836
F	23899.3	9680.9	7195.3	5365.0	4798.8

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Difference estimation on the 2009 data for the effect of interaction terms on food security measured as average meals per day.

	est2.1	est2.2	est2.3	est2.4	est2.5
Household part of beneficiary group	0.459*** (28.01)	0.421*** (12.61)	0.521*** (26.26)	0.436*** (33.71)	0.553*** (13.49)
Group III Poverty status	0.0610** (2.56)				0.0685*** (2.88)
Interaction: Group status & poverty status	-0.0443* (-1.83)				-0.0662*** (-2.72)
Household size		-0.00178 (-0.22)			0.000253 (0.03)
Interaction: Group status & household size		0.00405 (0.50)			0.000306 (0.04)
<i>Adibasi</i> Ethnicity			0.0651** (2.53)		0.0688*** (2.63)
Interaction: Group status & ethnicity			-0.151*** (-6.20)		-0.155*** (-6.23)
Female headed household				-0.0166 (-0.48)	-0.00416 (-0.12)
Interaction: Group status & female-headedness				0.00658 (0.19)	-0.00630 (-0.18)
Geographical controls	<i>Included</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>
Constant	2.427*** (129.52)	2.463*** (71.70)	2.412*** (113.48)	2.458*** (157.50)	2.379*** (57.71)
<i>N</i>	5715	5722	5716	5722	5711
<i>R</i> ²	0.465	0.463	0.481	0.463	0.484
F	184.5	185.0	193.3	185.8	111.4

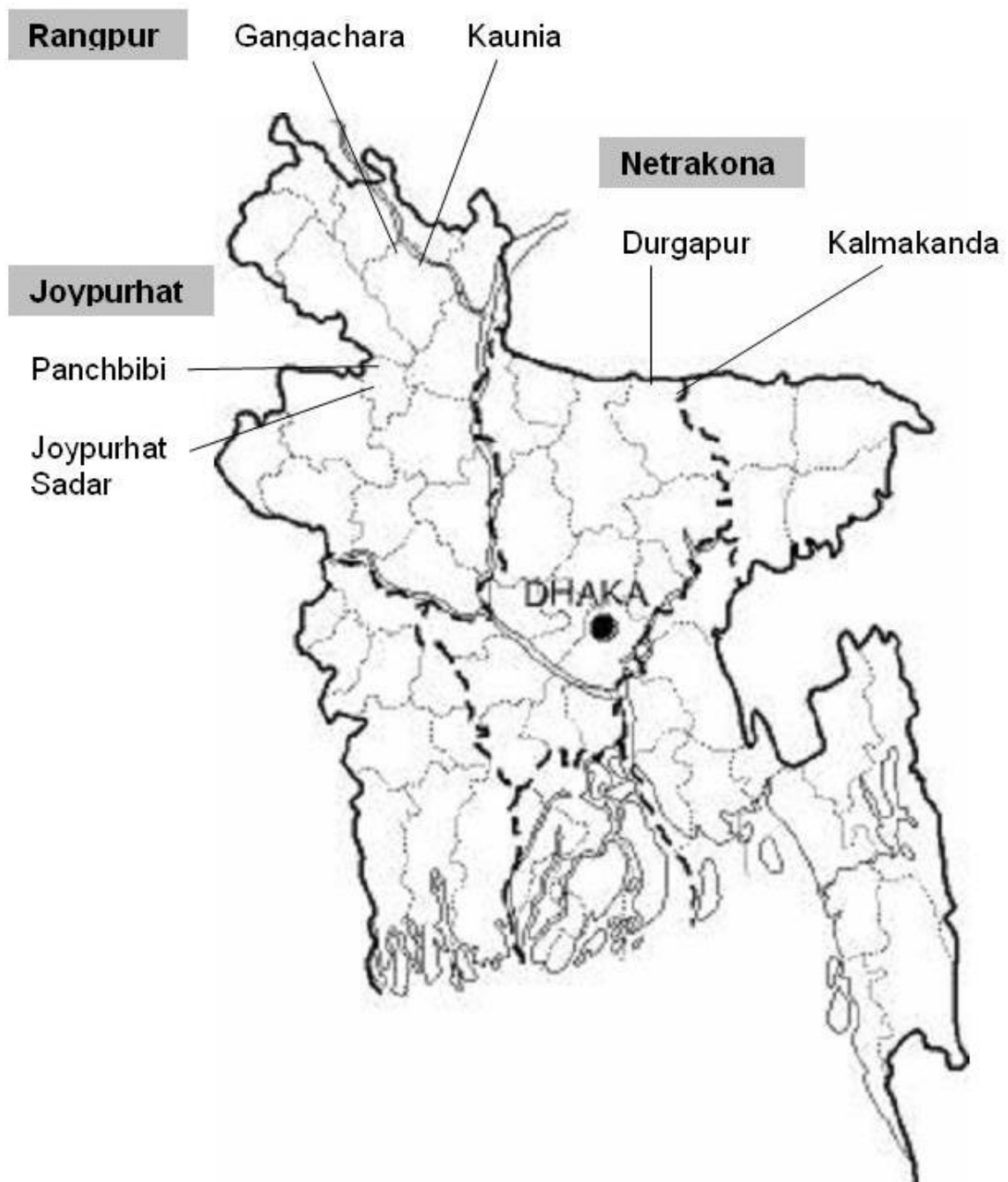
t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Difference estimation on the 2009 data for the effect of additional interaction terms on food security measured as average meals per day.

	est3.1	est3.2	est3.3
Household part of beneficiary group	0.510 ^{***} (17.33)	1.794 ^{***} (6.62)	1.736 ^{***} (6.36)
Secondary+ education of household head	0.0148 (0.22)		0.00478 (0.07)
Class 3-5 education of household head	0.162 ^{***} (3.33)		0.126 ^{***} (2.59)
Class 1-2 education of household head	0.143 ^{***} (2.73)		0.126 ^{**} (2.45)
Signature-only education of household head	0.0862 ^{***} (2.71)		0.0577 [*] (1.81)
Interaction: Group status & secondary education	-0.00577 (-0.09)		0.00664 (0.10)
Interaction: Group status & class 3-5 education	-0.153 ^{***} (-3.11)		-0.117 ^{**} (-2.36)
Interaction: Group status & class 1-2 education	-0.143 ^{***} (-2.65)		-0.125 ^{**} (-2.37)
Interaction: Group status & signature-only education	-0.0832 ^{**} (-2.53)		-0.0552 [*] (-1.67)
Log total wage income		0.156 ^{***} (5.80)	0.146 ^{***} (5.31)
Interaction: Group status & total log wage income		-0.133 ^{***} (-4.91)	-0.122 ^{***} (-4.42)
Membership of household in any GO/NGO program		0.0874 ^{***} (3.75)	0.0837 ^{***} (3.59)
Interaction: Group status & formal GO/NGO support		-0.0912 ^{***} (-3.87)	-0.0873 ^{***} (-3.71)
Controls for household characteristics	<i>Included</i>	<i>Included</i>	<i>Included</i>
Geographical controls	<i>Included</i>	<i>Included</i>	<i>Included</i>
Constant	2.392 ^{***} (76.80)	0.882 ^{***} (3.28)	0.930 ^{***} (3.44)
<i>N</i>	5711	5651	5651
<i>R</i> ²	0.475	0.488	0.492
<i>F</i>	86.71	114.9	74.94

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix 2: Map of Bangladesh wit Target Districts (grey) and Upazilas of the IFSUP Project



(Source: NETZ, <http://www.bangladesch.org/pics/download/IFSUP-Lessons-Learnt.pdf>)