Does heterogeneity in program intensity matter?

Supplementary Feeding Program Evaluation in Indonesia

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Abstract

This paper evaluates 'an almost universally distributed' supplementary feeding program. The use of simple binary program may not reveal sufficient variation to identify program effect. So, taking advantage from detailed information on program implementation in the data set, this paper uses proportion of child's life exposed to the program to reveal variation in program intensity. This enables us to proceed further to deal with endogenous program placement: excluding the non-treated children and focusing estimation of program effect on treated children. The main findings follow. First, although the program was almost universally distributed, there was high variation in program intensity across communities. In addition, the distribution of program intensity appeared to be non-random as indicated by the importance of several observed community characteristics as well as regional unobserved heterogeneity. Second, program appeared to be effective in maintaining nutritional status of children –including those with worst initial nutritional status. Its effectiveness however benefited only some segments of the group.

1. Introduction

Growing number of studies has established a link between nutritional status during early childhood and physical growth failure, delayed motor development, lower IQ, and low educational achievement. Similar literature has shown the association between better health and nutritional status during first few years of life with better health for young adults –which later matter in determining individual's incomes or wages (see Alderman et al 2001, Alderman, Behrman and Hoddinot, 2005, Alderman, Hoddinot and Kinsey 2006, Glewwe, Jacoby and King 2001, Glewwe and King 2001, Maluccio et al 2005, and Martorell 1999, Strauss and Thomas, 1998). These findings provide a motivation for governments in many countries to establish programs that attempt to prevent malnutrition during early childhood in order to avoid such short- and long-term adverse effects.

Indonesia is no exception. A set of community health programs that focused on child and mother's health have been introduced since mid 1980s in various villages. These programs include placement of village midwives and establishment of integrated child health services clinics (Pos Pelayanan Terpadu, Posyandu). Midwife program was designed to address basic health issues particularly among women in reproductive age. Some studies have evaluated the importance of such program and found that the placement of a village midwife improved the health of women between 15-49 years old and children between 1-4 years old (see Frankenberg and Thomas, 2001 and Frankenberg, Suriastini and Thomas, 2004). The establishment of Posyandu was aimed at maintaining children's –particularly those who are under 5 years old—health and nutritional status through growth monitoring, providing basic preventive health services and nutritional supplementation.

Public attention to welfare of children was intensified when economic crisis hit Indonesia in 1997/98. Government of Indonesia (GOI) launched a set of social safety net programs to cushion the adverse effects of the crisis. The safety net programs covered some important socio-economic areas such as food security, employment, and child education and health/nutritional status. A program that focused on maintaining child health and nutritional status was the supplementary food program (Program Makanan Tambahan, PMT), which was aimed at protecting nutritional status among children under 5 years and the health of pregnant women from adverse effect of the economic shock.

This study aims at evaluating the effect of supplementary feeding program on child health and nutritional status in Indonesia during 1997-2000. We estimate the 'intent-to-treat' effect of the program. This means quantifying the effect of program availability within the community on the targeted individuals regardless whether they participated in the program.[1] Our data come from the two sets national panel data from Indonesia Family Life Survey (IFLS-2 and IFLS-3) that covers pre- (1997) and post-crisis (2000) periods. IFLS-3 collected detailed information on implementation of Social Safety Net programs including PMT. From the use of this rich household and community panel surveys, we expect to contribute to the current literature in program evaluation in two ways.

First, to the best of our knowledge, this is the first study that uses a nation-wide panel survey to evaluate Indonesia's public program on child nutrition during the 1997/98 crisis period. The focus on crisis years should be of interest to researchers as well as policy makers since some studies have shown that there was no significant decline in Indonesian children's health

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[1] Using an 'intent-to-treat' approach in evaluating the effect of a program has some advantages relative to the use of actual participation indicator. Particularly the approach avoids the complication raised by the fact that participation of an individual is not exogenous.

and nutritional status during the crisis period (see for example Block et al, 2005, Frankenberg, Beegle and Thomas, 1999, and Strauss et. al. 2004)[2]. The natural question that arises from these findings is whether public programs such as PMT which focused on child health helped to prevent such decline in child health/nutritional status.

Second, using Indonesia as the object of study in evaluating the effect of nutritional program may produce importance policy implication for the county in short and long-term. Strauss et al (2004) report that, while evidence shows an improvement in child health, the level of stunting –an indicator of an extreme malnutrition—in Indonesia in 2000 was remain in the high 30s percent which is comparable with many low-income countries in sub-Saharan African. Identifying the effectiveness of such nutritional program may reduce the severity of the problem in the short-run and benefit the country in the longer-run.

Third, to date, the majority of the studies in the program evaluation literature use a single binary indicator of program exposure. Taking advantage of detail information on the program implementation in IFLS3, we exploit the variation on the intensity of program exposure across communities to estimate the impact of the program. The utilization of

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[2] Strauss et al add further that the evidence constant child health from two IFLS studies (Frankenberg et al, 1999 and Strauss et al, 2004) may be due to 'improper' timing of surveys with, if any, the events of negative shock on child health. While IFLS2+ in 1998 might be too early to detect the negative change of the shock in child health, IFLS 3 in 2000 might be a little too late to capture it. In addition, they also hypothetically proposed some potential explanation while there was no strong evidence on the decline of child health during crisis period, such as worse child health in pre-crisis period due to drought, and birth and/or mortality selection.

program intensity as program exposure variable should reveal a more detail information on program impact.

In addition, the use of this program exposure indicator enables us to deal more with bias from non-random government program placement. Particularly, the variation in program exposure allows us to exclude children who lived in communities without program and thus let us to compare program outcome only on targeted children who lived in exposed communities. This approach should address selection bias from endogenous program placement since we now focus our evaluation only among the treated sample.

This paper is organized as follows. In section 2, we will highlight some findings from previous studies on program evaluation particularly that focused on Indonesia, and show where this essay contributes to this literature. Section 3 will provide a description about the program and how it was distributed. Section 4 explains the analytical framework, which is then followed by discussions of about the data in section 5. We discuss empirical strategy and potential estimation issues in section 6. In Section 7, we present and discuss the results. The paper is concluded in section 8.

2. Previous Evaluation Studies on Indonesia Public Health Program

The effectiveness of post-crisis Indonesia supplementary feeding program has been evaluated in some previous studies. Yet some methodological flaws lead to some doubts on the validity and accuracy of estimated program effect in those studies. For instance, Sandjaja et al (2001) compare the change in standardized anthropometric measures between children who were given supplementary food and those who were not during three periods: pre-, during and post-intervention. They show that the period of intervention corresponds with improvement in (change of) nutritional status for treated children. However, while recognizing that the program was targeted more toward less healthy children, they do not particularly address potential bias from this endogenous program placement. Their cross-sectional data only allows them to control for post-intervention characteristics of sample. Accordingly their approach to match between the control and the treated groups could only be done using post intervention characteristics and thus do not reflect comparability before intervention took place. Other studies have faced similar problems: data inadequacy to implement correct procedure and deal with issues in estimating program effect.

In broader field –public health programs—some exceptions include Frankenberg (1995), Frankenberg and Thomas (2001), Frankenberg, Suriastini and Thomas (2005), and Gertler and Molyneaux (1994). With the access to better data set, they estimate program effect using fixed-effect or difference-in-difference approach to address endogenous program placement. Our discussion on strategy and results below are focused only on recent papers [see Strauss and Thomas (1995) for review of Frankenberg (1995) and Gertler and Molyneaux (1994)]

In order to identify the midwife's effect, Frankenberg and Thomas (2001), compare health status of women in primary age prior to the introduction of a midwife in a community with the health of the same individuals after the program. They argue that the program effect may be contaminated by two sources of unobserved heterogeneity: individual and community. To deal with first unobserved heterogeneity in individual level they estimate change in health status. First-differencing health status gets rid of individuals' heterogeneity which is typically assumed to be constant across time. They also control for community fixed-effect to sweep out any time-invariant unobserved heterogeneity at the community level that are correlated with placement of midwives. In addition, they argue that the program effect may leak to some non-targeted groups. Accordingly, they include more control groups such as primary age males and older males and females, and calculate the net program effect and identify the leakage. Their findings indicate that the midwife program increases body mass index of women in reproductive age by 0.20 more than of older and reproductive age men. They also show that the program in fact has spillover benefits to the older women.

Meanwhile, Frankenberg et al (2005) argue that comparing health status of children residing in a community with a midwife with that of their counterparts living in a community without a midwife is difficult to interpret due to confounding impact of the selective assignment of midwives. Accordingly, to measure the midwife effect, they compare the height-for-age of young children cohort (up to 4 years old) who were exposed to a midwife during that age with that of older age cohorts who lived in the same community but who were not exposed to a midwife when they were young. Their findings show that children who were fully exposed to a midwife during early childhood had significantly better height-for-age scores than older children who lived in the same community but were not exposed to the program.

However, while their strategy may adequately address bias from endogenous program placement, the validity of their program effect still relies implicitly on the assumptions that: (i) the program was implemented homogenously in term of level/duration across communities, and (ii) the effect of observed program was not correlated to the other public health programs that were already available and change with it. Indeed, in contrast to the first assumption, in reality the program might be implemented with various types of subprograms or heterogeneous intensity (duration, supplies, etc). If this truly occurred, those studies might either overstate or understate the effectiveness of program effect.[3]

[3] The use of program intensity as a measure of program exposure variable has been in the literature for sometime (see Rosenzweig and Wolpin, 1986), but its popularity –and importance—has just been growing recently (see Dulfo 2001, and more recently, Gertler 2004, Behrman et al 2004, and Armecin et al 2006). Gertler (2004) provides direct

Regarding the second assumption, Pitt et al (1993) argue that program placement is sensitive to regional distribution of other existing programs nearby, and thus it is important to control correlation between the program and other program that already available. Their result indicates that the proximity of school and health programs altogether significantly affect the school attendance of teenagers. Duflo (2001) also shows that controlling for other existing programs that were correlated with the program being evaluated makes the estimated program effect higher.

In sum, few studies have evaluated the effectiveness of public health programs in Indonesia with a robust approach and proper data set. Yet limited information on program implementation and distribution of other identical programs restricted these studies' identification strategy and only allowed them to assume that the program was distributed with homogenous intensity across regions. Our study addresses those limitations by taking into account heterogeneity in program intensity and distribution of other similar programs –while at the same time attempting to properly tackle non-random program placement. We utilize detailed information on program implementation to reveal the heterogeneity in program exposure and exploit it to quantify the effect of the supplementary feeding program. In addition we

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comparison of program effects from the two types of program variable –single binary and multiple binary program variables—and shows that both types of program indicators yield significant parameter of program effect, yet using multiple dummy for length of program exposure generates more detailed and insightful parameters of program effect. We also argue that continuous program exposure variable enables us to estimate the effect of marginal change in program length or the optimal rate of program exposure –which are aspects of evaluation that might be of policy makers' interest.

also control for access to other public programs to eliminate potential contamination when identifying the program effect.

3. Conceptual Framework

Following Rosenzweig and Wolpin (1986), a simple framework is illustrated to model the effect of the program on child nutritional status taking into account heterogeneity in program exposure. It assumes that preferences of household members are inter-temporally separable and in current period it maximizes a quasi-concave utility function over some goods, services and health status of children:

$$\max_{X,H} U^i(X^i, H^i; Z^i) \qquad (1)$$

where X^i is a vector of consumptions of goods and services of child i, H^i is child health/nutritional status, and Z^i represents a vector of household characteristics. The production of health/nutritional status, H^i, is characterized by the following production function:

$$H^i = h(N^i, X^i, Z^i, \mu^i) \qquad (2)$$

in which, child health is a function of per child health inputs N^i, household characteristics Z^i, and community characteristics μ^i–both observed and unobserved. This maximization problem is also subject a budget constraint which sets that total consumption of goods and services as well as health inputs cannot exceed total income:

$$Y^i = p_x X^i + (p_n - s_n)N^i \qquad (3)$$

where Y^i is total income, p_x is price of goods and services X^i, p_n and s_n respectively are price and subsidy of health input N^i.

Then solving the optimization problem in equation (1) conditional on equation (2) and (3) yields a reduced-form health/nutritional outcomes function for each individual within the household:

$$H^i = h(p_x, p_n, s_N^i, Y^i, \mu^i) \qquad (4)$$

Our interest here is to identify the impact of public nutrition program on child nutritional status. Using equation (4) we can predict program impact as follows:

$$\frac{\partial H^i}{\partial s_N^i} = \frac{\partial H^i}{\partial N^i}\frac{\partial N^i}{\partial s_N^i} + \frac{\partial H^i}{\partial X^i}\frac{\partial X^i}{\partial s_n^i} + \frac{\partial \mu^i}{\partial s_N^i} \qquad (5)$$

Equation 5 tells that the effect of the program (subsidy) on health or nutritional status can be decomposed into three components. First is the subsidy effect of nutritional inputs through a change in demand/consumption of nutrition inputs (price effect). Second component is a change in child nutritional status of program (subsidy) through relocation of resources within household. Literature has recognized that some nutritional intervention programs appeared to be ineffective when parents relocated some nutritional resources away from treated children to other household members.

The third term is bias which exist when the size of subsidy, s_N, is affected by unobserved characteristics (for researcher) of children or a community μ. The sign of the bias is ambiguous. It is negative when government or program distributor follows compensatory principle –when program is distributed more to the less-endowed areas—which thus potentially understate the true effect of the program. Conversely, if program was distributed more to better endowed areas, the sign of bias becomes positive and the estimated program effect overstates the true one. Thus unless program s_N allocation is independent of unobserved heterogeneity μ , the estimation of program effect should take into account the correlation between the two.

4. Nutritional intervention for children during economic crisis.

The goal of supplementary feeding PMT program was to protect nutritional status of targeted individuals, particularly children in preschool age from poor households from negative impact of 1997/98 economic shock.[4] The targeting of the program was made in, at least, two levels. At first, central and regional government decided which community or villages received the program. The targeting decision in this level involved two stages: (i) governments determined the placement of the program, and (ii) they decided the length and intensity of the program in each village. Then, once a community has been determined to receive the program and how low they

[4] A 'regular' supplementary feeding program, with less coverage and intensity, had been introduced prior to the crisis. In contrast to post-crisis supplementary feeding program, the pre-crisis program was a universal program and distributed solely through Village Integrated Health Post (*Pos Pelayanan Terpadu,* Posyandu) –in which a village typically has (at least) one Posyandu. Posyandu usually provide supplementary food once a month –along with some basic health services—to preschool age children and pregnant women residing around the post.

would receive it, the funding would be distributed through a public health clinic (Pusat Kesehatan Masyarakat, Puskesmas), and a list of eligible children to receive supplementary food then were prepared.[5]

The program provision was under supervision of village midwife which also coordinate the whole health Social Safety Net in the community. If village midwife was not available within the community, a Puskesmas staff took her responsibility. [6] The data shows that about 62% community had village midwife as caretaker of the program and in majority of the rest (about 35% of the sampled communities), it was supervised by a health clinic staff.[7] The program provision was provided and distributed to the member of community through several different providers. IFLS data shows that in majority of community the program were carried out by Posyandu. Other than Posyandu, village midwifes and village women association (Program Kesejahteraan Keluarga, PKK) play a role in delivering the program to the members of the community.[8]

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[5] IFLS data shows that although village midwife was mainly responsible for handling the program, a number of parties, such as village head/officials, family planning workers, Puskesmas staffs, and community activists, involved in preparing a recipient list.

[6] Village midwifes are health workers that trained to be publicly assigned to provide basic health services in community or village level. Their work are coordinated and supervised by the head of Puskesmas which their scope of services include one kecamatan –an administrative area which is one level above village.

[7] The policy that the program was handled by the midwife may raise an issue in identifying the effect of the program: how to isolate it from the effect of other (health) services offered by the midwife. Fortunately, the fact that in some village program was handled by the midwife and in some others was not can help us to distinct the program effect from the effect of other midwife's services. We will talk in more detail about this in empirical section.

[8] Despite the significant role in food supplementary program delivery, some services in Posyandu experienced a decline during period 1997-2000. Strauss et al (2004) find that provision of oralit in 2000 decreased by 9.4% while child growth monitoring service in 2000 was lower by 14.1% compared to provision in 1997.

The program targeted poor children between 6-59 months and pregnant women. It particularly divided targeted children into several sub-groups: (i) infants (6-11 months old), (ii) young children (12-23 months old), (iii) children (24-59 months old) and (iv) pregnant women. Majority of communities/villages have received particularly the program for children at least once during period 1998-2000. The data also indicate that the program served individuals other than those groups –children 5-14 years old, women in reproductive age, elderly and adult male.

The program was introduced for first time in the early of 1998 but it did not take in place in every community all at one time. The program coverage, as indicated in table 1, was low at the beginning of the crisis (the end of 1997 or early 1998) –as ongoing fiscal budget in 1997/1998 did not anticipate the economic crisis.[9] It was on the following fiscal year (1998/1999)[10] that coverage of the program reached almost 70% and then further increased to almost 90% in 1999/2000 fiscal year, before it went down to 80% in first half of 2000/2001 fiscal year. Overall, most of the sampled communities (97.36%) have received the program after the beginning of the crisis until the end of 2000.

Table 1 also shows that the program might take place in one community for more than one fiscal year. Among communities that received

[9] The national budget plan (fiscal year) in Indonesia prior to year of 2001 was started at April 1st and ended at March 31st. After 2001, the government of Indonesia adjusted their fiscal year to begin as calendar year.

[10] Pritchett et al (2002) even mention that initial fiscal year 1998/1999 did not include a post for emergency program to broadly cope with negative impact of crisis. It was on July 1998 that the ongoing budget was revised and thus contained an item for Social Safety Net Program.

the program, more than half of them received it three times (three consecutive years). Meanwhile a slightly more than quarter received the program twice (two years) and about one tenth of them received it once.

One important note is that the program predominantly was placed more in urban rather than rural communities during the observation years. Similarly, urban communities in average also received program more frequently. More urban communities received program thrice and twice during observation periods than rural communities.

The program manual guided that, for infants (6-11 months old), the supplemental diets were given in the form of soft meals to supplement breast milk, in which nutritional compositions per 100 grams of food must fulfill 360-430 Kkal of energy and 10-15 grams of protein. For young children (12-23 months old) and children between 24-59 months old, the supplementary food was a locally prepared snack with some nutritional compositions including energy (360-430 Kkal) and protein (9-11 grams).

Furthermore, according to guideline, the program discriminate the frequency and duration of the services provided for each of targeted groups. For infants between 6 and 11 months old, the supplementary food was given 3-4 times a day for 180 consecutive days. For older groups of children (12-23 months and 24-59 months), the supplementary diets were given for 90 consecutive days. The difference of services between the two groups of older children was that for young children, snack was given everyday (3-4 times a day) while for older children it was given once a week. As shown in the bottom line of Table 1, the length of program among communities with a program was on average 11.6 months. Consistent with the distribution of program, table 1 also indicates that, on average, the program length in urban is slightly longer than those in rural communities.

5. Data

The data used in this study come from two rounds (1997 and 2000) of Indonesia Family Life Survey which cover periods before and after the 1997/1998 Asian Financial Crisis. IFLS is an ongoing panel survey that collects data on various aspects of households/individuals' life. The survey also collects information about facilities and conditions in the community where these households and individuals reside such as socio-economic environment, physical infrastructures, health and education facilities, and many others.[11] In this study we link a community-level data on implementation of supplementary feeding program since the beginning of the crisis in 1998 with an individual-level data on nutritional/health status.

We focus on a group of children who were between 6 and 59 months in 1997 and 2000 and lived in IFLS sampled communities (2688 and 2612 respectively). The average age of these children in 1997 and 2000 were respectively 33.0 and 32.7 months.

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[11] Sampling and data collection methods of IFLS2 and IFLS3 can respectively be seen in Frankenberg, Beegle and Thomas (1999) and Strauss et al (2004).

As measures for child nutritional status, we use an anthropometric indicator that may capture the effect of shock on nutritional status in short and long-term named standardized height-for-age (HAZ). Anthropometric measures have been suggested as less problematic indicators –in term of measurement of error—of health relative to the other health measures[12]. HAZ reflect any events occurred on health of a child since born and measures long-term or chronic malnutrition changes in malnutrition. This may not be sensitive to sudden shock such as economic crisis, but if the magnitude of shock is large enough this measure might respond it overtime. We also use deficit in HAZ (under -2 standard deviation) --called stunting—to represent 'shortness'.

Anthropometric measures in this study are produced using a STATA ado program called 'zanthro' by Vidmar et al (2004). Using 'zanthro', standardized measures are calculated by comparing the actual measures in IFLS sample with those from US reference population as in 2000 Center for Disease Control and Prevention (CDC) Growth Charts.

Table 2 shows mean of standardized of height-for-age and proportion of stunting in 1997 and 2000 and their changes between the two periods. The table indicates little evidence implying the decline of child nutritional status particularly in for girls aged 24-59 months old as their HAZ score, on average, significantly lowered by a 0.11 standard deviation and stunting case

[12] In IFLS, height and weight are measured by trained health workers with regularly calibrated health equipment. Accordingly, we believe that measurement error is negligible in this case.

for this group significantly increased by 3.8%. But in on case we find the improvement in child health such as the decline in the proportion of stunting for girls aged 12-23 months by 7.3%. While in most of other cases, it shows that there were no significant changes in HAZ between 1997 and 2000.

Various reasons may explain why the change in child nutritional status during economic crisis period went on the opposite direction against conventional expectation. Block et al (2005) and Strauss et al (2004) are among the few which propose explanations toward this finding. Here we focus the investigation on the role an emergency supplementary feeding program might play in maintaining child nutritional status during period of shock.

Regarding the program, the data reveals that since 1998, more than 90% of the IFLS communities received the program, where in 1998, 1999, and 2000, the prevalence of the program was 71%, 93% and 82%, respectively. This program distribution creates a complication in assessing the program impact particularly when using simple binary program exposure (1 for exposed, 0 otherwise): we only have relatively small proportion of sample to be used as control groups. This proportion is likely even become smaller if we need to match between exposed (treated) and non-exposed (control) villages. In addition, as mentioned before, simple binary program exposure implicitly assumes that program was implemented with homogenous intensity. If program was implemented with different intensity, which is more likely to happen in reality, the use of single binary program exposure may lead to biased program impact.

To deal with these issues, we propose another measure of program exposure. We use program intensity variable to measure different program exposure across individuals in different communities. In IFLS3, the program informant was asked about details of program implementation such as the beginning and the ending date of the program for each targeted child groups: infant 6-11 months, young children 12-23 months and children 24-59 months.[13] We follow Rosenzweig and Wolpin (1986) approach in combining the information on child age and program duration at the time of the survey and use it to construct an index for program exposure intensity. This variable thus will be continuous, $\in \{0,1\}$, and measures a proportion of children's life that was exposed to the program.

The data reveals that the means of program intensity for each of those targeted groups (6-11 months, 12-23 months, and 24-59 months) are respectively 0.25, 0.20 and 0.13. In table 4, we further disaggregate that program exposure variable across various groups in 2000. Disaggregating the variable shows some gaps in program exposure between type of communities and also gender –particularly for infants 6-11 months.

Furthermore, it is important to notice that the program is not the only factor that may affect the child nutritional status. Some household as well as

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[13] IFLS3 data also reveals that majority of the communities remain to have program when the survey was conducted. In addition, in most of those communities, the program was introduced right when the crisis began in 1998.

community characteristics, both observed and unobserved, may also be determinants of child nutritional status. We therefore control for both types of characteristics. At the household level, we include mother and father height (to control for child health endowment), mother education, per capita expenditure, male head of household, whether is a household farm, number of female adults within the household, and whether household has access to own toilet, own sanitation, and free health services. In addition to household characteristics, we also control for community-level characteristics particularly that might be correlated nutritional status as well as with program placement. Here we include distance to district capital, length of paved asphalt road, whether the community has access to sewerage system, piped water and public transportation, and type of community. In addition we also include two community health programs that is likely to correlate with supplementary food program. Table 5 shows descriptive statistics for those household and community level characteristics.

6. Empirical Identification and Specification

Two facts about the program can be exploited to identify the effect of the program taking into account the heterogeneity in program intensity. First, program was initiated after the crisis hit the country in the late of 1997. Second, program targeted preschool aged children (under 5 year old) – and pregnant women—from poor households. Thus the date of birth of children (age of children), the program location as well as its starting (and ending) dates jointly determine intensity of program exposure to targeted children who reside in communities with the program. As we discussed in previous section, we then use a proportion of child's life that was exposed to the program to measure program intensity variable. We thus formulate an econometric specification to estimate the effect of different intensity of supplementary feeding program as follows:

$$H_{ivt} = \alpha_0 + \alpha_1 T_t + \beta PMT_{vt} * T_t + \delta_1 Z^h_{ivt} + \delta_2 Z^c_{vt} + \mu_v + \varepsilon_{ivt} \qquad (6)$$

where H_{ivt} is the outcome variable which is the nutritional status (using anthropometric measures) of child i living in community v at time t, T_t is dummy time period, PMT is program intensity variable, Z^h is household characteristics, Z^v is community characteristics, and μ is village fixed-effect.

As modeled in previous section, it is very likely that the government allocated the program based on some rules. So prior to estimating equation 6, it is important to know about government program placement rule. That is, to investigate whether or not program and program intensity correlate with some community-level characteristics, and, if so, what factors affect allocation of program and program intensity across communities. To do so, we estimate determinants of the availability and intensity of the program at the community level.

Estimating equation 6 to quantify the program effect therefore should take into account potential correlation between unobserved heterogeneity with both program availability and intensity. In the conceptual framework it is shown that program (subsidy) effect on child health/nutritional status is biased if program and program intensity are correlated with community-level unobserved heterogeneity.

We adopt two strategies to deal with this issue. First, we include (community) fixed-effect, time dummy as well as some observables both in household and village level that may affect child nutritional status. Community fixed-effect is a key in purging potential bias from correlation between program intensity and time-invariant unobserved heterogeneity. Time-dummy controls for common change in program outcome across periods that might be caused by factors other than time-variant unobserved heterogeneity and the observables. In addition, Z^h and Z^c respectively control for household and village level exogenous observables that may affect child nutritional status.

Our second strategy to deal with potential bias from endogenous program placement is to exclude sampled children living in communities without the program and to focus the identification only to targeted children living in exposed communities. If comparing the program outcomes between groups of targeted children who lived in exposed communities with those who lived in community without is likely to lead to selection bias, then comparing the outcome only among the treated should eliminate that concern.

After controlling for all of those factors, our program effect identification assumption is that the error term ε_{ivt} is uncorrelated with our program effect indicator, interaction between program intensity and time dummy. Given that assumption holds, â thus indicates the effectiveness of the program and should capture the effect of having longer exposure to the program on child nutritional status.

However there is a situation that may invalidate our identification assumption. The presence of supplementary feeding program in a community was likely correlated with other safety net programs such as free health services and/or basic health services provided by village midwife. Ignoring the presence of these other programs with our supplementary feeding program imply that we treat them as omitted variables and put them in error term, which thus may either over- or understate the program effect – depending on the direction of the relation among the programs. To deal with this concern, we include in our specification an indicator for availability of other programs that were potentially correlated with the presence of supplementary feeding program.

7. Results & Analysis

7.1. Determinant of Program Intensity

Prior to estimating program effect, we determine what factors affected program intensity across communities. As we discussed in previous section, although the program was designed as targeted program –that is to target particular communities and individuals, not for anyone in the community—, in reality, the program was 'almost universally distributed' one –as majority of communities received the program. So instead of looking upon the determinant of program placement –why one community received the program and the others did not—we investigate what factors affecting the program intensity –frequency and length of the program received by a community.

We first investigate what factors affecting the frequency of the program received by a community. We define a dummy variable of a community received program all three years during 1997-2000 and use those received once or twice during 1997-2000 as a based category. We estimate the probability of a community receiving program three times on a set of change in (community average) household and village characteristics using a probit model. Secondly, we estimate the determinant of program length across communities using similar set –but this time is in level—of covariates using pooled OLS. We compare the results from several specifications – those with and without provincial dummies.

The estimation result for the determinant of program placement is on table 5. It first shows that the regional (in this case is in the provincial level) dummies are important in explaining the distribution of program frequency. Two simple tests (not reported here) support this finding: (i) significant chisquared score of joint significant test of provincial dummies, and (ii) the omission of provincial dummies from the equation causes joint F-test tests result on insignificant overall explanatory variables. We also try different set of regional dummies which are district dummies (results are not reported here), but the results confirm the findings from the model using provincial dummies.

Second, change in average health/nutritional status of children under 5 years old appears to be matter in determining a community received the program three times. The significant and negative sign of the nutritional status change indicates that a community with worse change in children's nutritional status is more likely to receive program more frequently. The sign and significance level of the nutritional status parameter appears to be robust across different estimations and specifications. This implies that the program was distributed more to a community with less healthy and poorer children though per capita income appears to be unimportant for determining how many times in three years a community received the program. Among all community characteristics covariates, none of them but two are important. Two community characteristics –change in distance to closes post office and change in fraction of technical irrigation land— tend to support that notion. The positive and significant parameter of (change in) distance between village and the closest post office indicates that the further the distance the more likely a community received program more frequently. Furthermore, the larger a change in fraction of village land with technical irrigation the higher probability of a community received the program more often. It should be mentioned again that for most of the covariates in these models we use a change between the two years instead of level. Thus why a community with larger change in fraction of technical irrigation was likely to receive program more frequent probably because communities with such larger change were likely to be poorer in 1997 and thus were developed more intensively during 1997-2000.

For estimating the determinant of program length, we use pooled OLS and fixed-effect estimation techniques and compare the results. The covariates used in the two models are similar except that when using OLS technique, it does not control for differences in provincial level as it does in FE. In contrast with previous estimation, none of child health/nutritional status indicators matter. Table 6 also shows that neither (community average) height-for-age z-score of children under 5 years old nor proportion of same aged children with stunting problem were significant for determining program length in the community. The result from OLS and FE conform each other. Yet proportion of poor individuals (children under 5 years old) emerges to be significant. The negative sign tells that the more poor individuals in a community the longer the program stayed in that community. Some of community characteristics also appear to be important in explaining the distribution of program length across communities. Fraction of households in the community that have access to free low cost health services (using 'JPS health card') is positive and significant across different specification. This implies that government either use similar criteria as when distributing health card or use number of health card recipients to determine how long a community should receive the program.

Number of children under 5 years old in the community also appears to be consistently significant and strangely negative across specifications. This seems to diverge from what we expect: a community with more children under 5 years old is likely to have program that serve them in longer period. But this is probably because that variable does not actually differentiate between poor and non-poor children. At the same time we controlled for proportion of poor children in the community that emerged to be significant. So in net, this variable may represent only non-poor children which, if this is true, support the negative sign of the parameter. Two other community characteristics appear to be significant in one of specifications –fraction household in the community has access to private toilet and (average) education of household head—but become insignificant after we implement fixed-effect or control for some more community characteristics.

These results imply at least two things. First, regional unobserved heterogeneity –as indicated by the importance of regional dummies-- matters in explaining the distribution of program intensity across communities. Therefore estimating program effect, other than controlling for potentially important observed characteristics, needs to control for such unobserved heterogeneity particularly when such unobserved heterogeneity is thought to affect child nutritional status as well.

Second, the determinant of program frequency and program length appear to be different. While child nutritional status matter for determining how many times during 1997-2000 a community could received the program, child per capita expenditure is important in explaining the length of program in a community. This may reflect the fact that the decision about the two aspects of the program –distribution of frequency and length—was made in two different levels.

7.2. The effect of supplementary feeding program.

Findings from previous section show that some factors --observed as well as unobserved—were important in determining distribution of program intensity across communities. Though data show that the program might be placed to a community regardless their socio-economic status, such finding imply that program's intensity was non-randomly assigned across communities. Accordingly estimating the effect of the program –taking into account the heterogeneity in program intensity – should control for observed as well as unobserved heterogeneity that rule the distribution of the program. To capture for such heterogeneity, we control for community-level fixed effect. Including community-level fixed-effect estimation using panel data eliminates time-invariant unobserved heterogeneity that ruled program placement.

However, this procedure may not fully guarantee comparability of characteristics of sampled children lived in exposed and non-exposed communities, particularly, when there existed time-varying heterogeneity that determined program placement and program intensity. To deal with this issue, we then exclude sampled children who lived in non-exposed communities and comparing the program outcome due to program exposure only among children who lived in exposed communities (treated). This procedure mimics what matching method produces and thus handles potential selection bias from endogenous program placement. Finally, to address potential correlation between the program and other similar type of programs that already took place, we add in the estimated model an indicator for other available programs nearby to control for a correlation between those other programs and evaluated program.

Table 7 and 8 present summary of the program effect for all children and each of age groups on nutritional status (using height-for-age z-score) and proportion of stunting children. Tables that reported program effect along with other covariates are attached in the appendix of this paper. We find, as shown in table 7, that crisis should have negatively affected child nutritional status. The negative and significant time dummy parameters in table 7 imply that children who were under 5 years old in 2000 supposed to have worse nutritional status than their counterpart who lived in 1997. This may reflect the negative effect of the economic crisis on child nutritional status. There is little evidence that such negative effect also affected the proportion of stunting among children in 1997 and 2000. This supports results from table 2.

Table 7 also shows that program effect is positive and significant. The sign is consistent across models, but the size of the effect changes. Using all communities, fixed-effect estimation produces higher estimated of program effect than OLS estimation: an exposure to the program increase child height-for-age z-score by a 0.507 standard deviation (estimation from OLS is 0.1).

But, as mentioned earlier, these results may not be unbiased if there exists time-varying unobserved heterogeneity explaining the difference between the communities that received program and those that did not. To cope with this issue, we exclude children who lived in non-program communities and estimate program effect only among children lived in the treated communities. As we said, if endogenous program placement is an issue in determining which communities that received the program and which do not, then focusing estimation program effect only on treated communities should overcome that problem. It is worth also to mention that we need not really worry about number of observations to be dropped as proportion of treated communities is more than 90%.

Estimation results of program effect by excluding children lived in non-program communities are in column 3 and 4 of table 7. Consistent with previous estimate, results from FE estimation appear to be more superior to those from OLS. Estimating program effect only use treated sample also result on higher estimate of program effect. Fixed-effect estimation show that an exposure to the program increase z-score by a 0.554 standard deviation (higher than OLS estimation result which is 0.131).

Disaggregating the sample into several groups of children reveal further how effective the program was. It appears in table 7 (panel B – panel D) that the program mainly benefited group of children who were between 12-23 months (panel C). Program effect is positively strong and significant for three specifications on this group. For 24-59 months old children (panel D), the significant effect can only be found in one specification (OLS with all communities). While for infant 6-11 months (panel B), none of specification indicates the significant and positive effect of the program exposure.

The estimated effect of program exposure on proportion of stunting is in table 8. The results support and confirm what the results from table 7. Significant and positive time dummy seems to follow the story in table 7: the 1997-1998 economic crises appeared to increase proportion of stunting among children under 5 years old. The program, however, appeared to significantly reduce the proportion of stunting among children under 5 years old –and the positive effect of the program seemed off set the negative effect of the crises.

Estimation using FE technique shows that an exposure to the program reduces proportion stunting by 10.5% to 11.1% (panel A). Yet further examination reveals that the program was only effective in doing it for the group of 12-24 months old children (panel C). The program helped to reduce stunting proportion in this group by 24.8% to 33.8%.

8. Conclusions

This paper evaluates the effectiveness of supplementary feeding program in maintaining child nutritional status through the period of 1997-1998 economic crises. Motivating by the fact that the program was 'almost a universally distributed' program and by detailed information on program implementation, this paper utilizes the variation in program intensity to estimate program effect. The use of program intensity as indicator for program exposure brings at least two advantages in identifying program effect. First we believe that the use of program intensity indicator is more able to reveal the heterogeneity in program exposure rather than just simple binary one. Second, the use of program intensity enables us to implement one procedure to deal with endogenous program placement: excluding non-program communities and focusing estimation of program effect only on children lived in treated communities.

Our findings show that some community characteristics mattered in explaining distribution of program intensity and so did the unobserved heterogeneity. Yet the determinants of program frequency and program length –as two proxy of program intensity—were different. Other than in some community infrastructures, the difference in determinant was also found in main criteria. While child health status was important in explaining the distribution of program frequency, child welfare indicator (expenditure) mattered in determining program length.

Findings on the effect from program exposure show that the program was effective in maintaining the nutritional status of children –including those with worse nutritional status—through period of economic crisis. Yet its effectiveness mainly helped group of 12-23 months old children and there is little evidence that it also help the rest of the groups of children under 5 years old.

Our method to deal with endogenous program placement in intensity appears to work. Even after controlling for community fixed-effect and other similar type of programs, as we expected, excluding the non-treated children and estimating program effect only among treated children result on stronger program effect. This may imply that the results from FE estimation may remain biased particularly when time-varying unobserved heterogeneity is ignored.

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Table 1. Distribution of PMT across communities, 1998-2000

		Total	Urban	Rural
% of communities with PMT, 1998-2000		94.50	56.31	38.19
In 1998/1999 fiscal year		69.26	42.39	26.86
In 1999/2000 fiscal year		89.97	55.02	34.95
In 2000/2001 fiscal year*		80.26	47.57	32.69
Frequency of receiving program				
One time (%)		9.06	4.53	4.53
Two times (%)		25.89	14.89	11.00
Three times (%)		59.55	36.89	22.65
Length of program in a community with a program (in months)		11.6	12.0	11.0

Note: Sample of communities (n) is 303 (280 urban and 123 rural). (*) up to December 2000

Table 2. Standardized Height-for-age and Proportion Stunting, Children between 6 and 59 months in 1997 & 2000

	All Children			Boy			Girl		
	1997	2000	Change	1997	2000	Change	1997	2000	Change
All ages									
Mean	-1.44	-1.47	.03	-1.47	-1.47	.00	-1.41	-1.47	-.06
	(.03)	(.03)	(.04)	(.04)	(.04)	(.06)	(.04)	(.04)	(.06)
% of stunt	31.4	29.5	-.02	33.0	30.8	-2.2	29.8	30.3	.00
	(.01)	(.01)	(.01)	(.13)	(.13)	(.02)	(.01)	(.01)	(.02)
# of obs.	2688	2612		1370	1276		1318	1249	
6-11 mo.									
Mean	-.67	-.82	.15	-.54	-.75	-.22	-.82	-.89	-.07
	(.10)	(.08)	(.13)	(.14)	(.11)	(.17)	(.15)	(.12)	(.19)
% of stunt	16.7	15.9	.01	13.6	16.4	2.8	18.8	17.8	-1.0
	(.02)	(.02)	(.03)	(.03)	(.03)	(.04)	(.03)	(.03)	(.05)
# of obs	295	318		162	159		133	152	
12-23 mo.									
Mean	-1.56	-1.61	.05	-1.59	-1.74	.15	-1.52	-1.47	.05
	(.06)	(.07)	(.09)	(.09)	(.09)	(.13)	(.07)	(.11)	(.13)
% of stunt	34.5	28.2	-.06**	35.6	31.1	-4.5	33.4	26.1	-7.3**
	(.02)	(.02)	(.03)	(.03)	(.03)	(.04)	(.03)	(.03)	(.04)
# of obs	629	571		303	286		326	276	
24-59 mo.									
Mean	-1.53	-1.55	-.03	-1.59	-1.54	.05	-1.46	-1.57	-.11***
	(.03)	(.03)	(.05)	(.05)	(.04)	(.06)	(.05)	(.04)	(.06)
% of stunt	32.9	32.3	-.01	35.6	33.5	-2.1	30.2	34.0	3.8***
	(.01)	(.01)	(.02)	(.02)	(.02)	(.02)	(.02)	(.02)	(.02)
# of obs	1764	1723		905	831		859	821	

Source: calculated from IFLS data
Note: standard errors are in parentheses. (*) is significant at 10%; (**) is significant at 5%; (***) is significant at 1%.

Table 3. Mean of Individuals' Exposure to Supplementary Feeding Program, children 6-59 months in 2000.

	All groups	Community		Gender	
		Urban	Rural	Boy	Girl
All ages	.17	.18	.17	.17	.17
# of obs.	5303	2411	2892	2649	2567
6-11 mo.	.28	.28	.27	.29	.22
# of obs.	613	286	327	321	285
12-23 mo.	.23	.25	.22	.24	.22
# of obs.	1201	587	614	590	604
24-59 mo.	.13	.13	.13	.13	.13
# of obs.	3489	1538	1951	1783	1680

Source: calculated from IFLS3 data

Table 4. Descriptive Statistics

Variable	Mean	Std. Dev.
Household characteristics		
Mother height (cm)	150.39	5.29
Father's height (cm)	161.80	5.99
Mother's education (years)	7.03	6.51
Household head is male (Yes=1))	.88	.33
Farm household (Yes=1)	.39	.49
Number of female adults (15-59 years old)	1.68	.91
Per-capita expenditure (real, ln)	11.93	.74
Household own private toilet (Yes=1)	.59	.49
Household has own sanitation (Yes=1)	.21	.41
Household has free health services card (Yes=1)	.16	.37
Community characteristics		
Distance to district capital (km)	21.96	29.37
Community has sewerage system (Yes=1)	.56	.50
Community has piped water system (Yes=1)	.57	.49
Community has public transportation (Yes=1)	.75	.43
Proportion of land with technical irrigation (Yes=1)	.09	.19
Length of paved/asphalt road (km)		
Number of midwife available in the community	.65	.73
Number of posyandu available in the community	7.27	6.27
Urban (binary)	0.44	0.50

Source: calculated from IFLS3 data

Table 5. Determinant of program placement across communities 1997-2000

	LPM	Probit		
		(1)	(2)	(3)
Standardized height-for-age	-0.103	-0.249	-0.262	-0.339
	[0.049]**	[0.120]**	[0.123]**	[0.145]**
Proportion of stunting within the community	-0.162	-0.468	-0.494	-0.57
	[0.164]	[0.407]	[0.426]	[0.489]
Per-capita income (natural log)	-0.047			-0.14
	[0.064]			[0.186]
Education of head of household (years)	0.015			0.046
	[0.010]			[0.028]
Head of household is male (yes=1)	-0.064			-0.187
	[0.124]			[0.351]
# of children under 5 years old in the community	-0.004			-0.011
	[0.003]			[0.009]
Fraction of hh working in farm in the community	0.089			0.304
	[0.089]			[0.258]
Fraction of hh own private toilet in the community	-0.054			-0.185
	[0.085]			[0.249]
Fraction of hh own health card in the community	0.106			0.319
	[0.105]			[0.299]
Community has village midwife (yes=1)	-0.044			-0.152
	[0.055]			[0.157]
Distance between village to bus station (km)	-0.006			-0.017
	[0.005]			[0.014]
Distance between village to closest post office (km)	0.006			0.019
	[0.004]*			[0.010]*
Fraction of land in the village with technical irrigation	0.249			0.746
	[0.145]*			[0.407]*
Community has access to sewerage system (yes=1)	0.069			0.225
	[0.057]			[0.163]
Size of village (km^2)	0.188			1.394
	[0.171]			[1.216]
Constant	0.657	0.335	0.251	0.415
	[0.122]***	[0.075]***	[0.301]	[0.331]
Provincial dummies	YES	NO	YES	YES
Pseudo R-squared	0.14	0.01	0.07	0.11
Observations	268	292	292	268

Note: Dependent variable is dummy variable of a community received program in three fiscal years (base case is a community received program once or twice during period 1997-2000). Independent variables represent change in community average between 1997 and 2000. Standard errors are in brackets(*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table 6. Determinant of program length across communities 1997-2000.

	OLS	Fixed-effect (province)	
	(1)	(2)	(3)
Standardized height-for-age	-0.356	0.285	0.089
	[0.956]	[0.874]	[0.952]
Proportion of stunting within the community	-4.729	-3.236	-4.408
	[2.995]	[2.709]	[2.963]
Per-capita income (natural log)	-1.942	-3.001	-2.889
	[0.915]**	[0.878]***	[0.967]***
Education of head of household (years)	0.171	0.266	0.182
	[0.171]	[0.151]*	[0.172]
Head of household is male (yes=1)	-2.636	-2.592	-2.37
	[2.386]	[2.147]	[2.382]
# of children under 5 years old in the community	-0.148	-0.146	-0.156
	[0.026]***	[0.021]***	[0.026]***
Fraction of hh working in farm in the community	-1.233	0.987	0.485
	[1.331]	[1.118]	[1.395]
Fraction of hh own private toilet in the community	-2.734	-1.486	-1.421
	[1.326]**	[1.209]	[1.360]
Fraction of hh own health card in the community	3.572	4.641	3.77
	[1.761]**	[1.601]***	[1.755]**
Community has village midwife (yes=1)	0.321		0.169
	[0.797]		[0.823]
Distance between village to bus station (km)	-0.08		-0.101
	[0.065]		[0.066]
Distance between village to post office (km)	0.027		0.003
	[0.041]		[0.041]
Fraction of land in the village with technical irrigation	-3.419		-2.263
	[1.974]*		[2.022]
Community has access to sewerage system (yes=1)	-0.796		-0.921
	[0.812]		[0.828]
Size of village (km^2)	0.004		0.004
	[0.006]		[0.006]
Constant	36.162	45.891	46.707
	[11.140]***	[10.602]***	[11.712]***
Observations	534	617	534
Pseudo R-squared	0.12	0.17	0.18

Note: Dependent variable is number of months the program in the community between 1997-2000.
Standard errors are in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table 7. The effect of PMT exposure on height-for-age z-score, children 6-59 months in 1997 & 2000

	All communities		Treated communities	
	OLS	FE	OLS	FE
A. Children all ages				
Year (2000=1)	-0.161	-0.304	-0.146	-0.343
	[0.063]**	[0.079]***	[0.070]**	[0.089]***
Program Exposure*Year	0.099	0.507	0.131	0.554
	[0.102]	[0.143]***	[0.114]	[0.157]***
Observations	2774	2774	2291	2291
R-squared	0.16	0.30	0.16	0.30
B. Age 6-11 months				
Year (2000=1)	-0.252	-0.131	-0.161	-0.527
	[0.225]	[0.527]	[0.248]	[0.626]
Program Exposure*Year	-0.194	-0.678	-0.402	-0.421
	[0.259]	[0.751]	[0.283]	[0.846]
Observations	345	345	289	289
R-squared	0.2	0.71	0.24	0.71
C. Age 12-23 months				
Year (2000=1)	-0.297	-0.529	-0.356	-0.64
	[0.172]*	[0.348]	[0.198]*	[0.395]
Program Exposure*Year	0.247	1.122	0.444	1.338
	[0.211]	[0.483]**	[0.248]*	[0.545]**
Observations	516	516	419	419
R-squared	0.13	0.63	0.14	0.69
D. Age 24-59 months				
Year (2000=1)	-0.029	-0.098	0.012	-0.109
	[0.072]	[0.098]	[0.081]	[0.115]
Program Exposure*Year	-0.277	-0.052	-0.28	0.04
	[0.155]*	[0.259]	[0.176]	[0.291]
Observations	1913	1913	1583	1583
R-squared	0.2	0.36	0.19	0.35

Note: Standard errors in brackets. Other covariates include (but not reported here) mother education, mother and father height, number of female adults and children under 5 years old in the household, male head of household, farm household, per capita expenditure, household access to private toilet, sanitation and free health services, distance of village to district capital, community's access to sewerage, piped water and public transportation, number of village midwife and posyandu in the community, length of road in the community, size of village and type of community. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table 8. The effect of PMT exposure on stunting, children 6-59 months in 1997 & 2000

	All communities		Treated communities	
	OLS	FE	OLS	FE
A. Children all ages				
Year (2000=1)	0.01	0.033	-0.003	0.034
	[0.021]	[0.026]	[0.023]	[0.030]
Program Exposure*Year	-0.016	-0.105	-0.024	-0.111
	[0.033]	[0.046]**	[0.037]	[0.051]**
Observations	3087	3087	2542	2542
R-squared	0.12	0.23	0.12	0.24
B. Age 6-11 months				
Year (2000=1)	0.086	0.036	0.072	0.011
	[0.055]	[0.122]	[0.063]	[0.134]
Program Exposure*Year	-0.033	-0.054	0.007	-0.029
	[0.063]	[0.168]	[0.071]	[0.175]
Observations	369	369	310	310
R-squared	0.14	0.71	0.16	0.74
C. Age 12-23 months				
Year (2000=1)	-0.037	0.061	-0.023	0.141
	[0.049]	[0.085]	[0.058]	[0.107]
Program Exposure*Year	0.043	-0.248	-0.023	-0.338
	[0.060]	[0.127]*	[0.071]	[0.150]**
Observations	678	678	541	541
R-squared	0.11	0.52	0.13	0.57
D. Age 24-59 months				
Year (2000=1)	-0.021	-0.022	-0.05	-0.044
	[0.026]	[0.036]	[0.029]*	[0.042]
Program Exposure*Year	0.079	0.083	0.099	0.129
	[0.057]	[0.095]	[0.064]	[0.107]
Observations	2040	2040	1691	1691
R-squared	0.14	0.28	0.14	0.28

Note: Standard errors in brackets. Other covariates included (but not reported) mother education, mother and father height, number of female adults and children under 5 years old in the household, male head of household, farm household, per capita expenditure, household access to private toilet, sanitation and free health services, distance of village to district capital, community's access to sewerage, piped water and public transportaion, number of village midwife and posyandu in the community, length of road in the community, size of village and type of community. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Appendix

Table A1. The effect of PMT exposure on height-for-age z-score, all children

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	-0.161	-0.304	-0.146	-0.343
	[0.063]**	[0.079]***	[0.070]**	[0.089]***
Program Exposure*Year	0.099	0.507	0.131	0.554
	[0.102]	[0.143]***	[0.114]	[0.157]***
Mother education	0.014	0.011	0.012	0.008
	[0.004]***	[0.005]**	[0.005]**	[0.005]
Mother height	0.056	0.058	0.056	0.058
	[0.005]***	[0.005]***	[0.005]***	[0.006]***
Father height	0.036	0.036	0.035	0.034
	[0.004]***	[0.004]***	[0.004]***	[0.005]***
# of children	-0.013	-0.025	-0.031	-0.038
	[0.024]	[0.026]	[0.027]	[0.029]
Head of HH (male=1)	0.034	0.044	-0.03	-0.067
	[0.093]	[0.102]	[0.102]	[0.114]
Farm household	0.083	0.104	0.14	0.146
	[0.057]	[0.064]	[0.062]**	[0.069]**
Per capita income (ln)	0.135	0.16	0.141	0.184
	[0.037]***	[0.042]***	[0.041]***	[0.046]***
Household own private toilet	0.082	0.087	0.107	0.111
	[0.053]	[0.062]	[0.059]*	[0.068]
Household has sanitation	0.095	0.009	0.136	0.114
	[0.076]	[0.097]	[0.084]	[0.106]
Distance to district capital (km)	0.001	0.002	0.001	0.002
	[0.001]	[0.002]	[0.001]	[0.002]
Community has sewerage system	-0.138	-0.036	-0.168	-0.112
	[0.057]**	[0.096]	[0.062]***	[0.106]
Community has piped water system	0.094	-0.051	0.109	-0.038
	[0.060]	[0.103]	[0.066]*	[0.109]
Proportion of land w/ technical irrigation	0.072	-0.357	-0.028	-0.2
	[0.129]	[0.242]	[0.152]	[0.280]
Community has public transportation	-0.063	-0.193	-0.067	-0.268
	[0.057]	[0.092]**	[0.064]	[0.104]**
Length of road (km)	0	0	0	0
	[0.000]**	[0.000]	[0.000]**	[0.000]
Household received healthcard	0.268	0.287	0.223	0.237
	[0.065]***	[0.070]***	[0.073]***	[0.079]***
# of midwife in the community	-0.084	0.035	-0.071	0.041
	[0.036]**	[0.053]	[0.038]*	[0.056]
# of posyandu in the community	0.008	0.015	0.006	0.015
	[0.004]*	[0.008]*	[0.005]	[0.008]*
Type of community (urban=1)	0.196	0.218	0.216	0.2
	[0.072]***	[0.124]*	[0.080]***	[0.138]
Size of village (km^2)	0	0.001	0	0.001
	[0.001]	[0.001]	[0.001]	[0.001]
Constant	-17.484	-18.08	-17.471	-17.976
	[0.942]***	[1.061]***	[1.025]***	[1.157]***
Observations	2774	2774	2291	2291
R-squared	0.16	0.3	0.16	0.3

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table A2. The effect of PMT exposure on height-for-age z-score, Children 6-11 months

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	-0.252	-0.131	-0.161	-0.527
	[0.225]	[0.527]	[0.248]	[0.626]
Program Exposure*Year	-0.194	-0.678	-0.402	-0.421
	[0.259]	[0.751]	[0.283]	[0.846]
Mother education	0.007	-0.024	0.012	-0.018
	[0.015]	[0.027]	[0.016]	[0.030]
Mother height	0.044	0.026	0.038	0.022
	[0.015]***	[0.029]	[0.016]**	[0.033]
Father height	0.054	0.052	0.061	0.051
	[0.013]***	[0.023]**	[0.014]***	[0.024]**
# of children	0.067	0.14	0.044	0.074
	[0.081]	[0.118]	[0.087]	[0.132]
Head of HH (male=1)	0.06	0.212	-0.381	-0.583
	[0.281]	[0.564]	[0.319]	[0.735]
Farm household	0.091	0.141	0.114	0.301
	[0.174]	[0.279]	[0.181]	[0.320]
Per capita income (ln)	0.13	0.275	0.048	0.262
	[0.122]	[0.200]	[0.126]	[0.209]
Household own private toilet	-0.045	0.084	0.02	0.301
	[0.173]	[0.273]	[0.188]	[0.309]
Household has sanitation	0.187	0.405	0.104	-0.177
	[0.245]	[0.649]	[0.255]	[0.696]
Distance to district capital (km)	0.004	-0.005	0.004	-0.01
	[0.003]	[0.011]	[0.003]	[0.012]
Community has sewerage system	-0.071	-0.514	-0.073	-0.714
	[0.176]	[0.366]	[0.187]	[0.388]*
Community has piped water system	-0.246	-0.441	-0.437	-0.877
	[0.192]	[0.516]	[0.210]**	[0.777]
Proportion of land w/ technical irrigation	-0.068	0.511	-0.705	0.317
	[0.428]	[1.176]	[0.475]	[1.213]
Community has public transportation	0.231	0.467	0.23	0.839
	[0.173]	[0.467]	[0.186]	[0.620]
Length of road (km)	-0.001	-0.002	-0.001	-0.001
	[0.001]**	[0.001]**	[0.001]**	[0.001]*
Household received healthcard	0.666	0.857	0.684	1.151
	[0.205]***	[0.275]***	[0.232]***	[0.314]***
# of midwife in the community	-0.326	-0.686	-0.263	-0.572
	[0.125]***	[0.460]	[0.127]**	[0.504]
# of posyandu in the community	0.005	-0.038	0.006	0.041
	[0.020]	[0.080]	[0.021]	[0.100]
Type of community (urban=1)	0.268	0.325	0.443	0.274
	[0.227]	[0.664]	[0.245]*	[0.775]
Size of village (km^2)	0.001	0.001	0.001	0.002
	[0.001]	[0.002]	[0.001]	[0.002]
Constant	-17.731	-15.585	-16.559	-14.322
	[3.040]***	[5.803]***	[3.122]***	[6.180]**
Observations	345	345	289	289
R-squared	0.2	0.71	0.24	0.71

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table A3. The effect of PMT exposure on height-for-age z-score, Children 12-23 months

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	-0.297	-0.529	-0.356	-0.64
	[0.172]*	[0.348]	[0.198]*	[0.395]
Program Exposure*Year	0.247	1.122	0.444	1.338
	[0.211]	[0.483]**	[0.248]*	[0.545]**
Mother education	-0.005	-0.031	-0.004	-0.029
	[0.011]	[0.015]**	[0.012]	[0.016]*
Mother height	0.03	0.049	0.039	0.07
	[0.012]***	[0.014]***	[0.013]***	[0.016]***
Father height	0.034	0.038	0.028	0.025
	[0.010]***	[0.012]***	[0.011]**	[0.013]*
# of children	0.04	-0.012	-0.02	-0.055
	[0.063]	[0.074]	[0.069]	[0.078]
Head of HH (male=1)	-0.037	-0.001	-0.109	0.095
	[0.228]	[0.278]	[0.245]	[0.287]
Farm household	-0.056	-0.333	0.042	-0.486
	[0.137]	[0.185]*	[0.154]	[0.202]**
Per capita income (ln)	0.125	0.12	0.16	0.158
	[0.102]	[0.132]	[0.118]	[0.153]
Household own private toilet	0.131	0.235	0.182	0.372
	[0.130]	[0.172]	[0.147]	[0.183]**
Household has sanitation	0.035	0.148	-0.058	0.019
	[0.184]	[0.277]	[0.201]	[0.279]
Distance to district capital (km)	0.002	0.004	0.002	0.004
	[0.002]	[0.006]	[0.002]	[0.007]
Community has sewerage system	-0.239	-0.708	-0.234	-0.624
	[0.138]*	[0.309]**	[0.152]	[0.328]*
Community has piped water system	-0.042	0.144	0.029	0.188
	[0.145]	[0.293]	[0.160]	[0.297]
Proportion of land w/ technical irrigation	0.679	-0.228	0.36	-0.187
	[0.316]**	[0.764]	[0.388]	[0.783]
Community has public transportation	0.079	-0.557	0.029	-0.781
	[0.138]	[0.287]*	[0.161]	[0.369]**
Length of road (km)	0	0	0	0
	[0.000]**	[0.000]	[0.000]**	[0.000]
Household received healthcard	0.306	0.323	0.289	0.279
	[0.162]*	[0.191]*	[0.182]	[0.213]
# of midwife in the community	-0.052	0.095	-0.044	0.165
	[0.077]	[0.117]	[0.081]	[0.118]
# of posyandu in the community	0.028	0.04	0.023	0.015
	[0.010]***	[0.026]	[0.010]**	[0.029]
Type of community (urban=1)	0.198	0.34	0.261	0.251
	[0.178]	[0.378]	[0.193]	[0.398]
Size of village (km^2)	0	0	0	0
	[0.001]	[0.001]	[0.001]	[0.001]
Constant	-13.401	-16.216	-14.211	-17.547
	[2.427]***	[2.981]***	[2.747]***	[3.353]***
Observations	516	516	419	419
R-squared	0.13	0.63	0.14	0.69

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table A4. The effect of PMT exposure on height-for-age z-score, Children 24-59 months

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	-0.029	-0.098	0.012	-0.109
	[0.072]	[0.098]	[0.081]	[0.115]
Program Exposure*Year	-0.277	-0.052	-0.28	0.04
	[0.155]*	[0.259]	[0.176]	[0.291]
Mother education	0.018	0.02	0.014	0.014
	[0.005]***	[0.006]***	[0.006]**	[0.006]**
Mother height	0.063	0.066	0.061	0.063
	[0.005]***	[0.006]***	[0.006]***	[0.007]***
Father height	0.033	0.031	0.032	0.029
	[0.005]***	[0.005]***	[0.005]***	[0.006]***
# of children	-0.042	-0.023	-0.045	-0.023
	[0.027]	[0.031]	[0.030]	[0.034]
Head of HH (male=1)	0.131	0.08	0.066	-0.035
	[0.106]	[0.124]	[0.118]	[0.141]
Farm household	0.127	0.125	0.165	0.183
	[0.065]**	[0.076]*	[0.071]**	[0.083]**
Per capita income (ln)	0.16	0.209	0.177	0.243
	[0.041]***	[0.049]***	[0.045]***	[0.054]***
Household own private toilet	0.113	0.084	0.106	0.094
	[0.060]*	[0.072]	[0.066]	[0.081]
Household has sanitation	0.122	0.148	0.179	0.234
	[0.086]	[0.116]	[0.098]*	[0.128]*
Distance to district capital (km)	0	0.001	0	0.001
	[0.001]	[0.002]	[0.001]	[0.002]
Community has sewerage system	-0.168	0.081	-0.212	-0.05
	[0.065]***	[0.114]	[0.072]***	[0.129]
Community has piped water system	0.147	0.071	0.173	0.093
	[0.067]**	[0.122]	[0.075]**	[0.131]
Proportion of land w/ technical irrigation	-0.1	-0.226	-0.092	-0.136
	[0.145]	[0.282]	[0.172]	[0.338]
Community has public transportation	-0.107	-0.179	-0.075	-0.196
	[0.066]	[0.106]*	[0.075]	[0.122]
Length of road (km)	0	0	0	0
	[0.000]**	[0.000]	[0.000]**	[0.000]
Household received healthcard	0.24	0.28	0.193	0.188
	[0.073]***	[0.083]***	[0.082]**	[0.095]**
# of midwife in the community	-0.064	-0.056	-0.06	-0.042
	[0.041]	[0.066]	[0.045]	[0.073]
# of posyandu in the community	0.001	0.002	0.001	0.001
	[0.005]	[0.009]	[0.005]	[0.009]
Type of community (urban=1)	0.195	0.048	0.171	0.046
	[0.081]**	[0.143]	[0.093]*	[0.166]
Size of village (km^2)	0	0	0	0
	[0.001]	[0.001]	[0.001]	[0.001]
Constant	-18.637	-19.222	-18.305	-18.704
	[1.049]***	[1.222]***	[1.157]***	[1.360]***
Observations	1913	1913	1583	1583
R-squared	0.2	0.36	0.19	0.35

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table A5. The effect of PMT exposure on stunting, all children

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	0.01	0.033	-0.003	0.034
	[0.021]	[0.026]	[0.023]	[0.030]
Program Exposure*Year	-0.016	-0.105	-0.024	-0.111
	[0.033]	[0.046]**	[0.037]	[0.051]**
Mother education	-0.003	-0.002	-0.002	-0.001
	[0.001]**	[0.002]	[0.002]	[0.002]
Mother height	-0.017	-0.018	-0.017	-0.018
	[0.002]***	[0.002]***	[0.002]***	[0.002]***
Father height	-0.01	-0.01	-0.01	-0.01
	[0.001]***	[0.001]***	[0.001]***	[0.002]***
# of children	0.013	0.013	0.013	0.013
	[0.008]*	[0.009]	[0.009]	[0.009]
Head of HH (male=1)	0.001	-0.005	0.019	0.011
	[0.030]	[0.033]	[0.033]	[0.037]
Farm household	-0.013	-0.008	-0.024	-0.011
	[0.018]	[0.021]	[0.020]	[0.023]
Per capita income (ln)	-0.033	-0.042	-0.038	-0.05
	[0.012]***	[0.014]***	[0.014]***	[0.015]***
Household own private toilet	-0.055	-0.064	-0.056	-0.058
	[0.017]***	[0.020]***	[0.019]***	[0.023]**
Household has sanitation	-0.046	-0.014	-0.051	-0.036
	[0.025]*	[0.032]	[0.028]*	[0.035]
Distance to district capital (km)	0	-0.001	0	-0.001
	[0.000]	[0.001]*	[0.000]	[0.001]
Community has sewerage system	0.031	0.009	0.042	0.06
	[0.019]*	[0.032]	[0.021]**	[0.036]*
Community has piped water system	-0.014	-0.004	-0.021	-0.007
	[0.019]	[0.034]	[0.022]	[0.037]
Proportion of land w/ technical irrigation	-0.068	0.04	-0.024	0.038
	[0.042]	[0.079]	[0.050]	[0.094]
Community has public transportation	-0.015	0.054	-0.035	0.055
	[0.019]	[0.030]*	[0.021]*	[0.035]
Length of road (km)	0	0	0	0
	[0.000]**	[0.000]	[0.000]**	[0.000]
Household received healthcard	-0.06	-0.059	-0.068	-0.063
	[0.021]***	[0.023]**	[0.024]***	[0.026]**
# of midwife in the community	0.014	-0.022	0.012	-0.026
	[0.012]	[0.017]	[0.012]	[0.019]
# of posyandu in the community	0	-0.005	0	-0.005
	[0.001]	[0.003]*	[0.002]	[0.003]*
Type of community (urban=1)	-0.041	-0.032	-0.039	-0.054
	[0.023]*	[0.041]	[0.027]	[0.046]
Size of village (km^2)	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	4.965	5.238	5.083	5.324
	[0.307]***	[0.350]***	[0.339]***	[0.388]***
Observations	3087	3087	2542	2542
R-squared	0.12	0.23	0.12	0.24

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table A6. The effect of PMT exposure on stunting, children 6-11 months

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	0.086	0.036	0.072	0.011
	[0.055]	[0.122]	[0.063]	[0.134]
Program Exposure*Year	-0.033	-0.054	0.007	-0.029
	[0.063]	[0.168]	[0.071]	[0.175]
Mother education	0.002	0.012	-0.001	0.011
	[0.004]	[0.006]*	[0.004]	[0.006]*
Mother height	-0.009	-0.011	-0.01	-0.012
	[0.004]**	[0.006]*	[0.004]***	[0.006]*
Father height	-0.014	-0.012	-0.013	-0.009
	[0.003]***	[0.005]**	[0.003]***	[0.005]*
# of children	0.001	0.031	-0.001	0.027
	[0.020]	[0.026]	[0.022]	[0.028]
Head of HH (male=1)	0.101	0.065	0.127	0.092
	[0.069]	[0.116]	[0.081]	[0.131]
Farm household	-0.098	-0.024	-0.1	-0.002
	[0.042]**	[0.062]	[0.045]**	[0.068]
Per capita income (ln)	-0.044	-0.095	-0.037	-0.095
	[0.030]	[0.045]**	[0.032]	[0.045]**
Household own private toilet	-0.024	-0.084	0.005	-0.059
	[0.042]	[0.062]	[0.048]	[0.066]
Household has sanitation	0.005	-0.04	0.021	-0.043
	[0.060]	[0.122]	[0.065]	[0.118]
Distance to district capital (km)	0	-0.002	0	-0.001
	[0.001]	[0.002]	[0.001]	[0.002]
Community has sewerage system	0	0.164	-0.04	0.187
	[0.043]	[0.085]*	[0.047]	[0.085]**
Community has piped water system	0.077	0.021	0.116	0.009
	[0.046]*	[0.103]	[0.053]**	[0.112]
Proportion of land w/ technical irrigation	-0.006	-0.494	0.069	-0.498
	[0.102]	[0.274]*	[0.120]	[0.266]*
Community has public transportation	-0.037	0.077	-0.05	0.075
	[0.043]	[0.094]	[0.047]	[0.102]
Length of road (km)	0	0	0	0
	[0.000]	[0.000]***	[0.000]	[0.000]***
Household received healthcard	-0.103	-0.106	-0.102	-0.099
	[0.050]**	[0.064]*	[0.059]*	[0.070]
# of midwife in the community	0.041	0.036	0.034	0.049
	[0.031]	[0.098]	[0.032]	[0.100]
# of posyandu in the community	0.003	0.019	0.004	0.025
	[0.005]	[0.018]	[0.005]	[0.021]
Type of community (urban=1)	-0.078	-0.319	-0.085	-0.323
	[0.055]	[0.140]**	[0.061]	[0.140]**
Size of village (km^2)	0	-0.001	0	-0.001
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	4.095	4.593	4.1	4.291
	[0.755]***	[1.250]***	[0.800]***	[1.255]***
Observations	369	369	310	310
R-squared	0.14	0.71	0.16	0.74

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table A7. The effect of PMT exposure on stunting, Children 12-23 months

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	-0.037	0.061	-0.023	0.141
	[0.049]	[0.085]	[0.058]	[0.107]
Program Exposure*Year	0.043	-0.248	-0.023	-0.338
	[0.060]	[0.127]*	[0.071]	[0.150]**
Mother education	0	0.009	0.003	0.009
	[0.003]	[0.004]**	[0.004]	[0.005]**
Mother height	-0.014	-0.014	-0.017	-0.018
	[0.003]***	[0.004]***	[0.004]***	[0.005]***
Father height	-0.011	-0.012	-0.01	-0.011
	[0.003]***	[0.004]***	[0.003]***	[0.004]***
# of children	-0.012	-0.01	-0.014	-0.024
	[0.018]	[0.021]	[0.020]	[0.023]
Head of HH (male=1)	-0.063	-0.025	-0.051	-0.082
	[0.063]	[0.078]	[0.068]	[0.085]
Farm household	0.062	0.073	0.013	0.08
	[0.041]	[0.054]	[0.047]	[0.064]
Per capita income (ln)	-0.024	-0.007	-0.062	-0.051
	[0.029]	[0.038]	[0.034]*	[0.045]
Household own private toilet	-0.065	-0.123	-0.056	-0.122
	[0.037]*	[0.050]**	[0.043]	[0.057]**
Household has sanitation	-0.095	0.014	-0.079	0.06
	[0.052]*	[0.078]	[0.059]	[0.089]
Distance to district capital (km)	-0.001	0	0	0.001
	[0.001]	[0.002]	[0.001]	[0.002]
Community has sewerage system	0.009	0.085	-0.002	0.076
	[0.041]	[0.086]	[0.046]	[0.097]
Community has piped water system	0.006	-0.138	-0.015	-0.155
	[0.042]	[0.087]	[0.047]	[0.091]*
Proportion of land w/ technical irrigation	-0.162	-0.258	-0.106	-0.411
	[0.093]*	[0.196]	[0.114]	[0.231]*
Community has public transportation	-0.025	0.079	-0.064	0.073
	[0.041]	[0.075]	[0.049]	[0.097]
Length of road (km)	0	0	0	0
	[0.000]*	[0.000]	[0.000]**	[0.000]
Household received healthcard	-0.052	-0.056	-0.086	-0.084
	[0.046]	[0.053]	[0.052]	[0.061]
# of midwife in the community	-0.024	-0.11	-0.019	-0.138
	[0.024]	[0.036]***	[0.026]	[0.038]***
# of posyandu in the community	0	-0.001	0.001	0.003
	[0.003]	[0.008]	[0.003]	[0.010]
Type of community (urban=1)	-0.053	-0.036	-0.027	0.052
	[0.051]	[0.101]	[0.059]	[0.121]
Size of village (km^2)	0.001	0.001	0.001	0.001
	[0.000]**	[0.000]*	[0.000]*	[0.000]
Constant	4.589	4.468	5.541	5.428
	[0.714]***	[0.876]***	[0.827]***	[1.029]***
Observations	678	678	541	541
R-squared	0.11	0.52	0.13	0.57

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.

Table A8. The effect of PMT exposure on stunting, Children 24-59 months

	All communities		Treated communities	
	OLS	FE	OLS	FE
Year (2000=1)	-0.021	-0.022	-0.05	-0.044
	[0.026]	[0.036]	[0.029]*	[0.042]
Program Exposure*Year	0.079	0.083	0.099	0.129
	[0.057]	[0.095]	[0.064]	[0.107]
Mother education	-0.004	-0.005	-0.003	-0.004
	[0.002]**	[0.002]**	[0.002]	[0.002]
Mother height	-0.019	-0.02	-0.019	-0.019
	[0.002]***	[0.002]***	[0.002]***	[0.002]***
Father height	-0.01	-0.01	-0.01	-0.009
	[0.002]***	[0.002]***	[0.002]***	[0.002]***
# of children	0.02	0.015	0.02	0.013
	[0.010]**	[0.011]	[0.011]*	[0.012]
Head of HH (male=1)	-0.005	0.009	0.027	0.049
	[0.038]	[0.045]	[0.043]	[0.051]
Farm household	-0.019	-0.021	-0.019	-0.019
	[0.023]	[0.028]	[0.026]	[0.030]
Per capita income (ln)	-0.043	-0.061	-0.041	-0.063
	[0.015]***	[0.018]***	[0.016]**	[0.019]***
Household own private toilet	-0.061	-0.066	-0.064	-0.065
	[0.022]***	[0.026]**	[0.024]***	[0.029]**
Household has sanitation	-0.044	-0.047	-0.054	-0.07
	[0.031]	[0.042]	[0.035]	[0.047]
Distance to district capital (km)	0	-0.002	0	-0.002
	[0.000]	[0.001]**	[0.000]	[0.001]*
Community has sewerage system	0.053	0.002	0.075	0.094
	[0.024]**	[0.042]	[0.026]***	[0.047]**
Community has piped water system	-0.028	-0.023	-0.037	-0.009
	[0.024]	[0.045]	[0.027]	[0.048]
Proportion of land w/ technical irrigation	-0.053	0.046	-0.012	0.106
	[0.052]	[0.102]	[0.063]	[0.122]
Community has public transportation	-0.019	0.058	-0.038	0.045
	[0.024]	[0.039]	[0.027]	[0.045]
Length of road (km)	0	0	0	0
	[0.000]*	[0.000]*	[0.000]*	[0.000]
Household received healthcard	-0.058	-0.074	-0.067	-0.074
	[0.027]**	[0.030]**	[0.030]**	[0.034]**
# of midwife in the community	0.023	0.013	0.02	0.014
	[0.014]	[0.023]	[0.016]	[0.026]
# of posyandu in the community	0	-0.003	0	-0.003
	[0.002]	[0.003]	[0.002]	[0.003]
Type of community (urban=1)	-0.035	-0.009	-0.038	-0.073
	[0.029]	[0.053]	[0.033]	[0.061]
Size of village (km^2)	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	5.376	5.797	5.242	5.554
	[0.376]***	[0.441]***	[0.417]***	[0.493]***
Observations	2040	2040	1691	1691
R-squared	0.14	0.28	0.14	0.28

Note: Standard errors in brackets. (*), (**) and (***) indicate significance respectively at 10%, 5% and 1%.