Child Health in a Developing Country: Consequences for Short- and Medium Term Outcomes.

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Abstract

We investigate the relationship between quality of health care and child health and the effects of health on childhood schooling outcomes and early adulthood outcomes using a high-quality panel data survey from Tanzania. We find a positive relation between access to immunization and health status. Furthermore, childhood height positively affects primary school enrolment and, for girls, both the probability of completing primary school and literacy. Childhood weight, on the other hand, positively affects girls' propensity to marry whereas their weight negatively affects primary school completion. Labour market participation is unaffected by child health.

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1   Introduction

Whether economic outcomes such as education and labor market participation are affected by a person's health status - and whether this is possibly even more true in developing countries - has recently sparked a growing body of research, see Strauss & Thomas (1998) for an excellent survey. Lately, more studies have investigated this topic, many of which are concerned with effects of nutritional programs. Alderman, Behrman, Kohler, Maluccio & Watkins (2001), for example, use nonexperimental longitudinal data from Pakistan to analyse the relationship between nutrion and schooling as do Alderman, Hoogeveen & Rossi (2006b) for the Kagera region in Tanzania, and Glewwe, Jacoby & King (2001) for the Philippines. Similarly, Behrman, Cheng & Todd (2004)investigate the short term effects on cognitive skills of participating in a preschool program (PROGRESA), that provides day care, child nutrition, and educational services in Mexico. Overall, there is evidence of a strong positive relation between nutrition and schooling outcomes. Other health interventions have received attention as well; Kremer & Miguel (2004) exploits experimental data from Kenya and find strong positive effects of worm interventions on schooling outcomes and health status in Kenya.

We contribute to this literature in several respects. We exploit a high-quality survey from the Kagera region in Tanzania. The data constitute a panel that surveys individuals during 1991-1994 and follows up in 2004. The data hold a rich set of community characteristics on health care and education (information is available for all respondents, not only for households taking up the service) as well as individual and household specific information. See World Bank (2004) for a description of the first four waves and Beegle, de Weerdt & Dercon (2006) for the follow-up survey.

Using the Kagera data we firstly investigate the relationship between quality of health care experienced during childhood (7-10 year olds) and child health status. This part of the analysis complements that of Alderman, Hoogeveen & Rossi (2006a) who, exploiting the first four rounds of the data used in our paper, find that access to feeding posts improves childhood health in the Kagera region in Tanzania. Community level variation such as infrastructure and therefore health care may, however, be placed selectively by public policy even conditional on other observable characteristics, see Rosenzweig & Wolpin (1988) and Pitt, Rosenzweig & Gibbons (1993). Thus this first set of results is merely tentative and meant to demonstrate a correlation between health care characteristics and health outcomes.

We next investigate health dynamics. Specifically, we consider the effect of child health

status on primary school enrolment as well as young adulthood outcomes such as marriage status, primary school completion and literacy along with labor market participation. Compared to Alderman et al. (2006b), who focus on schooling, we investigate a much richer set of outcomes. A potential problem is that a positive relation between better health status and, say, school enrolment may be an artefact of, for example, higher community income leading to demand for higher quality health care and also higher propensities of school enrolment. To accommodate this we include measures for quality of health care in the community while growing up when we model the outcomes of interest. This will serve as a proxy for unobserved factors, which explain both the range of outcomes as well as childhood health. Realising that health status may have differential effects across genders, we estimate genderwise models.

Our results indicate a positive relation between access to immunization within the community and health outcomes measured by the body mass index. Though we are cautious with regards to this result, it is heavily backed by the medical literature and robust to using both an OLS and fixed effects estimation strategy as well as to estimating genderwise models. Henderson (1997), for example, states that "among all medical procedures, vaccination ranks at the forefront of lives saved and disabling illnesses prevented". Furthermore, we find that childhood height significantly affects the probability of attending primary school and, for girls, the probability of completing primary school along with literacy. Childhood weight, on the other hand, positively affects girls' propensity to marry but negatively affects the probability of completing primary school.

The paper is organised as follows: Section 2 presents background information for the Kagera region and discusses the available data, Section 3 outlines the econometric strategy, Section 4 presents the estimation results, and Section 5 concludes.

2 The Kagera Region and the Data

Our empirical analysis below is conducted using the Kagera Health and Development Survey (KHDS), which is a panel from 1991-1994 followed up in 2004. Kagera is located on the western shore of Lake Victoria, bordering Uganda to the north and Rwanda and Burundi to the west. Geographically, Kagera is one of the most remote regions from the administrative and economic growth centre of Dar es Salaam. Consequently, the Kagera region has been exposed to foreign influences and vulnerable to the influx of refugees resulting from the Great Lake Region conflict; a conflict pertaining to both Rwanda and Burundi and which became more glaring during the 1990s, especially after the first four

waves of our data was collected.

In 1988, the region had a total population of about 1.3 million compared to about 2 millon in 2004. The population is overwhelmingly rural and primarily engaged in producing bananas and coffee in the north and rain-fed annual crops (maize, sorghum, cotton) in the south. Socially, clan bonds are tight in the region, as well as in Tanzania in general. In rural areas, therefore, people are settled on clan land, which is fragmented to clansmen as the clan grows.

Of particular interest to our analysis is the health care and schooling situation in the region. During the 1990s Kagera was plagued by HIV - in fact, prevalence of HIV peaked in the early 1990s; the period under consideration. In addition, a technical report, National Bureau of Statistics Tanzania (2002), documents that access to social services including primary schools, electricity, and health care in the Kagera region by any comparison is limited. The report suggests a potential link between primary school enrolment and health status in the region: the major reasons from dropping out are identified as truancy, but also pregnancy and death to others are important. Further, the same report shows that child immunization levels in Tanzania *are* high compared to other sub-Saharan countries; the 2004 coverage rates were 80% for measles and 86% for dipteria-polio-tetanus. However, coverage levels for both types of vaccinations is lower by about 10 percentage points in rural areas, to which the Kagera region clearly belongs.

The 1991-1994 KHDS survey holds information about individuals in 915 households in addition to community, primary school, and health facility (dispensaries, health centers, and hospitals) information. The household information covers measures of consumption, expenditure, asset holdings, detailed time allocation information, morbidity, anthropometrics, health utilization, schooling information, participation in rotating credit associations, and information on non-resident children. For further information, see the Living Standards Measurement Study website: (http://www.worldbank.org/lsms/) and Ainsworth, Koda, Lwihula, Mujinja, Over & Semali (1992). Of the original 915 households, for 877 at least one household member was re-interviewed. The KHDS attempted to re-interview the household of all panel respondents reported to be alive in 2004 regardless of the person's location in 2004. If someone from the original survey married and moved into another household, for example, this entire new household was interviewed.

We consider an initial sample consisting of children aged 7-10 in 1991-1994. More precisely, we consider children *while* they are in this age range. As in Ainsworth, Beegle & Koda (2005) we restrict the sample to include children 7 years old and older. The reason is that at age 7, primary school participation is, in principle, compulsory. The upper age

bound is chosen because we are considering the relation between health care characteristics and early childhood outcomes only. Table 1 shows means of central variables for our initial sample.

[**TABLE 1 ABOUT HERE**]

Though compulsory, we see that only 39% of the children in our sample are enrolled in school, which corresponds well with the official national enrollment rates, see National Bureau of Statistics Tanzania (2002). Contrary to the descriptive analysis (based on another Tanzanian dataset) from Bommier & Lambert (2000), we do not observe any differences in enrolment patterns among girls and boys. This may be due to our much younger sample.[1] Table 2 shows the main reasons for not attending school during the last 7 days for the part of our sample actually *enrolled* in school. We see that poor health is a significant parameter; about 14% of the absence is health related. Presumably, this pattern carries over to the part of the sample *not* enrolled but unfortunately, the data does not provide such information.

[**TABLE 2 ABOUT HERE**]

Table 1 also documents that a significant share of children are either maternal (0.18) or paternal orphans (0.24) and that health care characteristics are strikingly poor. The majority of children live in communities with access to immunizations but less than a third have access to a doctor in the nearby health provider and less than half live close to a health care facility with a test laboratory. Further, we find that children living in communities with access to immunization have significantly higher body mass index (henceforth BMI)

$$BMI = \frac{Weight}{Height^2}, \quad weight\ measured\ in\ kilos,\ height\ measured\ in\ meters$$

and at least on the descriptive level Figure 1 below substantiates the hypothesis of a relation between health status, here measured by height, and school enrolment.[2]

[**FIGURE 1 ABOUT HERE**]

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[1] Bommier & Lambert (2000) consider a sample of individuals aged 7-25.
[2] This relation also holds for weight.

A possible explanation for the pattern seen in Figure 1 is that parents or teachers consider physical development (and thus ultimately health status) to be a determining factor for school readiness (in addition to or rather than age).

Of the $1,018$ children from the initial 1991-1994 sample, the whereabouts of a total of 744 were known in 2004. This is a very high rate of reoccurence compared to panel surveys in both low-income countries and high-income countries, see Alderman, Behrman, Lavy & Menon (2001). They find that survey attrition ranges from $1.5\% - 17.5\%$ *per year*. In addition, most of the surveys considered in Alderman, Behrman, Kohler, Maluccio & Watkins (2001) covered considerably shorter time periods (two to five years).

Table 3 shows selected means for our 2004 sample, who are now aged between $17 - 25$. The first line in Table 3 shows that of the $1,018$ children from the baseline survey, 10 individuals among the recovered 744 are registered as having died during the period. This number corresponds to the official statistic reported by the World Health Organisation for Tanzania in general for 2001. A large percentage, 39%, is married in 2004, the majority has completed primary school, while much fewer attains some secondary schooling. Most individuals self-report to be functionally literate; that is, they are able to read and write a letter. Finally, only a small share report that they participate in the formal labour market.[3]

[**TABLE 3 ABOUT HERE**]

3   Econometric Specification

In this section we will briefly discuss the objectives of the econometric analysis and notation and then discuss the parameters of interest along with our identification and estimation strategy. We study both short- (childhood, $7 - 10$ year olds) and medium term (early adulthood, $17 - 25$ year olds) outcomes. Regarding childhood outcomes, we estimate the relation between health care characteristics and child health measured by anthropometrics as well as the relation between anthropometrics and primary shool school enrolment. The choice of anthropometric outcomes as proxies for health status is common in the literature, see e.g. Schultz (1999). Regarding early adulthood outcomes, we analyse the effect of

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[3]Formal labor market participation is defined as having worked for someone who is not a member of the household such as an employer, a firm, or the Government.

childhood anthropometrics on educational attainment, cognitive skills, marriage status, and labour market participation.

Parental background information is crucial for empirically modelling especially school enrolment and completion but presumably also other outcomes such as marriage status (see e.g. Tambashe & Shapiro (1996)) and labour market participation. Ainsworth et al. (2005) and Beegle et al. (2006) (both using the same survey data as in this paper) emphasize the importance of conditioning on orphanhood status and Cochrane, Leslie & O'Hara (1980) and Schultz (1981) find that a year of additional schooling of the mother often decreases her child's likelihood of dying with $5 - 10\%$. Similarly, Glewwe (1999) argues that the mother's health knowledge is the single most important factor for increasing child health. He finds that the effect of schooling is to provide the basic skills (literacy and numeracy) that assist mothers in diagnosing and treating problems. In addition to conditioning on parental background information, the results from Bommier & Lambert (2000) indicate the potential need for considering gender specific schooling enrolment processes in Tanzania; their theoretical model explains how bride prices lower enrolment ages and reduces the total enrolment time for girls.

Consider first health care characteristics and anthropometrics. To account for fact that weight and height are intimitely related, we choose as anthropometric outcome the logaritm of the BMI and account explicitly for age in our empirical model. This is recommended over, for example, weight-for-height, for children older than two years, see e.g. Flegal, Wei & Ogden (2002).[4] Our measures of health care characteristics all inform on *access* (or availability) and relate to the closest facilty. As such, we do not measure whether, for example, a child receives immunization but rather whether immunizations are available. Our empirical specification takes the following form:

$$\log\left(BMI\right)_{it} = pers_{it} \cdot \beta + health\ care_{ct} \cdot \gamma + U_{it}, \tag{1}$$

where subscript i indicates invidual, t time, and c community. *pers* is a set of personal and family characteristics including gender, age dummies, parental education, orphanhood status, whether mother or father died within the last 6 months, mother's height, and household wealth proxies and *health care* is a set of health characteristics such as access to immunization, doctor, test laboratory, and operating room and distance to nearest

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[4] Alternative measures would be height-for-age z-scores, weight-for-age z-scores, or stunting and wasting. However, one thing is, for example, to be significantly higher than the median but if the child also has significantly lower weight compared to the median we would not want to classify the child as being healthy. Therefore it is important to use a measure explicitly accounting for both height and weight.

health care facility.Furthermore, we condition on level of suggested surgical fee. Alderman, Behrman, Kohler, Maluccio & Watkins (2001) argue that (lagged) price variation is exogenous to health status. However, in our case higher price of health care services is not only an access measure; it also potentially captures omitted quality.

Since we are particularly interested in the effect of these health care characteristics, we prefer estimating the above model using OLS and not a fixed effects panel data model though panel data are available. The reason is that our panel only covers four consecutive years. In such a setting, the fixed effects (or first difference, for that matter) transformation would force identification to be based on transitory fluctuations in the explanatory variables, of which there is little. See McKinnish (Forthcoming) on this issue.

A possible concern, however, is whether households with favourable unobserved characteristics increasing child health live in areas with good health care, which could bias our results. Given the tight clan bonds, we do not expect proximity to health facilities to be a determining factor in settling patterns. Still, there may be endogeneity problems if households/clans with favourable unobserved characteristics on the outset live in areas with better health care. Similarly, there may be purposive program placement where health care services are placed in areas with poor (or maybe better off) households, see discussion in the Introduction. Assuming that such individual specific unobserved characteristics are constant across time a fixed effects panel data estimator would solve this problem. Therefore, in addition to OLS, we estimated our model using the fixed effects transformation. This did not affect the parameter estimates, yet, not surprisingly, the precision was lower.[5]

A potential point of criticism is that the sample of 7-10 year olds is selected in the sense that they are *survivors* in the first four survey rounds. This point is made by Pitt (1997). Therefore, our analysis is *only* valid for this surviving sample and not for the (potential) population of all children aged 7-10.

We consider next the relation between anthropometrics and schooling. Here, our outcome of interest is primary school enrolment. Since we condition on children's age, see below, this outcome should be interpreted as age specific enrolment. Put differently, the alternative is *not* that the child is never enrolled but that he is not yet, at a given age, enrolled in school. We allow for individual effects of both height and weight on primary school attendance and estimate the following model:

$$S^*_{it} = pers_{it} \cdot \delta_1 + school_{ct} \cdot \delta_2 + height_{it} \cdot \delta_3 + weight_{it} \cdot \delta_4 + V_{it}, \qquad (2)$$

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[5]Estimation results available on request.

where again *pers* is a set of personal and family characteristics and *school* is a set of school characteristics at the village level covering average number of students per room, average number of boards per student, average number of teachers per student, distance, and primary school fee. School characteristics relate to the nearest primary school.[6] As with health care prices, primary school fees may affect access to school but they are also informative about quality. V is assumed to be a normally distributed random variable, and the parameters of (2) can then be estimated using a probit where

$$
S_{it} = \begin{cases} 1 & if \quad S_{it}^* > 0 \\ 0 & otherwise \end{cases}.
$$

Clearly, to avoid selection bias in the estimation of the effects of health outcomes on school attendence there must be no dependence between the explanatory variables and the error term. In particular, correlation may occur if unobserved factors explaining school enrolment (such as quality of schooling) is correlated with factors explaining health outcomes (such as quality of health care). To accommodate the point we re-estimate the school enrolment probit including the set of health care characteristics:

$$
S_{it}^* = pers_{it} \cdot \delta_1 + school_{ct} \cdot \delta_2 + health\ care_{ct} \cdot \gamma + height_{it} \cdot \delta_3 + weight_{it} \cdot \delta_4 + V_{it}. \quad (3)
$$

Here, health care characteristics serve as a proxy for potential omitted variables explaining both health status and school participation.[7]

We next turn to study the 2004 follow-up data set. The very first step here is to investigate the probability of reoccuring in the 2004 data set. This is extremely important because it informs on characteristics of the group of re-interviewed and thus on the validity of our results for the population. After having performed such analysis, we consider a range of early adulthood outcomes, A_{it}. To be precise, A_{it} includes re-interview probability, completion of primary school, participation in secondary school, self-reported ability to read and write, marriage status, and labour market participation. Since all are binary indicators, we estimate these using probit models, where

$$
A_{it}^* = pers_{it} \cdot \alpha_1 + height_{it} \cdot \alpha_2 + weight_{it} \cdot \alpha_3 + health\ care_{ct} \cdot \gamma + V_{it}, \quad (4)
$$

and

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[6]Unfortunately, the data do not hold information about the distance to the nearest primary school. The distance, therefore, is to the nearest secondary school.

[7]Clearly, if health care characteristics are not valid instruments because of selective program placement, they belong in the main equation.

$$A_{it} = \begin{cases} 1 & if \quad A_{it}^* > 0 \\ 0 & otherwise \end{cases}.$$

Again, *pers* is a set of personal and family baseline characteristics *health care* is a set of health care characteristics. Both are measured the *first* time we observe a child in 1991-1994. To avoid conditioning on variables affected by early childhood health status, we do not include variables in our conditioning set from the 2004 survey, see Rosenbaum (1984). As above, health care characteristics are included to proxy unobserved factors explaining both the A_{it} and health outcomes.

4   Estimation Results

Quality of Health Care and Health Status

Table 4 shows the results from an OLS regression of log body mass index conditioning on personal and family characteristics in addition to health characteristics as specified above. On average, girls have a lower body mass index compared to boys. Also, higher maternal education (mother completed some level of secondary schooling) significantly increases the BMI, as does family ownership of a business, a proxy for social and wealth status. This effect of maternal education squares with the findings of Glewwe (1999). The effect is, however, not linear in years of education: it seems that the effect only kicks in with a high level of education. Very few mothers in our sample complete secondary schooling which is presumably why we do not find any effect here. We do not find evidence of a link between orphanhood and the BMI nor between BMI and mother's height; an explanation could be that we condition on social and wealth information which is likely correlated with health status of the parents. An alternative justification for the result is the vast majority of relatives in Tanzania *absorb* orphans into their own households, see Ksoll (2007).

Importantly, we find that immunizations available at the nearest health care centre is associated with a 2% higher BMI. This result is significant and robust to a number of specifications including leaving out the other characteristics of health care. Current level fees, on the other hand, do not seem to be an important factor for the BMI. Remember, though, that the interpretation of the effect of surgical fees is not clear since it captures both a price and potentially a quality effect.

[TABLE 4 ABOUT HERE]

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Because there may be differential patterns for girls and boys in for example take-up of health care we consider genderwise specifications. Table 6 shows the estimated effects of health care characteristics on BMI for each gender from the OLS regression. Re-estimating the model is found not to influence the parameter estimates related to immunization yet presumably because of the smaller number of observations, the significance level is affected. Now, coefficient estimates are only significant at the 10% level. For the sample of girls, presence of a nearby doctor and access to appendectomy positively, and significantly, affects BMI. For boys, access to circumcisions is potentially an important factor. Of course, not too much can be read into a single parameter as they are all proxies for quality. The robustness of the parameter related to immunization is striking, though.

[**TABLE 5 ABOUT HERE**]

Health Status and Primary School enrolment

We next consider primary school participation. Table 7 shows marginal effects (evaluated at the mean) from probit models of school enrolment in our sample. We estimate school enrolment conditioning again on personal and family characteristics in addition to school characteristics. These results are presented in the first column of Table 7 under Specification I. Of particular interest is the effect of height on school attendance, where we observe a marginal effect of 1.6%. That is, there seems to be a clear effect of health status on school attendence. Weight does not have a significant effect on school enrolment, see also Haddad & Bouis (1991) and Thomas & Strauss (1997).

Turning to the other estimated coefficients we find, not surprisingly, that parental schooling as well as wealth proxies increase child school attendance. Also, the distance to nearest secondary school has a significantly negative effect. Primary school fees have a significantly positive effect on school enrolment, which on the outset seems counterintutive. Here we expect the fee to pick up unobserved quality effects. Orphanhood seems to affect neither the BMI, nor primary school attendance. This latter finding is in line with Ainsworth et al. (2005).

As pointed out above, to avoid selection bias in the estimation of the effects of health outcomes on school attendance there must be no dependence between the explanatory variables and the error term why we estimate specification (3) adding health care characteristics to the primary schooling participation probit. The results are shown in Table 7

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under Specification II. We see that though we do find correlation between school attendence and health care characteristics, inclusion has no effect on the estimated marginal effect of height.

[TABLE 6 ABOUT HERE]

To investigate the robustness of our specification we again consider genderwise models, see also Bommier & Lambert (2000). Table 8 below presents the marginal effects of height and weight on primary school participation for girls and boys. As in the case with the anthropometric outcome, our results are robust to this splitting of the sample. The effect of height on enrolment is slightly, but not significantly, higher for girls than for boys.

[TABLE 7 ABOUT HERE]

Early Adulthood Outcomes

Finally, we consider early adulthood outcomes. As mentioned above, we first have to investigate the probability of reoccuring the 2004 data set. The results are given in Table 9 below. We see that it is not random who are present in both waves. Data survivors stem from better family backgrounds: they are less likely to be orphans, their families are wealthier, and they are more likely to grow up in communities with access to immunization. Our starting point for considering early adulthood outcomes, therefore, is *the sample of data survivors* acknowledging that these may not be representative of our initial population. Remember, though, that the reoccurence rate is extremely high in a survey context.

[TABLE 8 ABOUT HERE]

Early adulthood outcome results are shown in Table 10 below. Here, we focus on the effects of health status (height and weight) only; the full set of results can be found in Table A1 - A12 in the appendix. In general, the estimated parameters vary greatly across genders. Therefore, we only present genderwise models.

[TABLE 9 ABOUT HERE]

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For girls, we find that childhood height significantly affects the probability of completing primary school along with the abilities to read and write. This is consistent with the results from above that childhood height increases primary school enrolment. Weight, on the contrary, seems to be important for marriage status and negatively affects the probability that a girls completes primary school. This result is interesting given the theoretical findings from Bommier & Lambert (2000) that bride prices (*along* with the wish to marry girls off as early as possible) lower enrolment ages and reduces the total enrolment time for girls. In Tanzania it is namely custom that married women - and any income and ressources they may bring home - belong to the family-in-law. Because low weight is negatively related to fertility, see e.g. Reid and van Vugt (1987), higher (normal) weight may increase the brideprice and thus the incentive to marry girls off earlier.[8]

To investigate this issue further, we re-estimate the probability of being married for girls and add information on primary school completion to the conditioning set. Perhaps not surprisingly, we find that having completed primary school significantly decreases the probability of being married with 14.3%, supporting our speculations of a school-marriage-weight trade-off.[9] Of course, the estimated parameter cannot be given a causal interpretation since the marriage and schooling decisions are likely be taken jointly.

For boys, childhood health status seems to have little impact on early adulthood outcomes. Only for school participation do we find a significant effect of height again in line with the result that height increases primary school enrolment. Of course, given that childhood height affects primary school enrolment at age $7 - 10$, which again, almost by construction, affects primary school completion, health status does have an indirect effect on educational attainment. Finally, for neither gender do we find any effect of health status on labour market participation.

5   Conclusion

Exploiting a high-quality representative survey from the Kagera region in Tanzania this paper investigates early childhood investments in human capital in a particularly remote area within a developing country. In particular, we consider the link between quality of health care and health outcome as measured by the body mass index for a sample of children aged 7-10 in the Kagera region in Tanzania. We find that access to immuniza-

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[8]The KHDS survey does include some information on brideprice payments. Unfortunately for our purposes, only very few of the individuals in our sample report that a brideprice has been paid.

[9]Full set of results available on request.

tions within the community is significantly associated with increased health status. This result is robust to a number of specifications, including estimating genderwise models and employing fixed effects estimation.

Further, we analyse the effect of health status on primary school participation. The results here indicate a highly sigificant effect of height on school enrolment no matter the gender. To account for the fact that health status may be endogenous to school enrolment we include measures for quality of health care in the community to proxy unobserved factors, which explain both participation as well as health. Including this information leaves our estimates unchanged.

Exploiting a follow-up survey from 2004, we finally investigate the effects of health status on early adulthood outcomes such as school attainment, cognitive skills (literacy), marriage status, and labour market participation. We find large heterogeneity in the estimated parameters across genders: for girls, height positively affects both the probability of completing primary school as well as the ability to read and write. Childhood weight, on the other hand, positively affects girls' propensity to marry but negatively affects primary school completion. For boys, we only find an effect of height on secondary school participation beyond the indirect effect of height on primary school completion through its effect on primary school enrolment. Labour market participation is unaffected by child health.

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TABLE 1

SELECTED DESCRIPTIVE STATISTICS,

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Average	Std. dev.
Personal and family characteristics		
Age	8.48	1.11
Girl	0.50	0.50
Father alive	0.76	0.43
Mother alive	0.82	0.38
Enrolled in primary school	0.39	0.49
Height (centimeters)	123	9
Weight (kilos)	23	4
Value of livestock	7137	17401
Good floor	0.14	0.34
Family owns business	0.37	0.48
Urban area	0.19	0.39
Characteristics of nearest health care centre		
Immunizations available	0.69	0.46
Doctor	0.29	0.45
HIV test available	0.09	0.28
Test laboratory	0.38	0.48
Operating room	0.21	0.41
Electricity	0.21	0.41
Circumcisions performed	0.20	0.40
Appendectomy performed	0.07	0.26
No fee required	0.58	0.49
Distance (km)	3.39	4.38
Nearest Primary School characteristics		
Average number of students per room	48	10
Average number of boards per student	0.02	0.01
Average number of teachers per student	0.03	0.01
Distance to nearest (secondary) school (km)	19	20
School fee (TSz)	229	118
# individuals	1018	

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TABLE 2

REASON FOR NOT ATTENDING SCHOOL LAST 7 DAYS

CHILDREN ENROLLED IN SCHOOL

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Reason	Share
Was ill	0.138
Cared for ill	0.005
Work	0.058
Holdiday	0.590
Mourning	0.042
Other	0.167
# observations	378

FIGURE 1

HEIGTH , 7-10 YEAR OLDS, KHDS SAMPLE 1991-1994
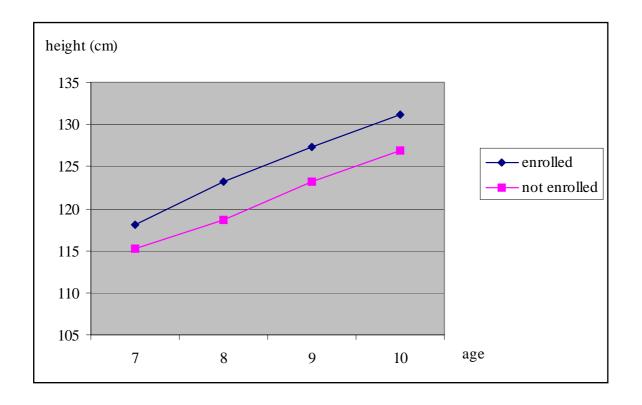
TABLE 3

EARLY ADULTHOOD OUTCOMES

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Average	# obs.
Survival	0.987	744
Marriage Status	0.383	734
Primary School Completion	0.684	734
Secondary School Participation	0.139	734
Ability to Read (self-reported)	0.804	734
Ability to Write (self-reported)	0.807	734
Labor Market Participation	0.195	734

TABLE 4

OLS Regression of Log Body Mass Index
Selected Coefficient Estimates
7-10 Year Olds, KHDS Sample 1991-1994

Variable	Coefficient Estimate	Standard Error
Personal and family characteristics		
Girl	**-0.013**	**0.005**
Father alive	-0.004	0.011
Mother alive	0.020	0.011
Father died within last 6 months	0.000	0.019
Mother died within last 6 months	0.012	0.029
Mother's height (meters)	0.011	0.008
Father some primary schooling	0.012	0.017
Father completed primary schooling	-0.011	0.017
Father some secondary schooling	0.021	0.031
Father completed secondary schooling	-0.004	0.019
Father adult education only	-0.009	0.026
Father post secondary education	•	•
Mother some primary schooling	0.011	0.018
Mother completed primary schooling	-0.007	0.013
Mother some secondary schooling	**0.034**	**0.015**
Mother completed secondary schooling	-0.013	0.017
Mother adult education only	•	•
Mother post secondary education	•	•
Value of livestock (100,000 TSz)	0.014	0.014
Good floor	0.011	0.009
Family owns business	**0.014**	**0.007**
Characteristics of nearest health care centre		
Immunizations available	**0.018**	**0.007**
Doctor	0.023	0.015
HIV test available	-0.005	0.013
Test laboratory	0.001	0.010
Operating room	0.005	0.025
Electricity	-0.004	0.010
Circumcisions performed	0.014	0.027
Appendectomy performed	-0.028	0.015
Suggested surgical fee (1,000 TSz)	0.005	0.021
No fee	0.004	0.013
Distance to nearest health care centre (km)	0.000	0.001

[a]OLS regression with robust standard errors. Bold coefficients indicate significance at the 5% level. Age dummies and community characteristics are included, as are dummies for missing values for all explanatory variables.

TABLE 5

GENDERWISE OLS REGRESSION OF LOG BODY MASS INDEX

COEFFICIENT ESTIMATES RELATED TO HEALTH CARE

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

	Girls		Boys	
Variable	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Immunizations available	*0.018*	*0.010*	*0.018*	*0.010*
Doctor	**0.036**	**0.010**	0.005	0.027
HIV test available	-0.010	0.020	0.003	0.023
Test laboratory	0.000	0.015	0.002	0.010
Operating room	0.041	0.026	-0.017	0.022
Electricity	0.000	0.013	-0.009	0.012
Circumcisions performed	-0.027	0.028	*0.043*	*0.024*
Appendectomy performed	*-0.033*	*0.017*	-0.019	0.034
Suggested surgical fee (1,000 TSz)	0.002	0.033	0.008	0.029
No fee	0.000	0.022	0.009	0.015
Distance to nearest health care centre (km)	0.000	0.001	0.000	0.001

[a]OLS regression with robust standard errors. Bold coefficients indicate significance at the 5% level while italics indicates

significance at the 10% level. Same conditioning set as in Table 4.

TABLE 6

SCHOOL ATTENDENCE PROBIT, SELECTED COEFFICIENT ESTIMATES
7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Specification I Marginal Effect	Specification I Standard Error	Specification II Marginal Effect	Specification II Standard Error
Personal and family characteristics				
Girl	0.031	0.032	0.043	0.031
Height (centimeters)	**0.017**	**0.004**	**0.017**	**0.004**
Weight (kilos)	0.000	0.008	0.002	0.009
Father alive	0.038	0.071	0.028	0.072
Mother alive	0.032	0.087	0.047	0.085
Father died within last 6 months	-0.149	0.118	-0.158	0.116
Mother died within last 6 months	0.141	0.138	0.108	0.141
Father some primary schooling	0.152	0.090	0.164	0.093
Father completed primary schooling	0.055	0.092	0.068	0.094
Father some secondary schooling	**0.395**	**0.154**	**0.445**	**0.113**
Father completed secondary schooling	0.181	0.110	0.214	0.105
Father adult education only	0.100	0.172	0.161	0.191
Father post secondary education	•	•	•	•
Mother some primary schooling	**0.203**	**0.105**	**0.242**	**0.099**
Mother completed primary schooling	**0.289**	**0.100**	**0.305**	**0.102**
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	**0.467**	**0.113**	**0.473**	**0.114**
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	**0.347**	**0.109**	**0.266**	**0.095**
Good floor	**0.188**	**0.063**	**0.170**	**0.067**
Family owns business	0.030	0.036	0.023	0.036
School characteristics				
Average number of students per room	-0.004	0.002	-0.003	0.002
Average number of boards per student	-6.016	5.240	-3.203	4.783
Average number of teachers per student	-4.047	3.684	-5.014	3.391
Distance to nearest (secondary) school	**-0.007**	**0.002**	**-0.005**	**0.001**
School fee (1,000 TSz)	**0.703**	**0.202**	**0.764**	**0.201**
Characteristics of nearest health care centre				
Immunizations available			-0.009	0.059
Doctor			**-0.325**	**0.050**
HIV test available			0.085	0.095
Test laboratory			**0.165**	**0.053**
Operating room			0.025	0.077
Electricity			**0.162**	**0.071**
Circumcisions performed			**-0.205**	**0.085**
Appendectomy performed			**0.317**	**0.074**
Suggested surgical fee (1,000 TSz)			**0.317**	**0.137**
No fee			**0.225**	**0.071**
Distance to nearest health care centre (km)			-0.008	0.005

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age dummies and community

characteristics are included, as are dummies for missing values for all explanatory variables.

TABLE 7

GENDERWISE SCHOOL ATTENDENCE PROBITS

SPECIFICATION II FROM TABLE 5

COEFFICIENT ESTIMATES RELATED TO HEALTH STATUS

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Girls		Boys	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Height	**0.022**	**0.006**	**0.016**	**0.006**
Weight	-0.007	0.010	0.009	0.012

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age dummies and community characteristics are included as are dummies for missing values for all explanatory variables.

TABLE 8

Data Survival Probit

Individuals Recovered in 2004 among

7-10 Year Olds, KHDS Sample 1991-1994

Variable	Marginal Effect	Standard Error
Personal and family characteristics		
Girl	-0.024	0.029
Height (centimeters)	-0.002	0.003
Weight (kilos)	0.010	0.008
Father alive	0.043	0.038
Mother alive	0.072	0.044
Father died within last 6 months	•	•
Mother died within last 6 months	•	•
Father some primary schooling	-0.041	0.061
Father completed primary schooling	**-0.111**	0.053
Father some secondary schooling	-0.020	0.165
Father completed secondary schooling	0.105	0.059
Father adult education only	-0.124	0.158
Father post secondary education	•	•
Mother some primary schooling	0.111	0.052
Mother completed primary schooling	-0.021	0.047
Mother some secondary schooling	•	•
Mother completed secondary schooling	-0.002	0.187
Mother adult education only	•	•
Mother post secondary education	•	•
Value of livestock (100,000 TSz)	**0.311**	0.110
Good floor	-0.058	0.045
Family owns business	-0.013	0.032
Characteristics of nearest health care centre		
Immunizations available	0.119	0.071
Doctor	-0.159	0.142
HIV test available	0.133	0.107
Test laboratory	•	•
Operating room	0.079	0.204
Electricity	0.022	0.059
Circumcisions performed	-0.075	0.241
Appendectomy performed	0.068	0.100
Suggested surgical fee (1,000 TSz)	0.000	0.000
No fee	-0.070	0.069
Distance to nearest health care centre (km)	-0.005	0.004

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age
 dummies and community characteristics are included, as are dummies for missing values
 for all explanatory variables.

TABLE 9

Early Adulthood Outcomes
Marginal Effects Related to Health Status
Individuals Recovered in 2004 among
7-10 Year Olds, KHDS Sample 1991-1994

Early Adulthood Outcome	Marginal Effect *Height*	Standard Error	Marginal Effect *Weight*	Standard Error
Girls:				
Marriage Status	0.000	0.005	**0.023**	0.012
- conditioning on quality of health care	-0.006	0.007	**0.034**	0.015
Primary School Completion	**0.014**	0.006	**-0.023**	0.011
- conditioning on quality of health care	**0.017**	0.006	**-0.027**	0.012
Secondary School Participation	0.005	0.004	-0.006	0.009
- conditioning on quality of health care	0.005	0.004	-0.006	0.008
Ability to Read	**0.010**	0.005	*-0.015*	0.009
- conditioning on quality of health care	**0.011**	0.004	*-0.016*	0.008
Ability to Write	**0.011**	0.005	*-0.016*	0.009
- conditioning on quality of health care	**0.011**	0.004	*-0.016*	0.008
Labor Market Participation	0.000	0.002	0.000	0.004
- conditioning on quality of health care	0.000	0.024	0.000	0.030
Boys:				
Marriage Status	0.002	0.004	0.012	0.010
- conditioning on quality of health care	0.002	0.004	0.011	0.009
Primary School Completion	0.004	0.005	-0.002	0.012
- conditioning on quality of health care	0.002	0.006	0.003	0.013
Secondary School Participation	**0.007**	0.004	-0.013	0.009
- conditioning on quality of health care	*0.006*	0.004	-0.012	0.009
Ability to Read	-0.003	0.004	0.003	0.010
- conditioning on quality of health care	-0.005	0.004	0.010	0.010
Ability to Write	-0.003	0.005	0.004	0.010
- conditioning on quality of health care	-0.005	0.004	0.011	0.010
Labor Market Participation	0.005	0.005	-0.004	0.012
- conditioning on quality of health care	0.008	0.006	-0.011	0.013

[a]Probits with robust standard errors. Bold (italic) effects indicate significance at the 5% (10%) level. Personal and family characteristics, age and time dummies, along with community characteristics are included, as are dummies for missing explanatory variables.

TABLE A1

MARRIAGE PROBIT, MEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Specification I		Specification II	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	0.002	0.004	0.002	0.004
Weight (kilos)	0.012	0.010	0.011	0.009
Father alive	0.042	0.052	0.024	0.044
Mother alive	-0.047	0.069	-0.041	0.060
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	0.076	0.097	0.094	0.094
Father completed primary schooling	-0.061	0.062	-0.030	0.054
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	0.000	0.094	-0.018	0.073
Father adult education only	0.047	0.224	0.073	0.217
Father post secondary education	•	•	•	•
Mother some primary schooling	0.022	0.105	0.024	0.090
Mother completed primary schooling	0.006	0.071	0.015	0.062
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	-0.072	0.142	-0.037	0.125
Good floor	0.007	0.067	0.005	0.060
Family owns business	**-0.186**	0.039	**-0.140**	0.035
Characteristics of nearest health care centre				
Immunizations available			-0.097	0.109
Doctor			**-0.170**	0.063
HIV test available			0.118	0.228
Test laboratory			•	•
Operating room			**-0.580**	0.049
Electricity			0.028	0.077
Circumcisions performed			**0.994**	0.001
Appendectomy performed			-0.036	0.084
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			0.011	0.083
Distance to nearest health care centre (km)			-0.002	0.005

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age dummies and community characteristics are included, as are dummies for missing values for all explanatory variables.

TABLE A2

Marriage Probit, Women

Individuals Recovered in 2004 among

7-10 Year Olds, KHDS Sample 1991-1994

Variable	Specification I		Specification II	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	0.000	0.005	-0.006	0.007
Weight (kilos)	0.023	0.012	**0.034**	0.015
Father alive	-0.037	0.072	-0.033	0.077
Mother alive	-0.056	0.079	-0.101	0.083
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	0.046	0.112	0.105	0.115
Father completed primary schooling	**-0.238**	0.099	-0.202	0.109
Father some secondary schooling	-0.373	0.208	-0.354	0.219
Father completed secondary schooling	-0.161	0.157	-0.170	0.159
Father adult education only	-0.124	0.158	•	•
Father post secondary education	•	•	•	•
Mother some primary schooling	0.122	0.116	0.096	0.129
Mother completed primary schooling	0.024	0.098	-0.009	0.105
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	0.015	0.355	0.095	0.348
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	**-0.334**	0.157	-0.301	0.169
Good floor	**-0.182**	0.087	-0.170	0.092
Family owns business	-0.049	0.060	-0.034	0.064
Characteristics of nearest health care centre				
Immunizations available			-0.124	0.138
Doctor			-0.391	0.207
HIV test available			-0.152	0.265
Test laboratory			•	•
Operating room			**-0.966**	0.008
Electricity			-0.098	0.118
Circumcisions performed			**0.931**	0.010
Appendectomy performed			0.347	0.158
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			-0.063	0.143
Distance to nearest health care centre (km)			0.003	0.009

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age

dummies and community characteristics are included, as are dummies for missing values

for all explanatory variables.

TABLE A3

SECONDARY SCHOOL PARTICIPATION PROBIT, MEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

	Specification I		Specification II	
Variable	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	0.007	0.004	0.006	0.004
Weight (kilos)	-0.013	0.009	-0.012	0.009
Father alive	-0.010	0.046	-0.021	0.046
Mother alive	-0.011	0.054	-0.011	0.051
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	0.151	0.115	0.157	0.115
Father completed primary schooling	0.149	0.087	0.123	0.083
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	0.219	0.125	0.168	0.119
Father adult education only	0.449	0.273	0.595	0.313
Father post secondary education	•	•	•	•
Mother some primary schooling	-0.057	0.060	-0.047	0.057
Mother completed primary schooling	0.034	0.065	0.046	0.067
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	**0.241**	0.098	0.174	0.100
Good floor	**0.113**	0.066	0.087	0.064
Family owns business	0.046	0.039	0.039	0.038
Characteristics of nearest health care centre				
Immunizations available			0.001	0.074
Doctor			0.241	0.280
HIV test available			0.169	0.258
Test laboratory			•	•
Operating room			0.202	0.315
Electricity			0.045	0.078
Circumcisions performed			-0.082	0.150
Appendectomy performed			**-0.157**	0.035
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			0.014	0.071
Distance to nearest health care centre (km)			-0.002	0.005

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age
dummies and community characteristics are included, as are dummies for missing values
for all explanatory variables.

SECONDARY SCHOOL PARTICIPATION PROBIT, WOMEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

	Specification I		Specification II	
Variable	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	0.005	0.004	0.005	0.004
Weight (kilos)	-0.006	0.009	-0.006	0.008
Father alive	0.001	0.049	0.005	0.047
Mother alive	0.045	0.046	0.040	0.044
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	•	•	•	•
Father completed primary schooling	0.126	0.091	0.130	0.092
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	0.039	0.115	0.041	0.111
Father adult education only	0.198	0.358	0.202	0.397
Father post secondary education	•	•	•	•
Mother some primary schooling	-0.093	0.046	-0.080	0.045
Mother completed primary schooling	0.010	0.065	0.002	0.060
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	0.068	0.089	0.024	0.085
Good floor	**0.210**	0.080	**0.158**	0.076
Family owns business	0.005	0.039	-0.017	0.036
Characteristics of nearest health care centre				
Immunizations available			-0.049	0.092
Doctor			0.130	0.195
HIV test available			0.184	0.257
Test laboratory			•	•
Operating room			•	•
Electricity			0.015	0.069
Circumcisions performed			**0.987**	0.048
Appendectomy performed			**-0.117**	0.047
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			0.040	0.090
Distance to nearest health care centre (km)			0.000	0.005

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age
dummies and community characteristics are included, as are dummies for missing values
for all explanatory variables.

TABLE A5

PRIMARY SCHOOL COMPLETION PROBIT, MEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

	Specification I		Specification II	
Variable	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	0.004	0.005	0.002	0.006
Weight (kilos)	-0.002	0.012	0.003	0.013
Father alive	0.024	0.069	-0.008	0.069
Mother alive	**0.230**	0.082	**0.222**	0.085
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	-0.005	0.107	-0.029	0.110
Father completed primary schooling	0.003	0.092	-0.023	0.095
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	**0.241**	0.082	**0.207**	0.088
Father adult education only	•	•	0.595	0.313
Father post secondary education	•	•	•	•
Mother some primary schooling	0.037	0.117	0.019	0.119
Mother completed primary schooling	0.134	0.082	0.126	0.082
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	0.094	0.153	0.098	0.152
Good floor	0.043	0.079	0.044	0.081
Family owns business	**0.130**	0.054	**0.115**	0.055
Characteristics of nearest health care centre				
Immunizations available			-0.082	0.123
Doctor			-0.346	0.241
HIV test available			0.188	0.161
Test laboratory			•	•
Operating room			**0.856**	0.022
Electricity			0.091	0.104
Circumcisions performed			**-0.977**	0.004
Appendectomy performed			0.053	0.158
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			0.038	0.130
Distance to nearest health care centre (km)			**-0.015**	0.007

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age

dummies and community characteristics are included, as are dummies for missing values

for all explanatory variables.

TABLE A6

PRIMARY SCHOOL COMPLETION PROBIT, WOMEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Specification I		Specification II	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	**0.014**	0.006	**0.017**	0.006
Weight (kilos)	**-0.023**	0.011	**-0.027**	0.012
Father alive	0.009	0.064	-0.025	0.062
Mother alive	-0.007	0.072	0.050	0.078
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	-0.075	0.105	-0.179	0.116
Father completed primary schooling	0.024	0.094	-0.046	0.104
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	**-0.306**	0.150	**-0.370**	0.155
Father adult education only	•	•	•	•
Father post secondary education	•	•	•	•
Mother some primary schooling	-0.002	0.105	0.090	0.086
Mother completed primary schooling	0.080	0.079	0.103	0.070
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	0.084	0.231	0.088	0.210
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	-0.005	0.142	-0.039	0.137
Good floor	0.019	0.078	-0.005	0.080
Family owns business	0.079	0.051	0.051	0.052
Characteristics of nearest health care centre				
Immunizations available			-0.026	0.127
Doctor			**0.265**	0.107
HIV test available			-0.157	0.258
Test laboratory			•	•
Operating room			-0.273	0.340
Electricity			**0.177**	0.078
Circumcisions performed			0.049	0.291
Appendectomy performed			-0.002	0.166
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			-0.076	0.110
Distance to nearest health care centre (km)			0.002	0.007

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age

dummies and community characteristics are included, as are dummies for missing values

for all explanatory variables.

TABLE A7

LABOUR MARKET PARTICIPATION PROBIT, MEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Specification I		Specification II	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	0.005	0.005	0.008	0.006
Weight (kilos)	-0.004	0.012	-0.011	0.013
Father alive	0.064	0.062	0.055	0.064
Mother alive	-0.097	0.078	-0.126	0.082
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	**-0.176**	0.077	**-0.178**	0.074
Father completed primary schooling	0.015	0.087	0.014	0.089
Father some secondary schooling	0.070	0.352	0.130	0.374
Father completed secondary schooling	-0.107	0.094	-0.114	0.093
Father adult education only	0.312	0.271	0.244	0.319
Father post secondary education	•	•	•	•
Mother some primary schooling	0.114	0.131	0.064	0.129
Mother completed primary schooling	0.024	0.089	-0.002	0.088
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	**-0.691**	0.217	**-0.672**	0.218
Good floor	-0.034	0.073	-0.014	0.079
Family owns business	0.018	0.054	0.039	0.057
Characteristics of nearest health care centre				
Immunizations available			0.133	0.108
Doctor			0.426	0.255
HIV test available			-0.080	0.212
Test laboratory			-0.069	0.090
Operating room			•	•
Electricity			-0.067	0.106
Circumcisions performed			-0.132	0.299
Appendectomy performed			-0.190	0.110
Suggested surgical fee (1,000 TSz)			-0.001	0.000
No fee			-0.107	0.149
Distance to nearest health care centre (km)			0.008	0.008

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age
dummies and community characteristics are included, as are dummies for missing values
for all explanatory variables.

TABLE A8

LABOUR MARKET PARTICIPATION PROBIT, WOMEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Specification I		Specification II	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	0.000	0.002	0.000	0.011
Weight (kilos)	0.000	0.004	0.000	0.014
Father alive	-0.043	0.035	-0.005	0.890
Mother alive	0.038	0.017	0.005	0.884
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	0.042	0.052	0.003	0.552
Father completed primary schooling	0.009	0.044	0.001	0.229
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	•	•	•	•
Father adult education only	•	•	•	•
Father post secondary education	•	•	•	•
Mother some primary schooling	0.080	0.076	0.019	2.966
Mother completed primary schooling	-0.017	0.032	-0.001	0.173
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	**0.117**	0.050	0.023	4.259
Good floor	-0.018	0.026	-0.001	0.257
Family owns business	0.011	0.022	0.001	0.199
Characteristics of nearest health care centre				
Immunizations available			0.294	23.495
Doctor			**1.000**	0.004
HIV test available			-0.016	10.313
Test laboratory			-0.004	0.715
Operating room			-0.154	16.200
Electricity			-0.001	0.196
Circumcisions performed			0.878	13.829
Appendectomy performed			-0.013	8.129
Suggested surgical fee (1,000 TSz)			0.000	0.003
No fee			-0.033	4.924
Distance to nearest health care centre (km)			0.000	0.010

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age

dummies and community characteristics are included, as are dummies for missing values

for all explanatory variables.

TABLE A9

SELF-ASSESSED READING ABILITY PROBIT, MEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Specification I		Specification II	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	-0.003	0.004	-0.005	0.004
Weight (kilos)	0.003	0.010	0.010	0.010
Father alive	0.012	0.060	0.028	0.055
Mother alive	**0.242**	0.082	**0.220**	0.082
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	-0.047	0.097	-0.048	0.089
Father completed primary schooling	-0.021	0.083	-0.031	0.077
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	•	•	•	•
Father adult education only	•	•	•	•
Father post secondary education	•	•	•	•
Mother some primary schooling	0.043	0.091	0.025	0.082
Mother completed primary schooling	0.086	0.064	0.059	0.059
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	-0.030	0.133	-0.053	0.120
Good floor	**0.138**	0.053	**0.118**	0.044
Family owns business	**0.104**	0.046	**0.082**	0.042
Characteristics of nearest health care centre				
Immunizations available			-0.104	0.074
Doctor			-0.038	0.191
HIV test available			0.015	0.166
Test laboratory			•	•
Operating room			•	•
Electricity			0.034	0.078
Circumcisions performed			**-0.991**	0.016
Appendectomy performed			-0.006	0.120
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			0.076	0.104
Distance to nearest health care centre (km)			-0.004	0.006

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age
dummies and community characteristics are included, as are dummies for missing values
for all explanatory variables.

TABLE A10

SELF-ASSESSED READING ABILITY PROBIT, WOMEN

INDIVIDUALS RECOVERED IN 2004 AMONG

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

	Specification I		Specification II	
Variable	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	**0.010**	0.005	**0.011**	0.004
Weight (kilos)	-0.015	0.009	-0.016	0.008
Father alive	0.021	0.054	-0.004	0.046
Mother alive	-0.010	0.060	0.014	0.059
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	0.069	0.062	0.001	0.073
Father completed primary schooling	**0.124**	0.048	0.078	0.047
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	0.019	0.106	-0.013	0.106
Father adult education only	•	•	•	•
Father post secondary education	•	•	•	•
Mother some primary schooling	-0.008	0.091	0.054	0.057
Mother completed primary schooling	0.041	0.067	0.056	0.050
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	0.214	0.155	0.164	0.121
Good floor	0.054	0.061	0.032	0.057
Family owns business	**0.084**	0.041	0.071	0.037
Characteristics of nearest health care centre				
Immunizations available			0.043	0.116
Doctor			**0.176**	0.063
HIV test available			-0.096	0.239
Test laboratory			•	•
Operating room			**0.597**	0.057
Electricity			0.095	0.057
Circumcisions performed			**-0.996**	0.001
Appendectomy performed			0.028	0.099
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			**-0.130**	0.064
Distance to nearest health care centre (km)			0.004	0.006

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age dummies and community characteristics are included, as are dummies for missing values for all explanatory variables.

TABLE A11

Self-Assessed Writing Ability Probit, Men
Individuals Recovered in 2004 among
7-10 Year Olds, KHDS Sample 1991-1994

	Specification I		Specification II	
Variable	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	-0.003	0.005	-0.005	0.004
Weight (kilos)	0.004	0.010	0.011	0.010
Father alive	0.015	0.061	0.029	0.056
Mother alive	**0.246**	0.083	**0.226**	0.082
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	-0.059	0.099	-0.060	0.093
Father completed primary schooling	-0.031	0.085	-0.036	0.078
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	•	•	•	•
Father adult education only	•	•	•	•
Father post secondary education	•	•	•	•
Mother some primary schooling	0.048	0.091	0.031	0.082
Mother completed primary schooling	0.090	0.064	0.061	0.060
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	-0.198	0.109	-0.177	0.106
Good floor	**0.129**	0.055	**0.110**	0.047
Family owns business	**0.104**	0.047	0.082	0.042
Characteristics of nearest health care centre				
Immunizations available			-0.100	0.076
Doctor			-0.140	0.219
HIV test available			0.089	0.114
Test laboratory			•	•
Operating room			•	•
Electricity			0.013	0.082
Circumcisions performed			**-0.991**	0.017
Appendectomy performed			0.005	0.117
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			0.094	0.106
Distance to nearest health care centre (km)			-0.006	0.005

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age
dummies and community characteristics are included, as are dummies for missing values
for all explanatory variables.

TABLE A12

SELF-ASSESSED WRITING ABILITY PROBIT, WOMEN
INDIVIDUALS RECOVERED IN 2004 AMONG
7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

Variable	Specification I		Specification II	
	Marginal Effect	Standard Error	Marginal Effect	Standard Error
Personal and family characteristics				
Heigth (centimeters)	**0.011**	0.005	**0.011**	0.004
Weight (kilos)	-0.016	0.009	-0.016	0.008
Father alive	0.019	0.055	-0.004	0.046
Mother alive	-0.010	0.060	0.014	0.059
Father died within last 6 months	•	•	•	•
Mother died within last 6 months	•	•	•	•
Father some primary schooling	0.070	0.062	0.001	0.073
Father completed primary schooling	**0.124**	0.049	0.078	0.047
Father some secondary schooling	•	•	•	•
Father completed secondary schooling	0.019	0.107	-0.013	0.106
Father adult education only	•	•	•	•
Father post secondary education	•	•	•	•
Mother some primary schooling	-0.004	0.090	0.054	0.057
Mother completed primary schooling	0.046	0.066	0.056	0.050
Mother some secondary schooling	•	•	•	•
Mother completed secondary schooling	•	•	•	•
Mother adult education only	•	•	•	•
Mother post secondary education	•	•	•	•
Value of livestock (100,000 TSz)	0.217	0.156	0.164	0.121
Good floor	0.054	0.062	0.032	0.057
Family owns business	**0.088**	0.041	0.071	0.037
Characteristics of nearest health care centre				
Immunizations available			0.043	0.116
Doctor			**0.176**	0.063
HIV test available			-0.096	0.239
Test laboratory			•	•
Operating room			**0.597**	0.057
Electricity			0.095	0.057
Circumcisions performed			-0.996	0.001
Appendectomy performed			0.028	0.099
Suggested surgical fee (1,000 TSz)			0.000	0.000
No fee			**-0.130**	0.064
Distance to nearest health care centre (km)			0.004	0.006

[a]Probit with robust standard errors. Bold effects indicate significance at the 5% level. Age
dummies and community characteristics are included, as are dummies for missing values
for all explanatory variables.