On the Quality of Health Care and Educational Outcomes in a Developing Country.

Marianne Simonsen*
Department of Economics
University of Aarhus

Flory Kessy
Economic and Social
Research Foundation (ESRF)

February 2006
Preliminary - please do not quote!

Abstract

This paper investigates early childhood human capital investment in a developing country. We consider the effect of quality of health care prior to school enrollment on subsequent educational outcomes using a high quality randomised survey from the Kagera region, a particularly remote and HIV-plagued area of Tanzania. Our resuls indicate a positive relation between access to immunization within the community and health outcomes measured by the body mass index. Furthermore, we find that height significantly affects the probability of attending primary school.

JEL Classifications:

Keywords: Health Care, Quality, Education, Africa

Acknowledgements:

*Corresponding address: Marianne Simonsen, Dept. of Economics, University of Aarhus, Building 326, 8000 Aarhus C, Denmark. Email: msimonsen@econ.au.dk. Phone: +45 8942 1599. Fax: +45 8613 6334.

1 Introduction

As pointed out by Schultz (1999) both health and education are critical for productivity and, ultimately, for growth because they are both, in effect, types of human capital investments. Furthermore, he provides evidence that health status as well as educational enrollment is low in Africa. Similar concerns for developing countries in general are expressed in a recent paper by Behrman, Cheng & Todd (2004); here, the authors consider whether early childhood investments in human capital result in subsequent improved child health outcomes as well as cognitive skills. In particular, Behrman et al. (2004) analyse the effect of participating in a preschool program, that provides day care, child nutrition, and educational services

An alternative type of early childhood human capital investment is provision of health care. Since health status and educational attainment are likely interrelated, the question naturally arises if a child that has been exposed to higher quality health care will have a higher propensity to go to school and thus subsequently add to both individual and country level well-being. This paper considers this link between health care and educational outcomes, hence informing on the scope for improving health care. The underlying hypothesis is that exposure to a higher quality health care system increases health and thereby school enrollment. Specifically, we investigate the effect of health care quality on health status as measured by the body mass index in addition to the effect of health status on primary school enrollment. A similar line of thought is found in Alderman, Hoogeveen & Rossi (2005) and Alderman, Hoogeveen & Rossi (2006) who argue that nutritional interventions during childhood has a positive effect on health status and that childhood stunting negatively affects subsequent learning.

To investigate the relation between health care and health and educational outcomes, we exploit a high-quality randomised survey from the Kagera region in Tanzania. Importantly, the data set represents a smaller area reducing the probability of prevalence of unobserved diseases in one area compared to another. The data constitutes a panel in that it includes surveys of households during 1991-1994. See Ainsworth, Beegle & Koda (2005) for a description of these four waves. The data holds a rich set of community characteristics on health care and education as well as individual and household specific information. We consider a sample of children aged 7-10 in 1991-1994.

Clearly, the task of uncovering the link between health care investments and educational attainment is not simple nor immediately resolved. Importantly, it requires measures of the quality of health care. Mwabu, Ainsworth & Nyamete (1993) consider the effects of

quality of medical care and choice of medical treatment in Kenya and point to the need for considering various measures of the quality factor. Fortunately, our data set includes such information and the information is available for all respondents, not only for households taking up the service.

In addition, we need to secure that a potentially positive relation between better health care and school enrollment is not just an artefact of, for example, higher community income leading to higher quality health care, higher propensities of school enrollment - and possible higher quality schooling. To accomodate this we include measures for quality of health care in the community in the model for primary school enrollment to proxy unobserved factors, which explain both participation as well as health.

Parental background information is crucial for empirically modelling school enrollment. Ainsworth et al. (2005) and Beegle, Weerdt & Dercon (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 line with our hypothesis, the results indicate a positive relation between access to immunization within the community and health outcomes measured by the body mass index. Furthermore, we find that height significantly affects the probability of attending primary school. We conclude, therefore, that access to better health care not only affects health but also indirectly schooling outcomes.

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 The Kagera Health and Development Survey (KHDS), which is a representative household panel from 1991-1994. 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 which became more glaring during the 1990s.

In 1988, the region had a total population of about 1.3 million. 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 form dropping out are identified as truancy, but also pregnancy and death are important. 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 915 households in addition to community, primary school, and health facility 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).

We consider an initial sample consisting of children aged 7-10 in 1991-1994. As in Ainsworth et al. (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 estimation sample.

[TABLE 1 ABOUT HERE]

Though compulsory, we see that only 39% of the children in our sample are enrolled in school. 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 absense 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 orphants (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 community 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 enrollment.[1]

[FIGURE 1 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 wish to estimate the relation between health care characteristics and anthropometrics as well as the relation between anthropometrics and shooling.

Consider first health care characteristics and anthropometrics. To account for fact that weight and height are intimitely related, we choose as anthropometric outcome the

[1] This relation also holds for weight.

logaritm of the BMI (see also Pitt (1997) and Foster (1994) for examples using the BMI as health measures).[2] Our measures of health care characteristics all inform on *access* (or avaibility) 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:

$$\log(BMI) = pers \cdot \beta + health\ care \cdot \gamma + U, \tag{1}$$

where *pers* is a set of personal and family characteristics including gender, 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 laboraty, and operating room and distance to nearest health care facility. Furthermore, we condition on level of suggested surgical fee. Alderman, Behrman, Lavy & Menon (2001) suggest that (lagged) price variation is exogenous to health status. However, 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, Z, we estimate 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 three 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.[3]

One possible concern is whether households with favourable unobserved characteristics settle in areas with good health care, which would bias our results. Given the tight clan bonds, however, we do not expect proximity to health facilities to be a determining factor in settling pattern and thus do not expect such a bias to be large. Another potential point of criticism is that the sample of 7-10 year olds is selected in the sense that they are *survivors*. 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 enrollment. We allow for individual effects of both

[2] 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 health. Therefore it is important to use a measure explicitly accounting for both height and weight.

[3] Running a fixed effects panel data model renders the coefficients of interest virtually unchanged but the standard errors increase in line with theory.

height and weight on primary schooling attendence and estimate the following model:

$$S^* = pers \cdot \delta_1 + school \cdot \delta_2 + height \cdot \delta_3 + weight \cdot \delta_4 + V, \tag{2}$$

where again *pers* is a set of personal and family characteristics and *school* is a set of school characteristis 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.[4] 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

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

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 enrollment (such as quality of schooling) is correlated with factors explaining health outcomes (such as quality of health care). To accomodate the point we re-estimate the school enrollment probit including the set of health care characteristics:

$$S^* = pers \cdot \delta_1 + school \cdot \delta_2 + health\ care \cdot \gamma + height \cdot \delta_3 + weight \cdot \delta_4 + V. \tag{3}$$

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

4 Estimation Results

Quality of Health Care and Health Status

Table 2 shows the results from a 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.

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

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 body mass index 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 that it is common practice for relatives in Tanzania to *absorb* orphans into their own households.

Importantly, we find that immunizations available at the nearest health care centre significantly increases the BMI with 1.6%. This result is robust to a number of specifications including leaving out the other characteristics of health care. 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 2 ABOUT HERE]

Because there may be differential patterns for girls and boys in for example take-up of health care we consider genderwise specifications. Table 3 shows the estimated effects of health care characteristics on BMI for each gender. Re-estimating the model renders the parameter estimates related to immunization virtually unchanged 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, quite intuitively, access to circumcisions is potentially an important factor **(reference here)**. 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 3 ABOUT HERE]

Health Status and Primary School Enrollment

We next consider primary school participation. Table 4 shows marginal effects (evaluated at the mean) from probit models of school enrollment in our sample. We estimate

school enrollment conditioning again on personal and family characteristics in addition to school characteristics. These results are presented in the first column of Table 4 under Specification I. Of particular interest is the effect of height on school attendence, where we observe a marginal effect of 1.6%. That is, there seems to be a clear effect of health status on school attendence, why investments in health care potentially not only affect health outcomes but also has an indirect - and positive - effect on schooling. Weight does not have a significant effect on school enrollment, 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 attendence. Also, the distance to school has a significantly negative effect. Primary school fees have a significantly positive effect on school enrollment, 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 attendence. 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 attendence 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 4 under Specification II. We see that though we do find correlation between school attendence and health care characteristics, inclusion has no effect at all on the estimated effect of height.

[TABLE 4 ABOUT HERE]

To investigate the robustness of our specification we again consider genderwise models. Table 5 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 enrollment is slightly, but not significantly, higher for girls than for boys.

[TABLE 5 ABOUT HERE]

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 immunizations within the community significantly increase health status. For girls we find that also access to a doctor in the nearby community significantly increase the body mass index. For boys, access to circumcisions seems to contribute positively to health status.

Further, we analyse the effect of health status on primary school participation. The results here indicate a highly sigificant effect of height on school enrollment no matter the gender. The conclusion, therefore, is that quality of health care not only improves health status but also has an indirect effect on schooling outcomes. To account for the fact that health status may be endogenous to school enrollment 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. We conclude, therefore, that quality of health care not only affects health status but also indirectly schooling outcomes.

The analyses carried out in this paper concern short run outcomes yet it is likely that health status has a permanent effect on for example labour market participation, wages, and income in general. In future work we plan to investigate such long run outcomes exploiting a 2004 follow-up survey to the data set applied in this paper.

References

Ainsworth, M., Beegle, K. & Koda, G. (2005), 'The Impact of Adult Mortality and Parental Deaths on Primary Schooling in Northwestern Tanzania', *Journal of Development Studies* **41**, 412–439.

Ainsworth, M., Koda, G., Lwihula, G., Mujinja, P., Over, M. & Semali, I. (1992), Measuring the Impact of Fatal Adult Illness in Sub-Saharan Africa. Living Standards Measurement Study no. 90, The World Bank.

Alderman, H., Behrman, J. R., Lavy, V. & Menon, R. (2001), 'Child Health and School Enrollment: A Longitudinal Analysis', *Journal of Human Resources* **36**, 185–205.

Alderman, H., Hoogeveen, J. & Rossi, M. (2005), Reducing child malnutrition in tanzania. World Bank Policy Research Working Paper 3567.

Alderman, H., Hoogeveen, J. & Rossi, M. (2006), Long Term Education Benefits form Improved Early Childhood Nutrition. Mimeo, The World Bank.

Beegle, K., Weerdt, J. D. & Dercon, S. (2006), Orphanhood and the Long-Run Impact on Children. Mimeo, The World Bank.

Behrman, J. R., Cheng, Y. & Todd, P. E. (2004), 'Evaluating preschool programs when length of exposure to the program varies: A nonparametric approach', *The Review of Economics and Statistics* **86**(1), 108–132.

Cochrane, S. H., Leslie, J. & O'Hara, D. J. (1980), The effects of education on health. World Bank Staff Working Paper No. 405, Washington, DC.

Foster, A. D. (1994), 'Poverty and illness in low-income rural areas', *American Economic Review* **84**, 216–220.

Glewwe, P. (1999), 'Why does mother's schooling raise child health in developing countries?', *Journal of Human Resources* **34**, 124–159.

Haddad, L. & Bouis, H. (1991), 'The Impact of Nutritional Status on Agricultural Productivity: Wage Evidence from the Philippines', *Oxford Bulletin of Economics and Statistics* **53**, 45–68.

McKinnish, T. (Forthcoming), Panel Data Models and Transitory Fluctuations in the Explanatory Variable, *in* D. Millimet, J. A. Smith & E. J. Vytlacil, eds, 'Advances in Econometrics', Elsevier Science, Oxford, United Kingdom.

Mwabu, G., Ainsworth, M. & Nyamete, A. (1993), 'Quality of medical care and choice of medical treatment in kenya', *Journal of Human Resources* **18**, 838–862.

National Bureau of Statistics Tanzania (2002), Household Budget Survey 2000/2001, Technical report, National Bureau of Statistics, Dar es Salaam.

Pitt, M. M. (1997), 'Estimating the Determinants of Child Health when Fertility and Mortality are Selective', *The Journal of Human Resources* **32**, 129–158.

Schultz, P. T. (1981), *Economics of Population*, Addison-Wesley Pub. Co., MA.

Schultz, T. P. (1999), 'Health and schooling investments in africa', *Journal of Economic Perspectives* **13**, 67–88.

Thomas, D. & Strauss, J. (1997), 'Health and Wages: Evidence on Men and Women in Urban Brazil', *Journal of Econometrics* **77**, 159–185.

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
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
# observations	2201	

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

FIGURE 1

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

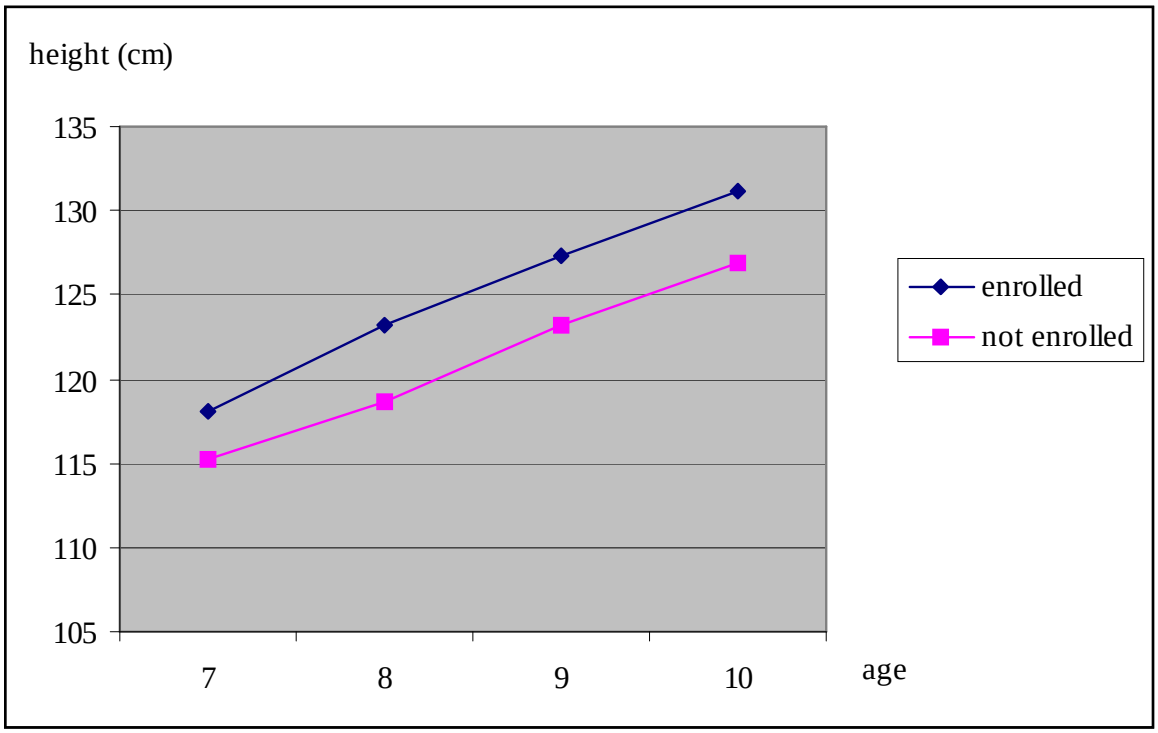

TABLE 3

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	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	0.000	0.000
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 and community characteristics are included as are dummies for missing values for all explanatory variables.

TABLE 4

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. Age and community characteristics are included as are dummies for missing values for all explanatory variables.

TABLE 5

School Attendence Probit, Selected Coefficient Estimates

7-10 Year Olds, KHDS Sample 1991-1994

Variable	Specification I		Specification II	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Personal and family characteristics				
Girl	0.031	0.032	0.043	0.031
Heigth (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 coefficients indicate significance at the 5% level. Age and community characteristics are included as are dummies for missing values for all explanatory variables.

TABLE 6

GENDERWISE SCHOOL ATTENDENCE PROBITS

SPECIFICATION II FROM TABLE 5

COEFFICIENT ESTIMATES RELATED TO HEALTH STATUS

7-10 YEAR OLDS, KHDS SAMPLE 1991-1994

	Girls		Boys	
Variable	Coefficient Estimate	Standard Error	Coefficient Estimate	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 coefficients indicate significance at the 5% level. Age and community characteristics are included as are dummies for missing values for all explanatory variables.