

**Boys and Girls' Changing Educational Opportunities in Thailand:
The Effects of Siblings, Migration and Village Location**

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Abstract

This paper uses unique data to explore, at multiple levels, the correlates and causes of increasing educational opportunity and declining gender inequality in education in rural Thailand. We examine three correlates of educational opportunity that are of theoretical and empirical interest: sibling number, gender, migration and the relative location of primary and secondary schools. The relationship among these correlates and children's educational opportunities is considered through the lens of the household economy literature in the context of social change and economic development in Thailand. The longitudinal data capture one period of rapid economic development in Thailand between 1984 and 1994 and include information about more than 5,000 households, their members, and the 51 communities in which they live.

Changing Educational Opportunities in Thailand: The Effects of Gender, Siblings, Migration, and Village Location

Introduction

As developing societies are integrated into the global economy, the perceived value of education tends to increase in national governments, communities, families, and among individuals. Individuals' levels of educational attainment tend to rise as a result, though the paths towards increasing educational attainment are not always linear and not all members of a population are equally affected. Differences between boys' and girls' educational attainments are one of the most common expressions of this inequality in which boys are more often favored for continued schooling (United Nations Development Program 1995; King 1991; King and Hill 1991). Until recently this was also the case in Thailand.

Periods of rapid economic development began in Thailand during the 1980s, and early evidence showed girls' total levels of education continuing to lag behind the educational attainments of boys' (Suvannathat 1989). Recent data analysis from the 1990 census, however, indicates a narrowing or closing of the gender gap across all levels of schooling, except at the tertiary level where there has been a crossover and a growing gap in favor of girls (Knodel 1997). The mechanisms through which economic development leads to changing levels of educational attainment have not yet been completely explained. Knodel (1997) suggests that these trends result partially from changing attitudes about family size and son preference and changes in the socioeconomic context that favor both men's and women's labor force participation. His conclusions are drawn from a series of focus groups held throughout Thailand at the end of the 1980s and the

beginning of the 1990's, conclusions, which have not been rigorously tested with quantitative data. This study is uniquely situated to follow-up on Knodel's qualitative insights with a quantitative, longitudinal study that investigates the question; how have Thais' educational levels changed over time by gender and what factors help to explain those changes?

We draw on three different literatures to derive hypotheses about the importance of sibling characteristics, household economics, and community resources for predicting educational attainment and changes in educational attainment in Thailand during the ten-year period (1984-1994) in which there was the most dramatic shift. We examine hypotheses about whether changes in the number of siblings influenced changing educational opportunities. We also examine the role of migration among other household members for either inhibiting or promoting educational attainment. Finally, we examine community level resources for their possible influence upon educational attainment, including relative location of primary and secondary schools (including changes in relative location over time). This limited set of variables is derived from an examination of the broader literatures about the character of economic and social change in Thailand, the literature about fertility declines and the value of children, and the literature about intra-household resource allocation. By examining the case of Thailand we hope to draw some lessons that might hold true for other settings or be suggestive of policy prescriptions in other developing country settings.

We apply our hypotheses to a data set, which has not been fully exploited, especially with regards to changes in educational attainment. The data are linked panel data from 1984 and 1994 of individuals (N=30,000+), households (N=5000+), and

communities (N=51) from one rural district in Northeastern Thailand. Information was collected at both time periods about all individuals and households in all of the communities. Although the data come from just one district in Northeastern Thailand, it is one of the largest districts, representative of one of the poorest regions of the country that has experienced the greatest change in social and economic development. Thus, we would expect to witness the most variability in both our dependent and independent variables over time. The timing of the data collection also offers a unique opportunity to test hypotheses, since there is no other data set, similarly situated with prospective capabilities in Thailand.

In the next section of the paper a brief description of the Thai context is provided, as well as an overview of the relevant literature on education in developing countries. A set of hypotheses is then generated which proposes explanations for the closing secondary education gap between boys and girls. This will be followed by a description of the data, definitions of variables, and the methodologies employed. The results of the analysis are discussed in light of the proposed hypotheses and related to previous research. A brief conclusion will summarize findings, suggest avenues for future research, and discuss implications for education and development policy.

Brief Background

Thailand is on the Indo-Chinese peninsula of Southeast Asia neighboring Malaysia, Burma, Cambodia, and Laos. Theravada Buddhism is the prominent religion though Islam is practiced in parts of the south (bordering Malaysia). It is also the only country of the region never to have been colonized. Its geographic location, cultural underpinnings, and historic past have been offered as explanations for a variety of social

and economic differences, especially concerning the relative status of women and the rapid rate of economic development which set it apart from its neighbors. Thailand experienced the fastest economic growth rate in the region during the 1980s with an average increase in Gross Domestic Product of 10% annually, though this rapid economic growth was not uniform (Warr 1993; Slagter and Kerbo 2000). Thailand remains a predominantly rural country with more than 65% of the populace living in the countryside. More than 30% of the rural population lives in absolute poverty and income inequality appears to be growing ((United Nations Development Program 1994; Warr 1993). Poor conditions are particularly evident in Northeast Thailand in which people are disadvantaged economically and educationally relative to the rest of the country, even into the late 1980s (Fry and Kempner 1996). No other study has compared gender across educational outcomes in the region, but the data for this analysis show that both boys and girls in the Northeast lag behind their counterparts in other parts of the country. The gender gap in education, however, is closing as it is in the country as a whole. Figures 1 through 3 show the narrowing of the education gender gap during the 1980's for the country as a whole and for the Northeast region, using data from the Thai National Statistical Office (the *Socio-Economic Survey*). Access to lower secondary school shows little difference for boys and girls at the national level, but in the Northeast the gap expands and narrows precisely during the time period covered by the survey we will be analyzing (Figure 1). Access to upper secondary school shows a longer period for which a gender gap exists at both the national and regional levels (Figure 2), and secondary school completion rates are significantly different for men and women at both the national and regional level throughout the 1980s but narrow in the early 1990s (Figure 3).

We seek to explain this change in access to schooling by looking prospectively at young people's education opportunities.

Before continuing further we should note something about the characteristics of the Thai schooling system. Between 1960 and 1978 primary education was mandatory through four grades, whereupon mandatory education became mandated through six years of schooling. Secondary education is divided into two levels, lower level and upper level, each for three years. In 1997, these mandatory levels were again changed and mandated through nine years of schooling. However, the building rate of the necessary school infrastructure has lagged significantly behind these mandated levels. It should be noted that dropout rates are low within any level and that the critical periods of decision-making are between primary and lower secondary and between lower and upper secondary.

Prior to the establishment of a uniform national education system at the beginning of the 20th century, literacy was gained through study in Buddhist temples and this opportunity was only available to males as part of preparation for entry into monkhood (Keyes 1991). Since the 1930's primary schooling was mandated for both boys and girls as a way to unite a disparate country and supersede local political power structures and local patronage systems (Keyes 1991). At this time, schooling became an entry point for access to a new source of patronage through the national government. Since the 1980s as Thailand's export oriented market driven economic policies became more important, education became crucially important for both men and women to achieve upward mobility. More recently, growing demands for higher skilled labor have increased the returns to secondary education investments, a previously under invested

sector in the Thai economy(Sussangkarn 1993). Returns to secondary education in the urban labor market are twice those of primary education (Sussangkarn 1993). However, gendered labor markets and not surprisingly, gender differences in education remain, especially in the Northeastern region of the country. Villagers in the study site are well aware of the gender differential in the labor market and its relationship to education. In 1992 an explanation offered by one 19 year-old woman, was an oft heard refrain:

One 19 year-old woman said in an in-depth interview: "If girls and boys finish 4th or 6th grade, usually girls will find work more easily because they can sew and usually industrial factories have sewing. A boy who finishes at this level will have trouble finding work."

And, another 24 year-old woman in a different in-depth interview said: "Most industrial factories want women. They only want men who have a high education, like artisans or professionals. They can then find work. Even if they finish 9th grade men have a hard time finding work."

Further, parents viewed education as a double-edged sword, as both an investment in non-agricultural futures and a challenge to traditional familial hierarchies associated with filial obligation and respect. As one young woman explained to me in 1992:

"My parents are conservative. They would not send their children. Back then even for 6th grade they would not send us. They said only go to 4th grade. We had already made my school uniform and they said there would not be anyone to work the fields. They said 'you study and then are naughty, you may have a husband too soon. Why should you study?' So, I did not go."

And in a focus group interview with women 40-55 years old, the following was said: I asked: "Your child who finished grade 6 and your child who finished high school, are they different from each other? Do they have different jobs?" One woman replied: "They are different. Those who study are unable to farm. They have enjoyed a comfortable life for a long time. However, those who finish grade 6, they can farm. They work harder. Those who study at a higher level do not work hard in the fields." Another woman added: "They do not like to farm, they like to other things. They like light work. They do not like strenuous jobs."

Despite these biases, which might work against girls' education opportunities, as Knodel has also noted(Knodel 1997), daughters are perceived as more diligent and harder

working at their studies. Thus, although they may have slightly lower risks of access to making the education transition from primary to lower secondary, once they have made it to lower secondary then they may be more likely to continue to upper secondary than boys.

Several things have changed within the Thai context and specifically in the Northeastern region that may suggest a possible diminishment in gender differences in education over the decades. First, fertility has declined dramatically. Although for a majority of the sample in this analysis, family sizes are still quite large, among the younger ages (6 to 8 year olds) sibling set size had fallen to two or three children per family rather than 4 or 5 children per family among the 10 to 12 year olds. Second, migration and particularly remittances, became a way to diversify risks in some cases, relieve an over supply of labor in others, and create an income stream used for savings or investment in non-farm assets, including education. Finally, the Thai government has shown concern for the low levels of educational attainment among children and links future educational attainment to brighter national economic prospects. The need to increase secondary education was mentioned in the Sixth Five Year Plan (1986-1991) and in the Seventh Five Year Plan (for 1992-1996) (Knodel 1997). In both cases, this meant greater school building. In the data for this analysis 20% of the boys and girls lived in villages where a new secondary school was built nearby, over the decade of study (1984-1994).

Hypotheses

In the broader literature on the gender gap in education explanations range across several different, but likely correlated, explanations. The first set of general explanations

is found at the family level including a value shift away from “tradition” towards “modernity”¹, a reduction in the opportunity costs associated with daughters’ household or farm labor, greater income returns to education, and a greater level of income that affords access to education for more children. A second set of general explanations is found at the community or national level where government investments in educational infrastructure and public transportation decrease the costs associated with schooling.

These general explanations can be grouped into three perspectives. The first is that with greater prosperity and more old age security a parents will invest more resources in children and value greater equality in those flows (Parish and Willis 1994; Becker 1981). We would expect, therefore, that greater household wealth would reduce gender inequality in educational access or increase girls’ access to secondary education. We add to this notion that it is also a reduction in the uncertainty of income flows and investments in non-agricultural wage labor that increases the likelihood of greater access to education. The idea derives from the household economics of migration literature whereby as incomes streams are diversified through migration, income uncertainties are reduced, wealth flows also increase and education becomes more available (Stark 1991; Massey 1990). Migration became an increasingly important social phenomenon in the region during the decade of the 1980s. Much of the migration from the Northeastern part of the country provided the factory and construction labor that contributed to Bangkok’s population and economic growth (Chamrathirong et al. 1995). Fieldwork experiences over the last ten years suggest that siblings and other household members claim to remit wages home in order to support their siblings’ education opportunities. However, one might also expect that migration experiences, especially positive ones may increase the

¹ This is also what Parish and Willis have called the “lingering patriarchy” effect (Parish and Willis 1994)

opportunity costs of schooling from the perspective of origin household members, especially if the labor market returns to low-skill migrant labor are relatively high. There are few studies that examine how migration impacts educational attainment from this perspective (one exception is an analysis of international migration upon Bangladeshi women's status, where remittances increase education and the status of women(Hadi 2001).

A second perspective is the resource dilution hypothesis(Blake 1989), which suggests that greater family size will reduce education opportunities for all, but especially for older siblings. Thus, we would expect that smaller family sizes reduce gender inequality, especially for daughters. One difficulty with this perspective is that family size and educational outcomes are endogenously related. That is smaller families may be a function of a higher valuation of education and a shift in the "quantity-quality" tradeoff. Although we cannot address this endogeneity problem through a modeling technique, we do include as a control, measures of educational attainment among adult members of the household. In previous research, Knodel and colleagues have found significant negative effects of family size upon educational attainment, because the costs of childrearing are primarily those of the couple (Knodel and Wongsith 1991). Further, through qualitative field work and analysis of cross-sectional survey data they find that the explanation lies with the quantity-quality value shift.

Finally, the context within which these decisions are made may also be important. The proximity of secondary school opportunities may decrease opportunity costs and expose parents and children to new ideas and opportunities. We know of no other study that has evaluated the impact of school establishment upon the educational opportunities

of youth in developing countries, particularly its impact upon girls' educational attainment.

Data and Methodology

Overview

To explain the shifts in both primary school completion and increases in secondary school enrollment, this study will analyze two waves of the Nang Rong Survey, 1984 and 1994². As described earlier, the data are a matched file of individuals, households, and villages. The data about individuals comes from a complete household census in 51 villages in the Nang Rong district, Buriram Province. The household census includes those people who were present in the village during the 1984 survey and those who moved into the village in 1994. Some data were also collected about individuals who were no longer living in the village in 1994 but were living in the village in 1984.

Our analysis begins by examining educational attainment for each panel and then longitudinally from 1984 to 1994. We then examine a set of correlates that might predict educational attainment by 1994 for those at risk of gaining more education but who had only achieved primary schooling or less in 1984 (6-12 year olds). Our analysis will then compare the relative effect of our independent variables (gender, sibling size, the addition of siblings between 1984 and 1994, household migration experience, presence of migrant remittance income, and relative location of primary and secondary schools and the building of new schools between 1984 and 1994) upon educational attainment. Thus, we expect to gain insights on the relative importance of a variety of factors that help explain the closing of the gender gap in education in rural Thailand.

The data for this analysis draws initially on a sample of 16-19 year olds in 1984 and a similar sample of 16-19 year olds in 1994. We then examine 1994 educational attainment levels among 6-12 year olds in 1984 limited to those who had not completed more than a primary school level in 1984. Among this second group several caveats must be mentioned. The matching of cases across the two panels is of relatively high quality. Of an initial sample of 6,652 6-12 year olds in 1984 with primary schooling or less, we lost 12% of the cases to sample attrition because entire households moved away and were not followed. The resulting reduction of the sample size to 5,837 was further limited by 2.6% because of a lack of information about siblings³.

Educational Attainment

In Table 1 we first compare educational attainment for 16-19 year old young men and women between 1984 and 1994. This age group is most likely to have gained some secondary education (7-12th grade). Looking at the 1984 differences in educational attainment, the gender differences are significant. Among boys 10.33% completed some lower secondary schooling, whereas only 5.87% of girls have done so. The differences are less dramatic for upper secondary schooling. Among boys 9.25% completed upper secondary schooling and 7.09% of girls have done so. These differences diminish by 1994. In fact, by 1994 girls appear to have a slight advantage. When we compare boys and girls' educational attainment between 1984 and 1994, however, boys make greater

² Information about this survey and data are available from the following:

<http://www.cpc.unc.edu/projects/nangrong/>

³ Most of the information about siblings came from a separate data collection instrument used in 1994, which asked about sibling age, sex, and location (line number in the household or current district or province or country). This instrument was applied to current household members in 1994 who were 18-35 years old – but to only one member of the sibling set. Among the sample used in this analysis 56.23% of the cases used sibling information from this source. Another 33% of the cases were migrants in 1994 and so were their siblings. Using information from the migrant portion of the data collection we were able to recover 70% of the sibling information for these respondents. Finally, for 8.4% of the cases we were able

gains than girls, especially in terms of access to upper secondary education (see Table 2). Among 6 to 12 year-olds with primary schooling or less in 1984, 8.33% of the girls have completed some lower secondary schooling by 1994 and a slightly higher proportion of boys have done so (9.84%). The gender differences are slightly greater for upper secondary schooling, where 9.13% of girls have some upper secondary schooling and 11.14% of boys have the same. The continued gap in girls' educational attainment in Table 2, which is not apparent in Table 1, is driven by the older cohort of youth (20-22 years old in 1994) included in Table 2, but not Table 1.

(Table 1 and 2 About Here)

Explanations for Closing the Gender Gap

As mentioned earlier there are several explanations for possible changes in the gender gap in educational attainment. We attempt to test these explanations with variables available on the Nang Rong data set. To test the resource dilution hypothesis or changing family size effect, we employ several different variables and test them separately. The first variable measures the total number of siblings as of 1984. The second measure categorizes sibling size. Others have suggested that the relationship between sibling set size and intra-household resource allocation is curvilinear (Morduch 2000). That is at small sibling set sizes there are greater resources, which are equally distributed. As sibling sizes grow so does inequality as the resource base may not change, but not everyone has access to the same resources. Finally, as sibling set size grows larger, it is likely that the resource base per capita is so diminished that no one will have access to any extra resources. Although these conclusions have been drawn from data about nutrition and health, it is probably just as likely a scenario for an even scarcer

to reconstruct sibling structures using information collected on the household roster asking for mother and

and more costly resource such as education. A third measure testing the resource dilution hypothesis examines whether any more siblings were born between 1984 and 1994.

Table 3 displays the distributions of the independent variables used in the analysis for the whole sample and across boys and girls. On average everyone has almost four siblings and the modal category is four or more siblings. Only 8% of the sample gained siblings over the 10-year period.

(Table 3 About Here)

The measures of migration are meant to capture the effect of risk diversification or income smoothing, which may be important for increasing educational opportunities. We test three different forms of this measure in our model. Unfortunately, the survey instrument did not connect educational investments with remittances, and our measure only captures migration at one point in time at the beginning of the period. Further, the measure of migration is only for temporary migration, where a person continues to be a member of an origin household but has not lived there for 2-12 months. These moves are representative of a vast majority of moves in the region and the country (Chamratrithirong et al. 1995). We do know whether or not the migrant has sent or brought money back to the household and we know the sex of the migrants. Thus, we can test several different forms of migration, a general measure of household migration, one which disaggregates remitting migrants from non-remitting migrants, and one which further disaggregates migrants by sex. Fieldwork experience suggests that daughters tend to remit more than sons, although there is some evidence that this pattern has also changed in recent years (personal communication with Knodel, March 1998). Almost

father's line number.

17% of respondents in our sample live in a household where there is a temporary migrant. A slight majority of these are remitting migrants and most of them are male (see Table 3).

Our final set of measures examines the respondent's village location relative to the district town (the location of the first secondary school and the main market) and relative to the nearest secondary school in 1984 and in 1994. Our measure of remoteness incorporates aspects of the difficulty of travel to the district town. The village is considered to be remotely located the more obstacles to travel. The obstacles we include in our measure are the presence of a portion of the route to the district town that is a cart path (upaved, rutted, and narrow), the lack of public transportation to the district town, travel to the district town takes an hour or more (as reported by a village headman or key informant), that during the year there are four or months of difficult travel to leave the village (this is also a measure of road conditions and susceptibility to flooding), and it is 20 or more kilometers to the district town. We recoded this variable into three dummy measures, not at all remote (0 obstacles), somewhat remote (1-2 obstacles), and very remote 3-4 obstacles).

School location is also measured categorically. We compared respondents who lived in villages with no secondary school nearby at both time periods to respondents in villages that had a secondary school built nearby in 1994 and to respondents in villages where there was a nearby secondary school in both 1984 and 1994. Nearby is defined as a school being built within the sub-district, a relatively small, administratively and geographically bounded area.

Controlling for Age, Household Members' Education, Landholding, and Household Size
Our models control for the age of our respondent, other household members'

educational attainment, landholding, and household size. These variables represent the

kinds of measures that have been included in previous analyses explaining the gender gap. They are substantive interest, but the purpose of our paper is to re-test the resource dilution hypothesis, examine whether migration impacts educational attainment, and examine whether new schools narrow the gap. The latter two hypotheses have not been tested in the literature about Thailand or the general literature on the gender gap in education.

Analytical Approach

We use a multinomial logistic estimation technique to test three different models for each of our hypotheses and then we include a full model that we test across gender. All of the models take into account the fact that the data are clustered by village and therefore we adjust the standard errors accordingly. The first model tests the impact of sibling size and additional siblings upon educational attainment. The second model tests the impact of migration upon educational attainment. And the third model tests the impact of village location upon educational attainment. We evaluate the model relative to a base model that includes sex and the control variables:

$$\log (p (M_{ij}=k)/p (M_{ij}=1))=X_i b_k+ m_j$$

The dependent variable is the log-odds that an individual *i* in 1984 in village *j* gains lower secondary schooling or upper secondary schooling (*k*) relative to primary schooling (1) by 1994. The first term ($X_i b_k$) represents the vector of variables in the base model, specifically sex and the control variables. The other three models are:

1. Sibling model - $\log (p (M_{ij}=k)/p (M_{ij}=1))=X_i b_k+ Sib_i \alpha_k+ m_j$
2. Migration model - $\log (p (M_{ij}=k)/p (M_{ij}=1))=X_i b_k+ Mig_i \alpha_k+ m_j$
3. Village location model - $\log (p (M_{ij}=k)/p (M_{ij}=1))=X_i b_k+ School_i \alpha_k+ m_j$
4. Full model - $\log (p (M_{ij}=k)/p (M_{ij}=1))=X_i b_k++ Sib_i \alpha_k+ Mig_i \alpha_k+ School_i \alpha_k+ m_j$

We then test a full model with all variables for the pooled sample and for boys and girls separately. Our analysis of the results will include an evaluation of the coefficients for the variables of interest as well as to see how inclusion of the variables of interest impacts the relationship of gender with educational attainment. Finally we will compare whether the full model is significantly different in its impact for boys and girls.

Discussion of Results

We first discuss our baseline model, which includes a measure of gender and the control variables. The base model in Table 1, model 1, shows that being a girl significantly lowers the odds of lower secondary schooling relative to primary schooling and lowers the odds of upper secondary schooling relative to primary schooling. However, there are no significant differences between boys and girls regarding the likelihood of upper secondary versus lower secondary.

The control variables show effects in expected directions. Age significantly lowers the odds of secondary schooling. Landless or near landless also reduces educational opportunities. Living in a household with a motorcycle significantly improves the odds of educational attainment, quite substantially. Lower educational attainment among other adults in the household lowers the odds of secondary educational attainment and, not surprisingly, so does household size.

Gender, Sibset Size and Educational Attainment

Table 4 displays the results for the full model and the models for sibset size. Results presented are odds-ratios for ease of interpretation. Model 2 incorporates a measure of total sibset size, which not surprisingly, lowers the odds of secondary

schooling. Model 3 tests a somewhat different functional form of sibset size by categorizing the values. There is still a relatively linear and negative association with continued schooling and sibset size. Finally, model 4 tests the impact of an additional sibling between 1984 and 1994. The impact is only observed for comparison between lower secondary and primary, suggesting that once a decision is made to continue schooling it's unlikely another sibling will disrupt or change those opportunities.

There is little to no impact of including the various measures of sibship size upon the relationship of gender and educational attainment. The gender differences remain for the first two comparisons and the gender similarities remain for the third comparison. The addition of the sibset size measures, however, significantly improves model fit.

(Table 4 About Here)

Gender, Migration and Educational Attainment

Three different models are evaluated regarding the impact of migration upon educational attainment (see Table 5). The first model tests whether having any temporary migrant improves educational attainment. There is no significant effect, in this case of a migrant upon educational attainment. However, when the effect of migration is parsed between those households where there is a non-remitting migrant and those households with a remitting migrant, we observe that there is a positive impact of a non-remitting migrant upon educational attainment. Finally, in model 3 we observe whether the effect of migration varies depending on the sex of the migrant. In this case, the effects are weaker, but still significantly improve model fit relative to the baseline model (Table 4, model 1). Interestingly, it is not having a female migrant that improves educational opportunities, but a male non-remitting migrant. Both models 2 and 3 significantly

improve the fit of the baseline model, however, the addition of these variables does not change the relationship between gender and educational attainment.

(Table 5 About Here)

Gender, Schools, Village Location and Educational Attainment

Table 6 displays the results of the village level variables upon educational attainment. Interestingly, the school variables have little effect upon educational attainment. Although both are positive they do not significantly increase educational attainment. However, if a village is remotely located relative to the main district town, the odds of secondary schooling are significantly reduced, by more than 60% for lower secondary relative to primary and upper secondary relative to primary schooling (Model 2 in Table 6). Adding location characteristics to the model also appears to have no differential effect upon the relationship between gender and educational attainment.

Our last model of the impact of village location tests whether it is the combination of school construction and remoteness that might make a difference. In fact this appears to be the case, although the results are not entirely consistent. Table 7 displays the predicted probabilities for the equation estimated in Model 3 of Table 6. What we can observe is that the positive effect of school construction is most important for those in villages that are not at all remote.

(Table 6 and Table 7 About Here)

Finally, we test a full model of explanations for changes in access to educational attainment. In this model we include all the variables that specify sibling composition, migration, and village location, as well as gender and the control variables. The specifications for each of the variables of interest take the best fitting form in the preceding estimations. The effects of the variables of interest upon educational

attainment remain unchanged. Further, even after including all of the variables that might explain gender differences in education, the gender gap remains and, in fact, becomes significant for the latter comparison between upper and lower secondary schooling.

Differences in Explanations For Boys and Girls

Despite the fact that the negative relationship between being a girl and educational attainment is not explained away by the addition of the sibset size, migration, or village location and school construction, it is still possible that some explanations are more important for boys than girls. To test this notion, we estimated our full model upon separate samples of boys and girls. We indeed find differences in effects between the two estimations. The importance of sibset size is significantly greater for girls than boys. Reducing their educational opportunities. The effect of migration is also more important for girls than boys. Having a male, non-remitting migrant in the household significantly improves a girl's educational opportunities, but not a boy's. On the other hand, the impact of school construction that we observed for the pooled sample is more important for boys than for girls. That is boys in villages that are not at all remote have significantly greater probabilities of having some upper secondary schooling.

(Table 8 and Table 9 About Here)

Conclusion: Interpretations and Implications

This analysis set forth to explain why the gender gap may have closed with regard to educational attainment in Thailand. We tested three possibilities for the closing of the gender gap. Decreasing family size, migration and its consequent impact upon income and resource demands, and school construction. The addition of these explanations to a

baseline model that indicates significant gender differences in educational attainment does not explain away the gender differences. These remain. However, a fully interactive estimation does suggest that some explanations are more important for girls' educational gains and others for boys'. Firstly, it appears that family size significantly diminishes a girl's educational attainment. This is nothing new in the literature. Migration, on the other hand does not predict educational attainment in the way we had expected. It appears having a male migrant who does not maintain ties to the household through remittances actually increases the educational opportunities of girls. One explanation may be that such a temporary migrant relieves resource constraints by simply not being around to consume them and therefore increases opportunities for all siblings. However, the effect is only significant for girls and only when the migrant is male. Again, since males are more likely to consume resources for education, on average, the out migration of a male may increase the educational resources available to a girl to a greater degree than the out migration of a sister who would not have laid claim to those educational resources anyway. The effects are somewhat small and one must be cautionary about this interpretation. Further, the measure of migration is relatively weak and doesn't take into account the cumulative impact of migration - which is likely to be greater than the somewhat more episodic measure included here.

The most surprising result from this analysis is the lack of effect of school construction upon educational attainment. This is puzzling. Over the time period no new schools were built nearby the very remote villages and most of the new schools were built near by somewhat remote villages. However, the greatest impact is felt for the boys living in villages that are not at all remote. The effect suggests a possible endogenous

relationship. Schools will be built where demand for schooling is greatest. This suggests that the potential for rapid school enrollment increases for girls at the secondary level is relatively low, at least initially. The endogeneity of the relationship is also suggested by the perception of schooling to be more important for boys than girls in terms of opportunities in the rapidly growing export manufacturing sector.

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Figure 1: Percentage of boys and girls age 12-15 with some lower secondary education, *Socio-Economic Survey*

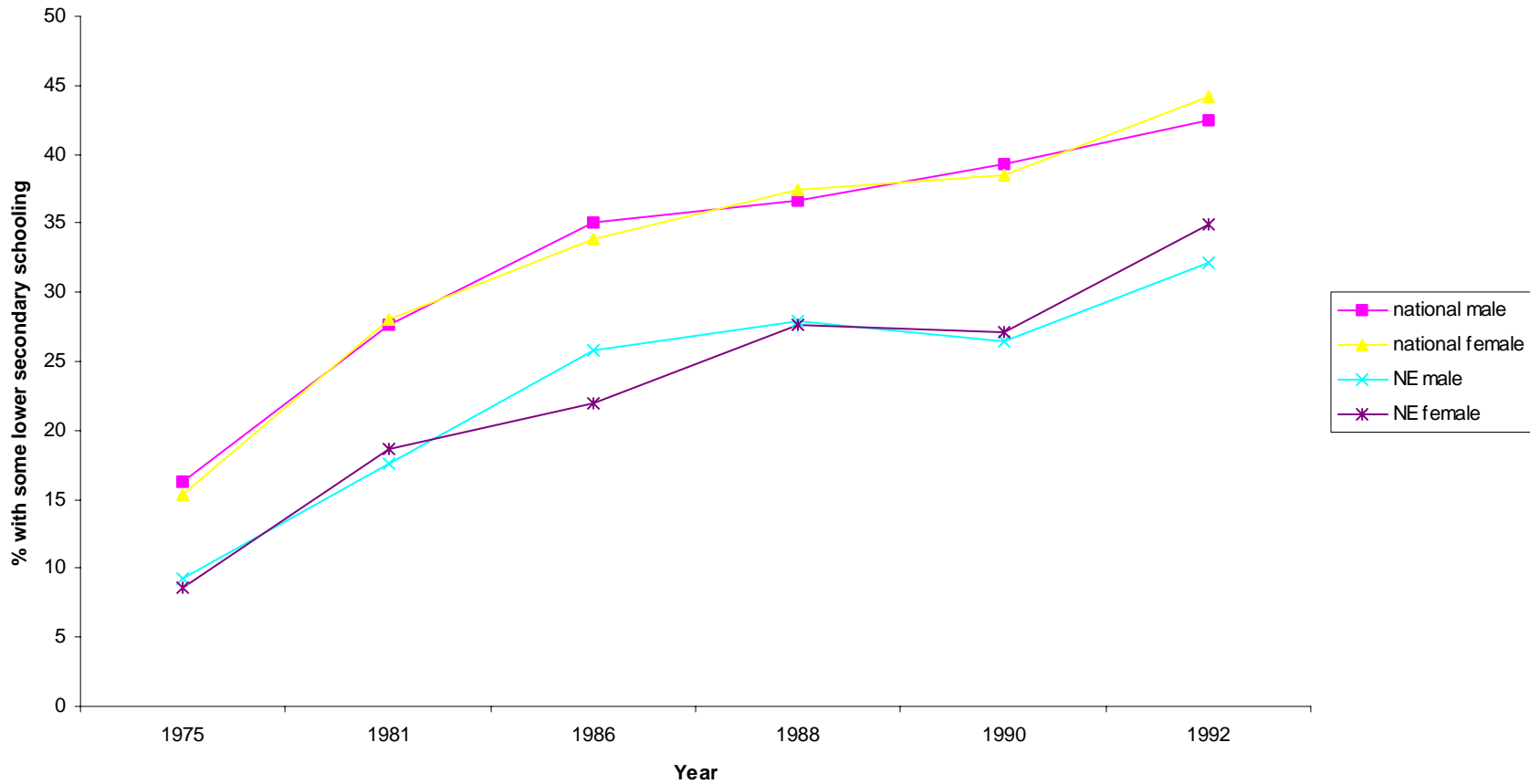


Figure 2: Percentage of boys and girls age 16-19 with some upper secondary education, *Socio-Economic Survey*

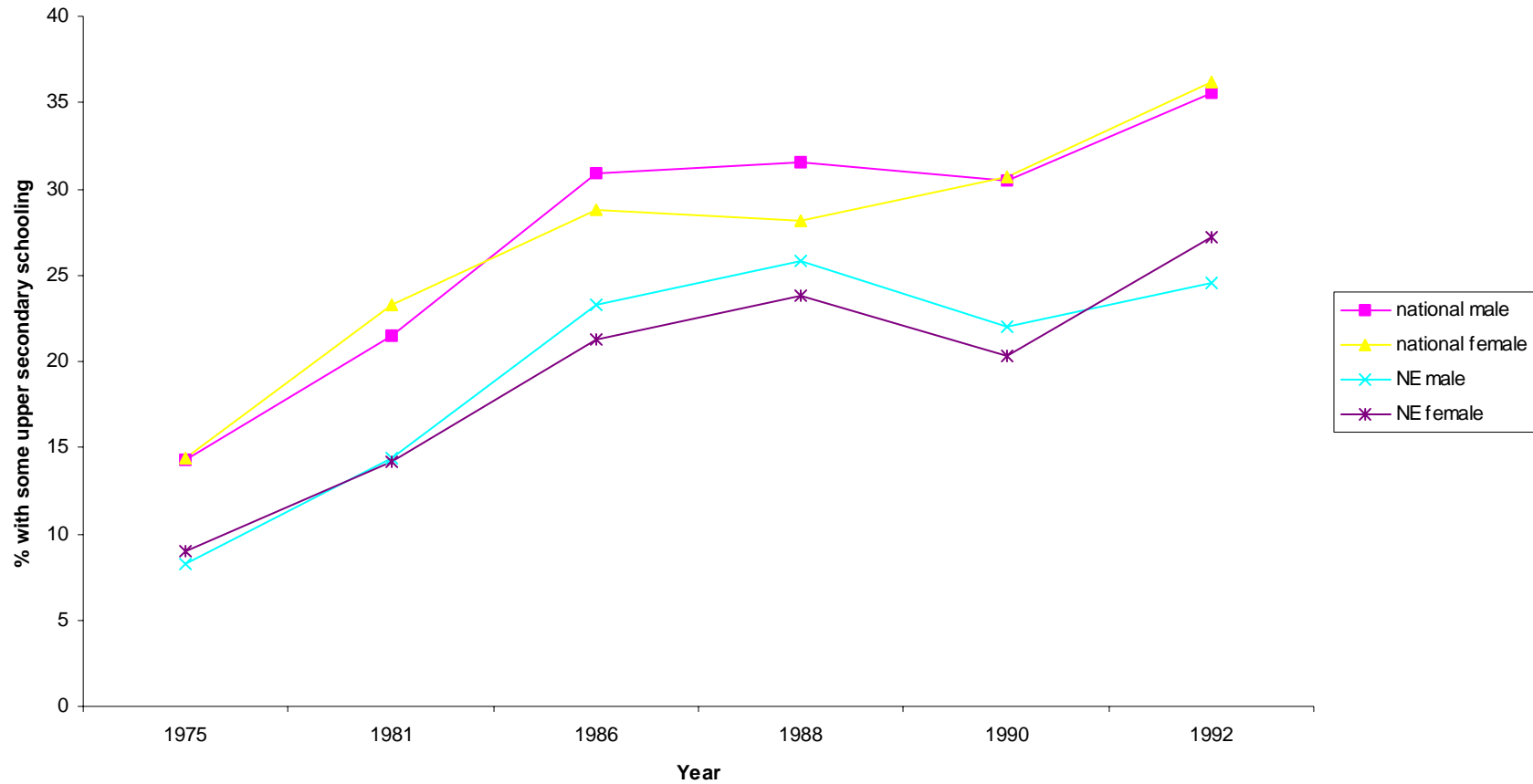


Figure 3: Boys and girls age 16-19 with secondary school degree, *Socio-Economic Survey*

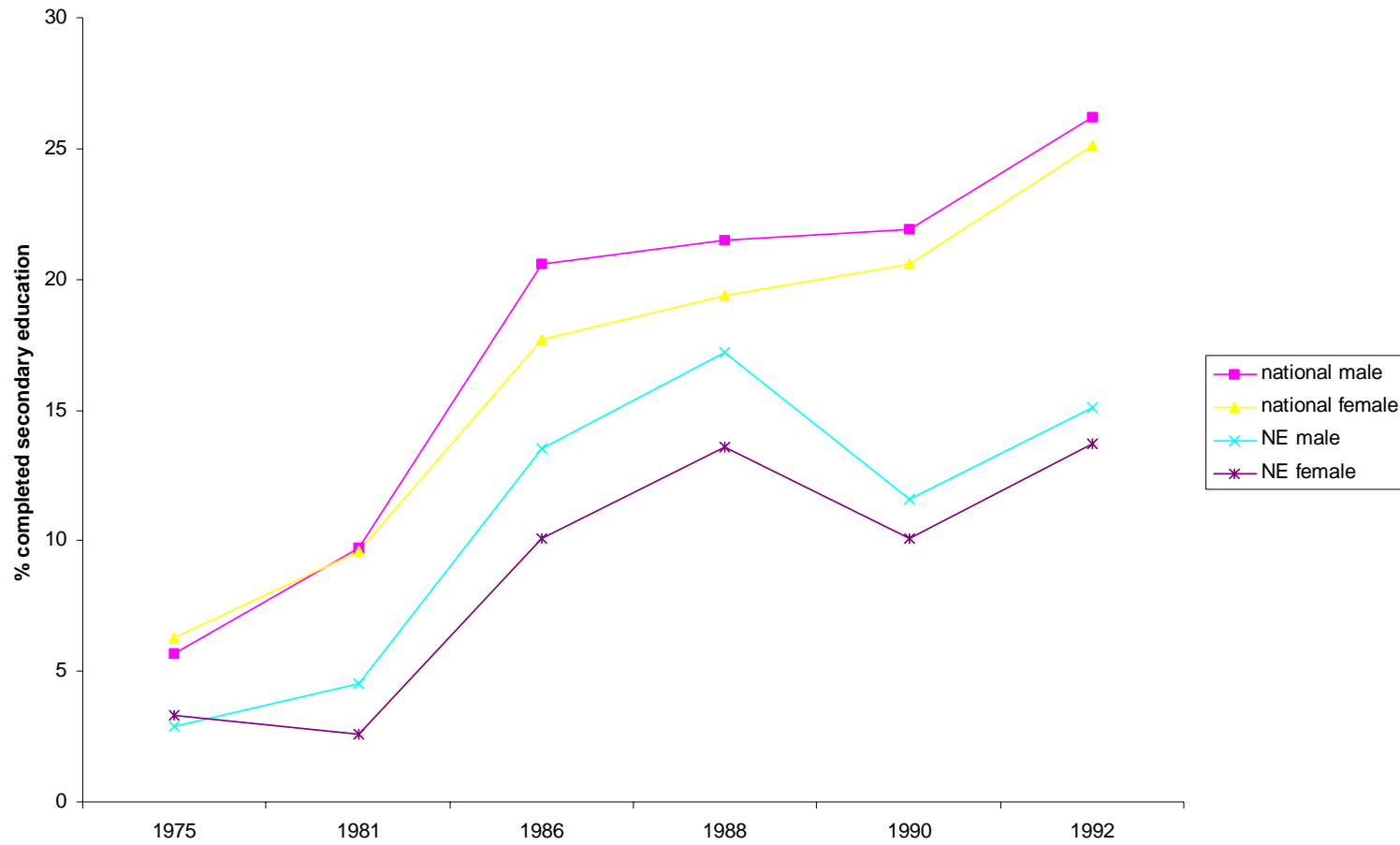


Table 1: Educational attainment among 16-19 year olds by sex, Nang Rong, Thailand 1984 and 1994

<i>Percentage</i>	<i>1984*</i>		<i>1994*</i>	
	Young Women	Young Men	Young Women	Young Men
Primary schooling or less (6 or fewer years)	87.04	80.42	76.25	78.44
Lower secondary schooling (7 to 9 years)	5.87	10.33	12.10	10.07
Upper secondary schooling (10 or more years)	7.09	9.25	11.65	11.48

* The gender differences in the 1984 schooling rates are significant with a X^2 value of 27.771 ($p=.001$) and non-significant in 1994 with a X^2 value of 3.292 ($p=.193$).

Table 2: Educational attainment by 1994 among 6-12 year olds with primary schooling or less in 1984, Nang Rong, Thailand*

<i>Years of Schooling in 1994</i>	Young Women	Young Men	Total
% with primary schooling or less	82.54	79.02	80.8
% with some lower secondary schooling	8.33	9.84	9.1
% with some upper secondary schooling	9.13	11.14	10.2
Total N	2878	2959	5837

*The gender differences in educational attainment between 1984 and 1994 are significant with a X^2 value of 11.847 ($p=.003$)

Table 3. Distribution of sibling characteristics, access to secondary schools, and other independent variables for 6-12 year old boys and girls in 1984, Nang Rong, Thailand

Variable	Boys	Girls	Total
<i>Sibling Number</i>			
Number of siblings in 1984	3.70 (2.02)	3.71 (2.11)	3.71 (2.06)
No siblings	1.96	2.78	2.36
One sibling	8.65	9.30	8.98
Two siblings	20.71	20.74	20.72
Three siblings	21.06	19.47	20.28
Four or more siblings	47.62	47.71	47.66
Any Additional Siblings 1984-1994	8.13	8.26	8.19
<i>Migration</i>			
At least one temporary migrant in 1984	16.93	16.54	16.74
At least one non-remitting migrant in 1984	8.21	7.99	8.11
At least one remitting migrant in 1984	9.94	9.80	9.87
<i>Sex Composition of Migrants</i>			
Female migrant in 1984	3.45	3.37	3.41
Remitting female migrant in 1984	4.87	4.59	4.73
Male migrant in 1984	6.02	6.01	6.01
Remitting male migrant in 1984	6.49	6.33	6.41
<i>Remoteness</i>			
Not at all remote in 1984	33.49	33.59	33.54
Somewhat remote in 1984	51.81	50.93	51.36
Very remote in 1984	14.69	15.48	15.09
<i>Schools</i>			
No Secondary School in 1984 or 1994	36.41	38.65	37.51
Secondary School in 1994 only	39.66	39.96	39.81
Secondary School in 1984 and 1994	23.93	21.40	22.68
<i>Land Ownership in 1984</i>			
10 or fewer rai	43.98	45.45	44.70
25 or more rai	29.52	31.01	30.25
Household owns a motorcycle in 1984 ^b	7.55	7.38	7.47
<i>Household Education in 1984</i>			
One adult with less than 4 years of school	22.82	21.57	22.21
Two or more adults with less than 4 years of school	9.50	8.16	8.84
Household size in 1984	7.00 (2.19)	6.95 (2.22)	6.98 (2.20)
Age	9.01 (2.02)	9.06 (1.97)	9.04 (1.99)
N	2959	2877	5836

Note: Values represent percentages or means (standard deviations).

Table 4: The role of sibship size for explaining educational attainment, multinomial logistic regression results (odds-ratios presented)

	Model 1 (gender)			Model 2 (number of siblings)			Model 3 (siblings in categorical form)			Model 4 (additional siblings)		
	Lwr vs. prim	Upr vs.prim	Upr vs. lwr	Lwr vs. prim	Upr vs.prim	Upr vs. lwr	Lwr vs. Prim	Upr vs.prim	Upr vs. lwr	Lwr vs. Prim	Upr vs.prim	Upr vs. lwr
Young Woman (vs. Young Man)	0.807 *	0.756 ***	0.937	0.787 *	0.768 **	0.976	0.783 *	0.768 **	0.981	0.786 *	0.768 **	0.978
Number of Siblings in 1984												
<i>Number of Siblings</i>	---	---	---	0.829 ***	0.868 ***	1.047	---	---	---	---	---	---
<i>No siblings</i>	---	---	---	---	---	---	2.479 *	1.790	0.722	2.216 **	1.719	0.776
<i>One sibling</i>	---	---	---	---	---	---	2.461 ***	2.181 ***	0.886	2.221 ***	2.102 ***	0.946
<i>Two siblings</i>	---	---	---	---	---	---	1.652 **	2.048 ***	1.240	1.515 **	1.987 ***	1.311
<i>Three siblings</i>	---	---	---	---	---	---	1.533 **	1.732 ***	1.130	1.468 **	1.707 ***	1.163
<i>(Four or more siblings)</i>	---	---	---	---	---	---	---	---	---	---	---	---
Any Additional Siblings 1984-1994	---	---	---	---	---	---	---	---	---	0.596 **	0.853	1.432
CONTROLS												
Age	0.797 ***	0.929 ***	1.166	0.820 ***	0.947 *	1.155 ***	0.822 ***	0.950 *	1.156 ***	0.819 ***	0.949 *	1.158 ***
Land Ownership (vs. 11-24 rai)												
<i>10 or fewer rai</i>	0.717 **	0.724 *	1.010	0.668 **	0.680 **	1.019	0.662 **	0.677 **	1.022	0.663 **	0.677 **	1.022
<i>25 or more rai</i>	1.140	1.292	1.134	1.142	1.306 *	1.143	1.133	1.300	1.147	1.125	1.296	1.152
Household owns a motorcycle	3.058 ***	7.435 ***	2.431	2.782 ***	7.139 ***	2.566 ***	2.801 ***	6.989 ***	2.496 ***	2.853 ***	7.041 ***	2.467 ***
Household Education (vs. one or more adults with more than 4 years of school)												
<i>One adult with less than 4 years of school</i>	0.740 *	0.687 *	0.928	0.692 *	0.665 **	0.961	0.696 *	0.658 **	0.946	0.699 **	0.659 **	0.942
<i>Two or more adults with less than 4 year of school</i>	1.019	0.823	0.808	0.787	0.742	0.943	0.819	0.727	0.887	0.831	0.730	0.879
Household size	0.912 ***	0.865 ***	0.949	1.022	0.951	0.931	1.000	0.964	0.964	0.992	0.961	0.969
Log Likelihood		-2626.1951				-2517.1776			-2510.7088			-2507.5937
Log Likelihood Ratio X ²		364.40 ***				439.81 ***			693.08 ***			852.23 ***
Pseudo R ²		0.0659				0.0697			0.0721			0.0732
X ² test comparison with model 1 in Table 4		---				18.85 ***			32.64 ***			39.33 ***

*p<=.1; ** p<=.05; ***p<=.01;

Table 5: The role of migration for explaining educational attainment, multinomial logistic regression results (odds-ratios presented)

	Model 1 (migration impact)			Model 2 (remittance impact)			Model 3 (sex composition of migrants)		
	Lwr vs. prim	Upr vs. prim	Upr vs. lwr	Lwr vs. prim	Upr vs. prim	Upr vs. lwr	Lwr vs. Prim	Upr vs. prim	Upr vs. lwr
Young Woman (vs. Young Man)	0.806 *	0.755 ***	0.937	0.806 *	0.758 **	0.939	0.807 *	0.757 ***	0.937
Migration (vs. no migrant in 1984)									
<i>Temporary migrant in 1984</i>	1.271	1.324	1.042	---	---	---	---	---	---
<i>Temporary migrant not remitting in 1984</i>	---	---	---	1.286	2.138 ***	1.662 *	---	---	---
<i>Remitting Migrant in 1984</i>	---	---	---	1.172	0.978	0.835	---	---	---
Sex Composition of Migrants (vs. No migrant in 1984)									
<i>Female Temporary Migrant</i>	---	---	---	---	---	---	0.752	1.736	2.308
<i>Female Remitting</i>	---	---	---	---	---	---	0.854	0.889	1.042
<i>Male Temporary Migrant</i>	---	---	---	---	---	---	1.351	1.842 **	1.363
<i>Male Remitting</i>	---	---	---	---	---	---	1.237	1.085	0.877
CONTROLS									
Age	0.796 ***	0.927 ***	1.165 ***	0.796 ***	0.926 ***	1.164 ***	0.796 ***	0.926 ***	1.164 ***
Land Ownership (vs. 11-24 rai)									
<i>10 or fewer rai</i>	0.711 **	0.718 **	1.011	0.713 **	0.723 **	1.014	0.711 **	0.719 **	1.010
<i>25 or more rai</i>	1.144	1.301	1.138	1.144	1.293	1.131	1.143	1.289	1.127
Household owns a motorcycle	3.078 ***	7.486 ***	2.432 ***	3.086 ***	7.677 ***	2.488 ***	3.069 ***	7.640 ***	2.490 ***
Household Education (vs. one or more adults with more than 4 years of school)									
<i>One adult with less than 4 years of school</i>	0.735 *	0.682 **	0.928	0.736 *	0.677 **	0.919	0.743 *	0.680 **	0.915
<i>Two or more adults with less than 4 year of school</i>	1.032	0.836	0.811	1.029	0.838	0.814	1.011	0.834	0.825
Household size	0.901 ***	0.853 ***	0.948	0.902 ***	0.848 ***	0.940 *	0.907 ***	0.849 ***	0.936 *
Log Likelihood		-2624.0671			-2619.879			-2620.2492	
Log Likelihood Ratio X ²		378.62 ***			375.60 ***			443.38 ***	
Pseudo R ²		0.0667			0.0681			0.0680	
X ² test comparison with model 1 in Table 4		2.66			12.41 **			17.69 **	

* p<=.05; **p<=.01;

Table 6: The role of village location for explaining educational attainment, multinomial logistic regression results (odds-ratios presented)

	Model 1 (access to schools)			Model 2 (remoteness)			Model 3 (full village location model)		
	Lwr vs. prim	Upr vs. prim	Upr vs. lwr	Lwr vs. Prim	Upr vs. prim	Upr vs. lwr	Lwr vs. prim	Upr vs. prim	Upr vs. lwr
Young Woman (vs. Young Man)	0.810	0.762 **	0.940	0.794 *	0.746 ***	0.939	0.788 *	0.746 ***	0.946
Access to Schools (vs. No School in 1984 or 1994)									
<i>School in 1994, but not 1984</i>	1.162	1.484	1.277	---	---	---	1.333	1.787 *	1.340
<i>School in 1984 and 1994</i>	1.128	1.349	1.196	---	---	---	0.846	1.026	1.214
Remote Village (vs. not at all remote)	---	---	---	0.930	0.735	0.790	1.152	0.891	0.774
<i>Somewhat remote</i>	---	---	---	0.344 ***	0.377 **	1.096	0.336 ***	0.408 **	1.213
<i>Very remote</i>									
Somewhat remote *School in 1994, but not 1984	---	---	---	---	---	---	0.547 *	0.564	1.032
CONTROLS									
Age	0.798 ***	0.931 **	1.167 ***	0.796 ***	0.925 ***	1.163 ***	0.794 ***	0.924 ***	1.164 ***
Land Ownership (vs. 11-24 rai)									
<i>10 or fewer rai</i>	0.712 **	0.714 **	1.002	0.720 *	0.734 *	1.019	0.706 **	0.706 **	0.999
<i>25 or more rai</i>	1.151	1.329 *	1.155	1.153	1.312 *	1.138	1.169	1.371 **	1.173
Household owns a motorcycle	3.037 ***	7.339 ***	2.417 ***	3.096 ***	7.433 ***	2.401 ***	3.044 ***	7.237 ***	2.377 ***
Household Education (vs. one or more adults with more than 4 years of school)									
<i>One adult with less than 4 years of school</i>	0.753 *	0.711 *	0.944	0.746 *	0.685 **	0.919	0.738 *	0.700 **	0.949
<i>Two or more adults with less than 4 year of school</i>	1.050	0.880	0.838	1.056	0.839	0.795	1.033	0.862	0.834
Household size	0.909 ***	0.859 ***	0.945 *	0.912 ***	0.870 ***	0.954	0.912 ***	0.865 ***	0.949
Log Likelihood		-2620.4464			-2595.7836			-2585.9804	
Log Likelihood Ratio X ²		352.29 ***			434.46 ***			435.72 ***	
Pseudo R ²		0.0680			0.0767			0.0802	
X ² test comparison with model 1 in Table 4		2.54			13.93 ***			19.17 ***	

* p<=.05; **p<=.01;

Table 7: Predicted Probabilities for the Effect of School Location Upon Educational Attainment

	<i>Probability of Educational Attainment by 1994</i>		
	Primary	Lower Secondary	Upper Secondary
<i>Not At All Remote</i>			
No Secondary School	.789	.107	.104
Secondary School Built by 1994	.715	.126	.159
Secondary School in 1984	.799	.092	.108
<i>Somewhat Remote</i>			
No Secondary School	.785	.123	.093
Secondary School Built by 1994	.809	.093	.097
Secondary School in 1984	.797	.106	.097
<i>Very Remote</i>			
No Secondary School	.904	.044	.053
Secondary School Built by 1994	.859	.054	.086

Table 8: All Explanations for the gender gap in educational attainment, multinomial logistic regression results (odds-ratios presented)

	Full Model (both boys and girls)		
	Lwr vs. prim	Upr vs. prim	Upr vs. lwr
Female	0.767 *	0.762 **	0.994 *
Sibling Number			
<i>No siblings</i>	2.047 *	1.630	0.796
<i>One sibling</i>	2.026 **	1.951 **	0.963
<i>Two siblings</i>	1.431 *	1.847 ***	1.290
<i>Three siblings</i>	1.445 *	1.701 **	1.177
<i>(Four or more siblings)</i>			
Any Additional Siblings 1984-1994	0.583 **	0.852	1.462
Sex Composition of Migrants			
<i>Female Temporary Migrant</i>	0.703	1.907	2.713
<i>Female Remitting</i>	0.786	0.569	0.723
<i>Male Temporary Migrant</i>	1.442	2.109 **	1.462
<i>Male Remitting</i>	1.424	1.163	0.816
Access to Schools (vs. No School)			
<i>School in 1994, but not 1984</i>	1.374	1.893 *	1.377
<i>School in 1984 and 1994</i>	0.866	1.099	1.269
Remote Village (vs. not remote at all)			
<i>Somewhat remote</i>	1.217	0.977	0.803
<i>Very remote</i>	0.333 **	0.418 **	1.255
Somewhat remote*School in 1994, but not 1984	0.514 *	0.545	1.061
CONTROLS			
Age	0.813 ***	0.938 **	1.154 ***
Land Ownership (vs. 11-24 rai)			
<i>10 or fewer rai</i>	0.643 **	0.653 **	1.016
<i>25 or more rai</i>	1.164	1.365 *	1.173
Household owns a motorcycle	2.858 ***	7.122 ***	2.493 ***
Household Education (vs. one or more adults with more than 4 years of school)			
<i>One adult with less than 4 years of school</i>	0.709 *	0.675 **	0.953
<i>Two or more adults with less than 4 year of school</i>	0.848	0.788	0.928
Household size	0.977	0.935	0.956
Log Likelihood		-2460.8701	
Log Likelihood Ratio X ²		2588.73 ***	
Pseudo R ²		0.0904	

*p<=.05; **p<=.01;

Table 9: Predicted Probabilities for the Effect of School Location Upon Educational Attainment

	<i>Probability of Educational Attainment by 1994</i>		
	Primary	Lower Secondary	Upper Secondary
<i>Not At All Remote</i>			
No Secondary School	.798	.105	.097
Secondary School Built by 1994	.720	.125	.155
Secondary School in 1984	.802	.091	.107
<i>Somewhat Remote</i>			
No Secondary School	.783	.124	.093
Secondary School Built by 1994	.809	.091	.100
Secondary School in 1984	.789	.108	.102
<i>Very Remote</i>			
No Secondary School	.908	.042	.051
Secondary School Built by 1994	.861	.053	.086

Table 10: Differences in explanations for educational attainment across girls and boys, multinomial logistic regression results (odds-ratios presented)

	Model 1 (girls)			Model 2 (boys)		
	Lwr vs. prim	Upr vs.prim	Upr vs. lwr	Lwr vs. Prim	Upr vs.prim	Upr vs. lwr
Sibling Number						
<i>No siblings</i>	2.879 **	2.429	0.844	1.446	0.983	0.680
<i>One sibling</i>	1.973 **	2.300 **	1.166	2.096 **	1.621	0.774
<i>Two siblings</i>	1.478	1.791 *	1.212	1.402	1.818 ***	1.297
<i>Three siblings</i>	1.926 **	2.541 ***	1.320	1.173	1.206	1.028
<i>(Four or more siblings)</i>	---	---	---	---	---	---
Any Additional Siblings 1984-1994	0.776	0.769	0.991	0.434 **	0.845	1.946
Sex Composition of Migrants						
<i>Female Temporary Migrant</i>	0.648	1.646	2.542	0.826	2.135	2.585
<i>Female Remitting</i>	0.839	0.389	0.464	0.753	0.674	0.895
<i>Male Temporary Migrant</i>	0.902	2.944 ***	3.266 *	1.774	1.695	0.956
<i>Male Remitting</i>	1.764	1.678	0.951	1.167	0.774	0.663
Access to Schools (vs. No School)						
<i>School in 1994, but not 1984</i>	1.408	1.791	1.272	1.331	1.979 *	1.487
<i>School in 1984 and 1994</i>	1.031	0.958	0.929	0.744	1.184	1.591
Remote Village (vs. not remote at all)						
<i>Somewhat remote</i>	1.055	0.859	0.815	1.326	1.085	0.818
<i>Very remote</i>	0.320 **	0.399 **	1.248	0.332 **	0.443 **	1.333
Somewhat remote*School in 1994, but not 1984	0.815	0.706	0.867	0.361 **	0.424 *	1.175
CONTROLS						
Age	0.803 ***	0.829 ***	1.032	0.829 ***	1.019	1.230 ***
Land Ownership (vs. 11-24 rai)						
<i>10 or fewer rai</i>	0.472 ***	0.799	1.693 *	0.785	0.540 ***	0.688
<i>25 or more rai</i>	1.528 ***	1.311	0.858	0.918	1.397 *	1.522 *
Household owns a motorcycle	2.205 ***	7.176 ***	3.254 ***	3.515 ***	7.334 ***	2.086 ***
Household Education (vs. one or more adults with more than 4 years of school)						
<i>One adult with less than 4 years of school</i>	0.575 **	0.697 *	1.212	0.806	0.634 *	0.787
<i>Two or more adults with less than 4 year of school</i>	0.670	0.909	1.357	1.009	0.682	0.677
Household size	1.027	0.926	0.902 *	0.940	0.930	0.990
Log Likelihood		-1104.232			-1104.232	
Log Likelihood Ratio X ²		2697.96 ***			2697.96 ***	
Pseudo R ²		0.1013			0.1013	

*p<=.05; **p<=.01;

Table 11: Predicted Probabilities for the Effect of School Location Upon Educational Attainment For Girls and Boys

	<i>Probability of Educational Attainment by 1994</i>		
	Primary	Lower Secondary	Upper Secondary
GIRLS			
<i>Not At All Remote</i>			
No Secondary School	.822	.085	.093
Secondary School Built by 1994	.751	.106	.143
Secondary School in 1984	.822	.088	.089
<i>Somewhat Remote</i>			
No Secondary School	.828	.091	.082
Secondary School Built by 1994	.803	.099	.098
Secondary School in 1984	.828	.094	.079
<i>Very Remote</i>			
No Secondary School	.922	.032	.046
Secondary School Built by 1994	.882	.043	.075
BOYS			
<i>Not At All Remote</i>			
No Secondary School	.774	.124	.103
Secondary School Built by 1994	.690	.142	.169
Secondary School in 1984	.784	.094	.122
<i>Somewhat Remote</i>			
No Secondary School	.741	.154	.105
Secondary School Built by 1994	.815	.085	.100
Secondary School in 1984	.756	.118	.126
<i>Very Remote</i>			
No Secondary School	.892	.050	.057
Secondary School Built by 1994	.839	.061	.100