# Has the One-Child Policy Improved Adolescents' Educational Wellbeing in China?

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## Abstract

One of the purposes of China's one-child policy is to improve child wellbeing. However, past studies overwhelmingly focus on policy effect on fertility, and thus, whether the policy has achieved this goal remains unclear. This paper explores the relationship between the one-child policy and educational wellbeing (measured as school enrollment and grade completion) among adolescent children in the 1990s, using CHNS data (1993-2000). Drawing on local variations in policy strength and sibship composition, I find a consistent, strong advantage of single children in school enrollment and grade completion relative to those with an older brother or 2+ siblings among children beyond compulsory education, regardless of residence and child gender. The quality of children decreases with quantity, particularly with the presence of an older brother. The results provide evidence to support the idea that restricting family size (but not necessarily one child per couple) and promoting sibling equality will necessarily help increase adolescents' educational wellbeing in developing settings.

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## INTRODUCTION

One of the purposes of the one-child policy in China is to improve child wellbeing. The government has taken strenuous effects to ensure that couples limit their fertility in exchange for high "quality" children – "give birth to fewer children, but give them better care and education." The underlying rationale is that more resources at the national, community and household levels would be available for children, and that children with fewer siblings would garner more resources and be better off in physical and intellectual development (Chen 1979; Peng 1997a; Wu 1997).

However, although the one-child policy is not only about fertility limitation, but also aims to improve child wellbeing, two factors limit studies on the relationship between the one-child policy and child (particularly adolescent) wellbeing. First, it is only recently that testing such long term outcomes of the one-child policy is possible due to the date of first implementation of the policy; second, researchers and policy makers both inside and outside China are mostly concerned with the policy effect on fertility (Gu et al. 2006; Qiao et al. 2005). Thus, it has been well acknowledged that the one-child policy has successfully curbed population growth: fertility is below replacement and the proportion of all births that are second and higher parity keeps falling (Guo et al. 2003; Zhang 1998). What is less known is the consequences of the policy beyond fertility. There is little question that the one-child policy, through legislating when couples can give birth and to how many children, shapes, in fundamental ways, Chinese family life (Short et al. 2001). This would in turn have implications for child wellbeing. Do children with no sibling, one sibling or two or more siblings, for example, differ in their wellbeing?

This paper focuses on one dimension of child wellbeing, education wellbeing, defined as school enrollment and grade completion, among adolescent children in a rapidly developing and low

fertility regime. Using data from multiple waves of the China Health and Nutrition Survey, it addresses three interrelated issues by exploring a broad range of factors at the community, household, and individual levels associated with child schooling. Is the one-child policy related to child school enrollment and grade completion? To what extent is it related to child education? What are the mechanisms for policy to affect child schooling?

My interest in child wellbeing in the context of the one-child policy regime necessitates that I take into account local variations in policy rules. The so-called one-child policy varies substantially across the nation. Drawing on direct measures of policy variations and sibship composition, I am able to evaluate the consequences of the one-child policy beyond fertility and make inferences about policy effects on children's educational wellbeing. Very few studies have empirically examined the relationship between the one-child policy and adolescents' education that includes direct local policy measures. This study also complements other sociological analyses of children's lives in contemporary China by focusing on teenage children. Other studies have examined childcare practice under the one-child policy regime (Short et al. 2001) and compared educational attainment, personality development or physical growth between the only children and children with siblings for young children (Falbo et al. 1989; Falbo and Polit 1986; Falbo and Poston 1993; Poston and Falbo 1990). Among these, only few adopt local policy measures (Short et al. 2001; Short et al. 2003).

This paper is organized as follows. It first describes policy characteristics and its potential linkage to child education. Then it presents data and variable specifications. Descriptive and analytical results are followed; finally, it summarizes the major findings emerging from this analysis, presents conclusion and provides policy implications.

The one-child policy, initiated in 1979, promotes one child per couple. Contrary to public perception, however, the policy has not been implemented uniformly across the nation. The state government stipulates basic regulations of the one-child policy, which allow exceptions. It is up to the local government to interpret and implement exceptions (Peng 1997b). Based on local economic development (Merli and Smith 2002) and population size, seven provinces and municipalities implement the strict one-child policy under normal circumstances;[1] six provinces and the rural areas of Tibet implement a two-or-more-child policy, and the rest provinces have a girl-exception policy in the countryside (Guo et al. 2003; Peng and Li 2002; Zhang and Chen 1999).[2] The latter allows couples whose first child is a daughter to have a second birth, provided a four-year interval between the two births (Peng 1997b). Thus, some families may have two or more children, while other families are still limited to one child. Nevertheless, variations always exist within each policy rule. Sichuan and Jiangsu, for example, still allow some couples to have a second birth (White 1992; Zeng 1989). Even within close proximity in the same geographic areas, practice of the one-child policy varies widely (Kaufman et al. 1989).

Two closely intertwined mechanisms can be identified for the policy to affect child education: (1) change fertility and childrearing norms and (2) change fertility behavior. The first results from the campaigns of "*you sheng you yu*" (give birth to fewer children, but give them better

[1] Normal circumstances are broadly defined: the couple is Han ethnicity, not from overseas, has sibling(s); children do not have health problems, etc. The most common variation is that if the first child has health problems, broadly defined, couples are allowed to have a second birth. This exception applies to all families across the nation.

[2] Strict one-child policy provinces and municipalities include Beijing, Tianjin, Shanghai, Chongqing, Jiangsu and Sichuan; two-child policy provinces or autonomous regions include Qianhai, Hainan, Yunan, Tibet, Ningxia and Xinjiang; the rest provinces implement a girl-exception policy in the countryside. These two exceptions mostly apply to rural residents. Urban residents are under stricter policy control and required to have only one child (Ahn 1994) under normal circumstances. Also, regulations in urban areas tend to be more stable than in the countryside.

care and education), which, as policy propaganda, have been conducted across the country. Family planning activists visited urban working units and the countryside, presenting systematic family planning education (Family Planning 1984); posters, signs, billboards, and building walls have been continuously used to remind couples of the advantage of one child per family for the child, the family and the nation (Peng 1997b). The long-lasting "*you sheng you yu*" campaigns would exert intangible or imperceptible influences on couples' childbearing and childrearing ideology, increase their expectations for children, and provide them incentives to better educate children.

To change couples' fertility behavior, the government has taken great efforts to promote gender equality, encourage couples to lengthen birth intervals, reduce higher parity birth(s), and have fewer children. This would substantially shape family building process, not only sibsize, but also birth interval, birth order and sex composition of siblings in households.

The core of the one-child policy is a set of systematically designed implementation strategies, including incentives (e.g., healthcare subsidy to the only children), disincentives (e.g., out-of-plan birth fine), and family planning responsibility system (Peng 1997b). Policy incentives target couples who sign the one-child certificate, a pledge agreeing to have only one child in return for benefits. On the contrary, disincentives exist as sanctions for couples that have "out of plan births," including fines, but there are no tuition or other penalties to child schooling. Under the family planning responsibility system, the local chief cadre is responsible for implementing the policy and keep the number of births under his/her jurisdiction under the officially assigned birth quota. As economic and administrative constraints to couples' reproduction, these implementation methods aim to encourage couples to conform to the policy, and would have greatly shaped couples' reproduction.

The rationale behind the one-child policy is that, with a lower fertility rate, more resources will be available for children at the national, community and household levels, benefiting children. This is consistent with the conceptual framework of resource dilution. The resource dilution model

argues that sibsize shapes the amount of resources that can be distributed to each child. The more siblings a child has, the more household resources will be diluted, and hence the lower the quality of output, and vice versa (Blake 1981; Steelman et al. 2002). Sibsize effect on child outcomes, however, may be intervened by birth order. A short interval prevents parents from devoting maximum attention to them, and diminishes financial assets or makes it harder to recover from economic setbacks than a wider spacing (Powell and Steelman 1990, 1995). A higher-order birth may imply a shorter spacing and a larger sibsize. Hence, the addition of a higher-order birth further dilutes the share of resources each child may receive. Given limited family resources, many children with a shorter interval may be disadvantaged in development, particularly for higher parity children.

However, worldwide studies on the relationship between sibship composition and child education have yielded mixed effect. First, most studies have documented an inverse association between child education and (a) sibsize (Blake 1981; Downey 1995; Knodel 1993; Knodel et al. 1990; Pong 1997; Shreeniwas 1997; Sudha 1997), (b) a short birth interval (Powell and Steelman 1990; 1993; 1995), (c) lower-order births (Parish and Willis 1993; Powell and Steelman 1995; Stash and Hannum 2001; Steelman et al. 2002), and (d) daughters (Buchmann 2000; Greenhalgn 1985; Jejeebhoy 1993; Lloyd 1993; Sathar 1994). Second, some studies have found a positive linkage between child education and sibsize (e.g. Chernichovsky 1985; Gomes 1984; Guo and VanWey 1999; Qian 2004) or a lower order birth (Jejeebhoy 1993). Third, other studies have generated no effect of sibsize and child education when interactions are controlled for (Anh et al. 1998; Buchmann and Brakewook 2000). Lastly, recent studies tend to find that the effect of sibsize and birth order on child education is intervened by (a) sibling density (Buchmann and Hannum 2001; Chernichovsky 1985), (b) household wealth (Buchmann 2000; Fuller et al. 1995), (c) parental background (Lillard and Wills 1994), (d) kinship system (Buchmann 2000; Shavit and Pierce 1991), (e) living arrangements

(Buchmann 2000; Lloyd and Blanc 1996; Pong 1997), and (f) contextual factors (Buchmann and Brakewood 2000; Parrado 1998; Post 1994).

When applying the concept of sibship composition to China, it is necessary to note that, first, studies on the relationship between sibship composition and adolescents' education are very few (for exception, see Feng 2002, 2003) due to the aforementioned reasons. Second, variations in sibship composition are small in China than in other developing countries due to the one-child policy: many Chinese children are either the first or the last, or both the first and the last for most urban children under the one-child policy regime. Nevertheless, the new generation born under the one-child policy regime is growing up, and their wellbeing deserves attention. Meanwhile, policy variations across communities do generate different sibsize and birth order, and shape the sex composition of children. Large families with three or more children still account for one fourth to one third among all families, despite that they are increasingly uncommon in China. Thus, given the markedly reduced family size partly due to the one-child policy and policy campaigns that highlights the norm of "*you sheng you yu*", we might expect children with or without siblings and those in different policy context to have varying educational outcomes in the long run.

## DATA AND METHOD

### Sample

To find out answers to the above question, I draw on data from multiple waves of the Chinese Health and Nutrition Survey (CHNS), jointly conducted by the University of North Carolina and the Chinese Academy of Preventive Medicine, Beijing. The CHNS is designed to examine how social and economic transformation of Chinese society and family planning programs implemented by national and local government affect the health and nutritional status of its population. The survey drew a sample from eight provinces, stretching from northeast to southwest,

including Heilongjiang, Liaoning, Henan, Shangdong, Jiangsu, Hubei, Hunan, Guizhou, and Guangxi.[3] These provinces vary substantially in geography, economic development, public resources and infrastructure (PCO et al. 2002) and socioeconomic development (Statistic Bureau of China 2001). Other analyses of birth planning data indicate that policy varies substantially across communities and over time (Short and Zhai 1998). Households in each province are selected using a stratified multistage cluster design that includes approximately 20 households in each of some 190 urban and rural communities.

As a panel data, the CHNS has interviewed households five times between 1989 and 2000. My analysis uses information from the 1993, 1997 and 2000 survey. For each wave of survey, I identify children age 13-19, who were born between 1974-1980, 1978-1984 and 1981-1987, respectively. Most children in1993 were born before the implementation of the one-child policy, and those in 1997 and 2000 were born under the one-child policy regime.

I draw three samples from the household rosters. First, a sample of all children age 13-19 in households, regardless of residence at the time of survey, is selected for the purpose of estimating school enrollment. Primary school-age children are excluded from the sample because their enrollment is almost universal (Chinagate 2003), particularly for children age 10 or younger. This sample allows observing the educational experience across cohorts born during 1974-1987. All children in the sample start to attend secondary school after 1986, a year marking the onset of rapid expansion of formal education, the 9-year compulsory education. Year 1986 also marks the relaxation of policy when more families are allowed having more than one child. The total sample size of this analysis is 4825, 1455, 1451 and 1919 children are from the 1993, 1997 and 2000 survey,

[3] In 1993, Liaoning is surveyed, but it is replaced by Heilongjiang in 1997; the 2000 survey includes both and other provinces.

respectively.[4]

Second, among those who have ever enrolled in school, two sub-samples of children age 14 and 17 are selected to examine primary school (*xiao xue*, 1-6 grades) and middle school (*chu zhong*, 6-9 grades) completion respectively. These two analyses are conditional, and simultaneously assess attrition rate among those who should finish primary and middle school. The Compulsory Education Law requires that all children attend school at age 6 or 7. In some less developed regions or households, children probably will not start to attend school until age 8 or even older, but this is not common. Thus, ages 14 and 17 allow sufficient time for children in the sample to have completed the sixth grade and ninth grade. The sample size is 1024 and 711 for primary and middle school completion, respectively.

Third, a sample of children age 20 is selected to examine high school (*gao zhong*, 10-12$^{th}$ grades) completion. This sample includes graduates from high school and equivalent technical school. It is not conditional on previous enrollment given the low incidence of high-school enrollment. Age 20 is selected to allow the youths to have sufficient time to have finished the 12$^{th}$ grade. The sample size is 700.

## Variables

*Dependent variable*: My interest centers on adolescents' educational wellbeing, defined as school enrollment and grade completion. I create the indicators of this construct from the following three questions in the CHNS: (1) how many years of formal education have you completed? (2) What is the highest level of education attained? and (3) are you currently in school? The enrollment variable is derived from (3): if respondents are in school at the time of survey, they are considered as

[4] The 1989 survey is excluded from this analysis because part of the 1989 sample started to attend middle school before 1986, which complicates the analysis.

enrolled.[5] It is possible that children age 19 may have already completed high school. By comparing their level of education and years of schooling, I exclude those who have finished high school from the sample.

Grade completion is gauged by questions (1) and (2): primary school completion is created for respondents who report that their year of schooling is greater than 0; middle school completion is created for respondents whose year of schooling is greater than 6. For high school completion, all children with 12-year schooling are coded as having completed high school.

*Key predictors*: To assess the effect of the one-child policy on child education, it is necessary to first develop appropriate measures of the policy. As discussed above, the policy could affect child education through two mechanisms: (1) change fertility and childrearing norms, and (2) change fertility behavior. Due to lack of data, it is impossible to measure change in fertility norms. To measure childrearing norms, I capitalize on policy variations across communities. The community survey asks local cadres whether couples in their communities and villages are allowed to have one child, two children, or a second birth if the first child is a daughter, among other exceptions. I highlight the two exceptions that allow couples a second birth if the first child is a daughter and two children under normal circumstances. The two exceptions are particularly relevant to this study because they generate different sibship composition among households. Also, as Short et al. (2001) point out, these variations are likely a reasonable indicator of local policy climate. Using these exceptions, I distinguish between three kinds of policy strength based on local cadres' responses to the policy questions: *one-child policy*, *girl-exception policy*, and *two-child policy*, and refer them as strong, moderate and weak for the ease of discussion (Short et al. 2001). Policy variations are, while not ideal, a rough proxy of childrearing norms given data limitation, because the intensity and

[5] Of course, school enrollment is not the same as currently being in school. It is possible to be enrolled in school, but do not attend regularly or at all. Thus, this measurement may underestimate school enrollment.

effectiveness of "*you sheng you yu*" campaigns vary by policy rules. It is particularly strong and enduring in areas with a strict policy, but less effective in other communities, yielding divergent impact on couples' childrearing norms.

To measure the second, I draw on sibship configuration, measured as number of siblings: single child, 1 sibling and 2+ siblings. For those with only 1 sibling, I also differentiate the sibling by gender, order and interval, as appropriate, to fully capture the effect of different dimensions of sibship composition on the outcome variables.

The policy is a gendered policy (Greenhalgh 1986; Short et al. 2001) given the girl-exception variation, and it also shapes children's sex or sibling's sex composition within a household. Parents who keep girls as the first child in girl-exception policy context may differ from parents who keep girls in other contexts. Studies have found that girls suffer disproportionately in prenatal and postnatal period (Li et al. 2006; Zhang 2005); once they become a family member, they may be also treated differently under different policy environment (Short et al. 2001). Thus, sex of children is used as a key predictor.

*Control variable*: A series of other individual, household and community characteristics are incorporated as control variables. These variables include child age, household wealth, father's education and occupation, and contextual background that might confound the policy effect on the outcome variable.[6] Table 1 lists variable definitions. Note that in the following multivariate analyses, I adopt two approaches to account for policy, sibship composition and father's education and

[6] In exploring the determinants of child schooling, it is necessary to take into account whether the result could be affected by factors that I cannot observe or directly observe. School characteristics, the quality of school and students' performance and peer pressure at school, for example, are all important for child educational wellbeing (Fuller 1987; Fuller and Clarke 1994; Heyneman 1976). Unfortunately, the CHNS does not contain such information. However, the effect of these factors are assumed to be additive, and will not bias the findings. Additionally, preliminary models show that there is no indication to include ethnicity and the presence of school in the model.

occupation. For school enrollment, I use the above specification; when analyzing the smaller samples of grade completion, I collapse policy as strict vs. other policy, sibship as sibsize, and primary school vs. higher education and farmers vs. non-farmers of fathers.

[Table 1 about here]

## DESCRIPTIVE RESULTS

Figures 1 and 2 describe school enrollment by age and grade completion between 1989 and 2000, respectively. Overall, school enrollment among adolescents tends to increase over time, but for each year, older children are less likely to enroll in school than younger children. However, enrollment in 2000 is lower than that in 1997 in most ages, which is puzzling, and deserves further studies beyond the scope of this analysis. The rate of grade completion, regardless of levels, also rises from 1989 to 2000. Despite compulsory education, however, there are still 10 and 20 percent of children who do not finish primary and secondary school, respectively. Only slightly over one-third of children has a high school diploma.

[Figures 1 and 2 about here]

Table 1 describes proportion/means and standard deviations, as appropriate, of variables used in this analysis, for the full sample of school enrollment. About one-fourth of sampled children are single children; another one-fourth has two or more siblings, and the rest have only one sibling. About half communities implement a strong policy. The samples also differ in individual, household and contextual background. Additionally, the prevalence of school enrollment varies by age cohorts and urban residence (not shown here). Children age 16 to 19 and the rural youths have a much lower incidence of enrollment in school than younger and urban children, respectively, but the rate of school enrollment for boys and girls is similar.

Table 2 presents the relationship between the local variations of the one-child policy and

sibship composition for the sample of school enrollment. As it shows, sibship composition corresponds to policy strength such that a strong policy is associated with fewer siblings, and vice verse. Regardless of the specification of sibship composition, children in strong-policy communities are over 3 times more likely to be single children (39 percent) and twice less likely to have 2+ siblings (18 percent) than those in weak policy communities (12 and 37 percent, respectively). But it appears that there is no gender difference between strong policy and weak policy communities. Nevertheless, not all children in strong policy communities are single children; even for those in the 2000 sample who were all born after 1982, less than half of children in strong policy communities are single children (results not shown). Sibship variations associated with policy strength indicate that sibship is largely determined by policy strength, but individual choices are still being made in response to one's own fertility desire. This provides evidence to include both policy strength and sibship composition in same equations. The effect of policy strength also goes beyond sibship composition and captures something that sibship does not.

[Table 2 about here]

How related is the one-child policy and sibship composition to child educational wellbeing? Table 3 shows that single children have the highest enrollment rate among all children, about 30 percent higher than children with 2+ siblings and those with an older brother. In fact, the latter have the lowest rate of enrollment. Those from strong-policy communities have an 8 percent higher rate of enrolling in school than their peers in weak-policy communities (68 vs. 60 percent). However, it is children residing in girl-exception policy communities that have the lowest enrollment rate (59 percent). This pattern holds for grade completion. There are also great disparities in school enrollment by age cohort and urban residence, but boys and girls do not differ in this outcome across policy strength and family context (results not shown here). The lack of a gender gap in enrollment and grade completion is striking given China's son preference and will be revisited in the analyses

that follow.

[Table 3 about here]

The bivariate associations based on the CHNS clearly suggest a connection between policy and adolescents' schooling, whether it works through fertility (sibship composition) or norm change (policy strength). However, this relationship may be confounded by other factors, such as child age and household and community characteristics. Thus, I now turn to a series of regression models, controlling for child age, father's education and occupation and household wealth, as well as contextual factors.

## ANALYTIC RESULTS

### For school enrollment

In developing models my overall goal is to predict the likelihood of school enrollment and grade completion, focusing on the net effects of policy variations and sibship composition. Due to the fact that children age 13-15 are, but children older are not, under the coverage of the Compulsory Educational Law, the one-child policy and sibship composition may have different impacts on the outcome variable. Also, because of the tremendous socioeconomic stratification between the countryside and urban settings, it is reasonable to believe that factors mentioned above may work differently for urban children and rural children. Current studies of child wellbeing commonly focus on rural children (Hannum 1999, 2000; Short et al. 2001). By examining both, I am able to demonstrate the potentially different policy effects on both. Additionally, past studies have suggested that the local variations of the one-child policy not only affect who becomes a family member, but also the degree to which a given child in a family is valued (Short et al. 2001). Thus, I fit fully interactive models by stratifying the sample by age cohort, urban residence, and children's sex. This will prevent the possibly divergent effect of predictors on the outcome variable from being

cancelled out. Analytical results for all children and by stratified samples, adjusted for standard errors (White 1980), are presented in Table 4.

Results indicate that sibship composition is indeed a consistent and strong determinant of school enrollment.[7] Across all models except for children age 13-15, single children are more likely to enroll in school than other children, particularly than those with an older brother or 2+ siblings. Thus, the presence of an older brother or 2+ siblings has a detrimental effect on sibling's schooling. Not only sibsize, but also sibling gender and order are important for child education, and sibling gender and order are somewhat more important than sibsize in this regard. Compared only children with 1-sibling children, singletons are only advantaged in education than those with an older brother. A model (result not shown here) where sibship composition is specified as single children, 1 sibling and 2+ siblings also shows a difference between singletons and 1-sibling children. By differentiating sibling gender and order, we know that it is the older brother that matters.

This finding is consistent with existing studies demonstrating that the onlies have higher academic scores than sibling children (Falbo and Poston 1993; Poston and Falbo 1990). To the extent that the one-child policy prevents couples from having more children, it increases the likelihood of school enrollment working through sibship composition. Sibship composition, particularly the presence of an older brother and 2+ siblings, remains a consistent and substantial predictor of adolescents' education in the reform-era, irrespective of other factors.

Other things being equal, however, policy strength does not bear a significant relationship to enrollment across all models. Children in strong policy communities have a better chance to enroll

[7] Parallel model where sibship composition is specified as the combination of birth interval and sibsize are also fitted, yielding similar results. For sibship composition, however, there is no significantly different school enrollment between single children and those with 1 sibling, regardless of birth interval (results not shown).

in school than those in moderate policy communities, but the magnitude is not significant. The strong fertility effect and weak norm effect on enrollment suggest that it takes a longer time for norms to affect human behavior.

[Table 4 about here]

Policy effect on enrollment substantially varies by age cohort. While policy strength bears no significant effect on both younger and older cohorts, sibship composition clearly shows a strong impact on the older cohort, but has no effect on younger children age 13-15. Among children age 16-19, the presence of an older brother, a younger brother and 2+ siblings all decreases the sampled children's likelihood of school enrollment at the time of survey. The divergent policy effect by age cohorts may reflect the following issues. The first pertains to China's educational policy and the costs of schooling. Younger children are required to attend school by the Compulsory Educational Law and their education is presumably at low cost, mainly for books and other school supplies (which can be costly in reality). By contrast, the older cohort is beyond the coverage of compulsory education, and thus, parents have to rely on their own resources to send children to school, constraining household finance. Second, the younger cohort is too young for the labor market, but labor market for older adolescents is widely available in more advanced areas in China, which pulls children to it. Thus, for households with more than one child, particularly those in need of cash, they may terminate some children's schooling and send them to work. For children age 16-19, if he/she has a brother, the brother has advantages in schooling because of his economic and cultural values to the family; if he/she has a younger brother, the brother might be too young to go to the labor market, decreasing the sampled children's school opportunity.

Policy effect also varies by urban residence: rural children with an older sister are marginally more likely to enroll in school than single children. In mainland China, as in Taiwan and other settings with son preference, among parents with limited resources, a common strategy to raise sons'

education is to educate daughters a little, send them out to work, and then use daughters' incomes to better educate sons. Thus, a substantial number of young women workers work for supporting their siblings', especially younger brothers', schooling (Greenhalgh 1985). When girl disadvantage in schooling exists, it likely exists in the countryside.

Additionally, model results provide indication that the effect of sibship composition on school enrollment varies by child gender. The presence of a brother, regardless of order, or 2+ siblings poses threat to boys' education, while only the presence of an older brother is detrimental to a girl's education. Thus, for boys, siblings of the same sex appear to be rivals in attracting educational investment from parents. In Malaysia (Lillard and Wills 1994) and Taiwan (Parish and Willis 1993), a boy's educational opportunity is threatened by the presence of other brothers.

Household characteristics are important and strong determinants of children's school enrollment. Children of fathers with a middle school or higher education have a better chance to enroll in school than those of fathers with primary or less education, regardless of age (except for younger children), residence and gender. Similarly, a more prestigious occupation of fathers is positively related to child education. The measure of household wealth suggests that households with more consumer durable goods are also better able to enroll their children in school, and it is in fact the most consistent predictor of this educational outcome. Among contextual factors, percent of labor force in agriculture and village residence decrease school enrollment. While adolescents residing in northern and southern provinces are associated with a lower likelihood of school enrollment than their peers in central provinces, the difference is non-significant.

For grade completion

Our descriptive results reveal the importance of differential rates of school attrition (grade completion) in producing educational differentials by sibship composition and policy strength. This section explores the issue of grade completion in a multivariate context in order to view disparities

by policy strength and sibship composition, controlling for the effects of other individual, household and community background.

Three levels of grade completion are investigated: primary, secondary and high school completion. The first two are conditional on ever being enrolled in primary school and secondary school among children age 14 and 17, respectively, and the analytical results would not only tell us policy effect, but also provide information on the attrition rate under the compulsory educational system. Due to the low incidence of high school enrollment, high school completion is unconditional, including all children age 20. This measure reflects educational attainment of all youths. Due to small sample size, in the analysis of grade completion, I only differentiate children by sibsize, and those in strong policy communities from those in other communities. Father's education and occupation are also collapsed. No fully interactive models will be fitted.

The results, presented in Table 5, confirm a hierarchy in attrition by policy through sibship composition for high school completion. As in school enrollment, policy does not seem to matter significantly to younger children, as both policy strength and sibsize bear no significant effect on primary and middle school completion. For the high school completion sample, single children have a higher likelihood of finishing high school education than others. The persistence of sibship disparities in a multivariate context indicates that the observed relationship between sibsize and high school completion cannot be attributed to differences resulting from household background and other contextual characteristics. Child gender is not significantly related to school completion, regardless of education levels. Household wealth, percent in agriculture, urban residence, and time are determinants of grade completion.

For both school enrollment and grade completion, child gender does not make a difference. This suggests that the traditional ideology of "*nu zi wu cai bian shi de*" (lack of scholastic knowledge is a desired virtue in women) is disappearing in adolescents' schooling in contemporary

China. Similarly, the fully interactive model by child gender does not yield girl disadvantage by policy. Thus, although studies on other dimensions of child wellbeing such as childcare and preschool education have indicated that girls are treated differently in different policy environments (Short et al. 2001; Short and Sun 2003), gender bias is less salient in adolescents' education, perhaps partly due to the current education policy. The compulsory educational system grants girls an equal opportunity to boys to enroll in primary and middle school. High school entrance is based on school performance and competition, and only those who pass the high-school examination can go to high school. Thus, even if parents tend to give sons a better education, they sometimes cannot.

## DISCUSSION AND CONCLUSION

It has been well acknowledged that the one-child policy has profoundly affected family formation processes and sibship composition. What is less known is the nature and extent of policy effect on child wellbeing. Though frequently recognized, the connections between what might be simultaneous and contradictory policy effects on child wellbeing have just begun (Short et al. 2001:934). This work investigates the relationship between the one-child policy and school enrollment and grade completion for adolescent children in transitional China, drawing on and highlighting local variations of the policy and sibship composition. Multivariate analyses show that sibship composition is related to education such that singletons consistently have a higher chance of enrollment and grade completion than other children among those beyond compulsory education, regardless of residence and child gender. A strong policy is also associated with better educational opportunities of children, although the magnitude of the effect is statistically non-significant.

While these are perhaps not conclusive evidences of the one-child policy effect on child educational opportunities, findings of this analysis indicate that the one-child policy does affect child educational wellbeing, net of household and contextual characteristics, and the mechanism for

the policy to affect child education is mostly through fertility (sibship composition). It might be that reduced fertility and thus a smaller sibsize increase parents' ability to provide higher levels of education for children. Given limited household resources, couples of single children are less constrained in finance, time and energy, and presumably able to invest more resource per child than do parents of children with siblings. This enhanced attention and investment may facilitate child intellectual development and increase the competition of the child in school, contributing to a higher likelihood of school enrollment and completion. It is also possible that parents of single children have better internalized the "quality children" norm. With a higher expectation for children in mind, they translate this norm into behavior by giving children better education.

However, sibship effect on education is partly contingent on sibling order and gender. Children with an older brother are constantly associated with the lowest probability of enrollment and grade completion, even lower than those with 2+ siblings. The strong yet inverse association between the presence of an older brother and schooling reflects sibling inequality when sibling size, gender and order are jointly measured. Such inequality might be explained by the resource dilution model and/or son preference. When new children are born, household resources (such as income to buy food and/or time for child schooling) have been diluted, and parents are unable to allocate sufficient resources to higher parity children (Horton 1988; Lomperis 1991). Nevertheless, we still need to disentangle what resources are diminished in such a way that they have implications for child outcome. It is unlikely financial resources since household wealth has been controlled for. The potential resources that may be diluted include parental quality time and energy in helping children with their schools. In addition, as it is well known, parents favor earlier births because of their economic values to the family; parents favor sons for their economic and cultural values. If the child is both an older child and a son, he will be entitled to advantages for both older children and sons, and the family has greater incentives to invest more in his education. Therefore, the presence of an

older brother always poses a risk to other siblings' schooling. Although younger sons are also highly valued and parents are willing to invest in their schooling, parents may not be able to treat them the same way as they do for the older son because of financial constraints. Thus, the gap in schooling among single children and other children, particularly those with an older brother or 2+ siblings, may increase in the long run.

This analysis fails to find a gender disparity in child schooling. Gender is no longer condition entry into schooling; girls who did enter school progress at an equal rate with boys through the primary and secondary school, and are as likely to finish high school as boys among all youths age 20. Another study on child malnutrition and overweight in China yields no gender gap either (Yang 2005). It might be that gender bias *among children* within households is disappearing in China (Short et al. 2001). While son preference maintains, particularly in the countryside, on the outcomes I explore, once daughters become family members, parents are likely to treat them similarly to sons. On the optimistic side, it is certainly possible that the wellbeing of boys and girls grow more similar over time. Of course, gender bias is not eradicated; it exists in a more nuanced way, as shown by older brother's advantage.

Sibship affects child schooling above and beyond economic development. The detrimental impact on children's educational opportunity of sibsize does not go away with the increase of household wealth and a higher father's education and more prestigious occupation, nor with local economic development or urbanization. This suggests that in transitional China the effect of the one-child policy is not a function of local socioeconomic development and household wealth. Wealth alone is not the entire story of child education. Other factors, including the one-child policy, do play a role in children's educational opportunities.

By situating child educational opportunities in the context of the one-child policy in transitional China, we have found that to the extent the policy shapes sibship composition by

reducing sibsize and higher-order births, lengthening birth interval and promoting gender equality, it benefits children in their educational opportunities. However, not all children benefit equally. Those with an older brother, for example, do not fare as well as those without. The existence of policy effect on the outcomes may reflect China's long scholastic tradition and high value that Chinese have attached to education. For rural and urban family alike, couples are likely to send all children to school. In modern societies, education remains the engine for social mobility; "those who gets ahead" are "those who get educated" (Deng and Treiman 1997; Treiman and Yip 1989). Education might be particularly important for rural families. Due to the tremendous rural-urban stratification, peasants strive desperately to become urbanites, and education is the best way, if not the only way, to achieve this goal for the majority of peasants. Nevertheless, parental desire for children's education might be compromised by their reproductive behavior and thus family context. This might be particularly true under two circumstances: (1) parents have to rely on their own resources for child education, and (2) when parents view education beyond the compulsory level as necessary to prepare a child for making a living and to achieve the better standard of living in the rapidly changing socioeconomic environment (Knodel et al. 1990). When parents expect children to continue education, sibship composition becomes an important determinant of how much post-middle-school education parents will be able to provide for their children. In this sense, family planning programs are perhaps one efficient way to improve child educational wellbeing.

This study has several limitations. For example, there might be potential endogeneity in program design and local fertility preference. In other words, program design might not be independent of local fertility preferences. If strict one-child programs are intentionally placed in areas with high fertility, then program effects may be underestimated. On the other hand, if strict one-child programs occur in areas with already low fertility, then program effects may be overestimated. If this is the case, then local policy variations and child outcomes are jointly

determined by fertility preference. Although I control for local development level and distinguish between urban/rural residences, it is likely that I do not capture completely the variations in fertility preference across communities. The inability to measure local variations in fertility preference directly is not unique to this analysis, but common to most examinations of fertility preference and other related studies such as gender bias (Short et al. 2001).

Nevertheless, precisely because of the one-child policy, endogeneity is less a problem in China than it is in settings without such policy. While in other settings most couples respond to and balance their own desires of family size, the policy makes the situation in China somewhat unusual. For a substantial proportion of couples, fertility is not their intentional choice; family size does not necessarily reflect their fertility desire, and their ability to control their own family building is constrained by policy regulations and normative pressures created by the policy. Studies have consistently shown that the ideal number of children among Chinese couples, including those in strong policy regime, is 2 (Mo 2005; Zheng 2004).[8] Thus, while the policy might be non-randomly placed, it does not seem to pose a serious endogenous threat to this analysis. Besides, the ability to use local measures of the one-child policy and other contextual measures may to some extent offset the possible endogeneity.

Also, policy variations might not be independent of local economic development (Merli and Smith 2002). It is possible that advanced settings are more likely to have a strong policy than less developed communities. This problem can be solved using a two-step procedure. The first is to predict which community has a strong policy and the second step is to use the predicted values of policy to predict child outcomes (Evans 2003, personal talk). However, I do not adopt this strategy

[8] Note that this desire does not take into account the sex of children. In other words, fertility desire might be higher if the sex composition of children is considered (Zheng 2004), or/and the one-child policy is not in place.

because zero-order correlation shows that the local variations of the one-child policy are not highly correlated with local development measure (results not shown). When provincial government makes decisions on policy regulations, it not only considers local economy, but also population size and political environment. Thus, for example, while Sichuan province is less developed, it implements a strong policy due to its huge population size; by contrast, Guangdong province, the economically most advanced province in China, adopts a girl-exception policy. This further suggests that the one-child policy is exogenous with respect to adolescents' education, and the parameters of parametric models of the kind estimated here are not biased by the local selection of policy strength.

Additionally, sibship composition is also a variable over time (Heer 1985) as new children were born to the mother. Nevertheless, since I examine children age 13-19, it is uncommon for them to have new sibling(s) under the one-child policy regime; that is, the fertility of parents of the sampled children can be confidently treated as being completed and that sibship composition occurs earlier in time than the outcome variables.

Although more studies are needed to better understand the policy-education relationship, findings emerging from this analysis indicate a consistent, strong advantage of single children relative to those with an older brother or 2+ siblings among children beyond compulsory education, regardless of residence and child gender. It is clear that without favorable educational policies, the quality of children decreases with quantity and with the presence of an older brother. The results provide evidence to support the idea that restricting family size and promoting sibling equality will necessarily help increase average human capital investment in developing settings. Thus, policy makers who aim to improve adolescents' educational wellbeing should maintain small family norms. Nevertheless, restricting family size does not necessarily mean one child per couple. Strengthening the campaign efforts of "giving children better education" down to the local level, and particularly, promoting sibling equality among families with more than one child and those with older son(s) may

remove the educational disparity of single children and 1-sibling children.

Alternatively, the disadvantage of sibling children in education might be offset by better enforcements of the current compulsory education and the expansion of the current system. Educational bureaus should first ensure, by all means, all children to complete the ninth grade, and then gradually expand compulsory education to twelve years. Expansion of educational system is feasible because, first, economic development in the past two decades enables the central and local government to invest more in adolescents' education. Second, the substantially reduced cohort size of children in high-school age due to the one-child policy makes such expansion even more possible. Only inequalities in education among children within and between households, and across residence and regions are reduced, can then "population quality" of China can be ultimately enhanced.

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**Table 1. Variable Construction and Definition for Children Age 13-19**

| Variables | Definitions | Mean | S.D. |
|---|---|---|---|
| School enrollment | 1=the child enrolled in school at the survey time; 0=otherwise | See Figure 1 | |
| Grade completion | 1=the child completed primary/secondary/high school; 0=otherwise | See Figure 2 | |
| **Individua characteristics** | | | |
| Sibling Composition | | | |
| Single child | 1=the child has no sibling; 0=otherwise | 0.25 | |
| 1 sibling | 1=the child has only 1 sibling; 0=otherwise | | |
| (by sibling gender and order) | | | |
| 1 older brother | 1=the child has only 1 older brother; 0=otherwise | 0.11 | |
| 1 younger brother | 1=the child has only 1 younger brother; 0=otherwise | 0.16 | |
| 1 older sister | 1=the child has only 1 old sister; 0=otherwise | 0.09 | |
| 1 younger sister | 1=the child has only 1 younger sister; 0=otherwise | 0.12 | |
| (by sibling density) | | | |
| Wide spacing | 1=birth interval > 36 months; 0=otherwise | 0.12 | |
| Close spacing | 1=birth interval <= 36 months; 0=otherwise | 0.36 | |
| 2+ sibling | 1=the child has 2 or more siblings; 0=otherwise | 0.28 | |
| The child is a girl | 1=girls; 0=boys | 0.48 | |
| Age of children (in years) | Ranging from 13 to 19 | 15.73 | 1.97 |
| **Household characteristics** | | | |
| Father's education | | | |
| <=primary school | 1=father has no education or primary education; 0=otherwise | 0.45 | |
| Middle school | 1=father has a middle school education; 0=otherwise | 0.35 | |
| Post-middle school | 1=father has a post-middle school education; 0=otherwise | 0.19 | |
| Father's occupation | | | |
| Farmer | 1=father is a farmer, fisherman, logger or not work; 0=otherwise | 0.58 | |
| Ordinary worker | 1=father is a serviceman, housekeepers, craftsmen, non-skilled workers, drivers, ordinary soldiers or policemen, secretary, office helpers or other; 0=otherwise | 0.29 | |
| Administrator | 1=father is an administrator, professional, police officer, army officer or artist; 0=otherwise | 0.13 | |
| Household wealth | Unweighted sum of household consumer durable goods, including color TV, washing machine, A/C, electric fan, etc. | 4.26 | |
| **Community characteristics** | | | |
| One-child policy strength | | | |
| One-child policy | 1=community implements a strict one-child policy; 0=otherwise | 0.45 | |
| Girl-exception policy | 1=community implements a girl-exception policy; 0=otherwise | 0.30 | |
| Two-child policy | 1=community implements a two-child policy; 0=otherwise | 0.25 | |
| Percent in agriculture | Percent of labor force engaging in agriculture | 0.50 | 0.33 |
| Urbanization | | | |
| City | 1=the community is in city; 0=otherwise | 0.09 | |
| Suburb and town | 1=the community is in suburb or town; 0=otherwise | 0.30 | |
| Village | 1=the community is a village; 0=otherwise | 0.62 | |
| Region | | | |
| North | | 0.35 | |
| Center | | 0.34 | |
| South | | 0.31 | |
| Survey year | | | |
| 1993 | 1=1993 survey; 0=otherwise | 0.23 | |
| 1997 | 1=1997 survey; 1=otherwise | 0.23 | |
| 2000 | 1=2000 survey; 2=otherwise | 0.30 | |

Source: 1993, 1997 and 2000 CHNS.

**Table 2. Cross Tabulation between the Local Variations of the One-Child Policy and Sibship Composition (%) for the Sample of School Enrollment among Children Age 13-19: CHNS 1993-2000**

| Sibling Composition | One-child policy | Girls-exception policy | Two-child policy |
|---|---|---|---|
| Single child | 38.94 | 19.97 | 11.85 |
| 1 sibling | | | |
| (by sibling gender and order) | | | |
| 1 older brother | 9.61 | 11.32 | 12.39 |
| 1 younger brother | 13.86 | 17.53 | 16.13 |
| 1 older sister | 8.31 | 9.39 | 10.47 |
| 1 younger sister | 11.36 | 11.98 | 11.85 |
| (by sibling density) | | | |
| 1 sibling widely spaced | 12.24 | 12.87 | 13.91 |
| 1 sibling closely spaced | 30.90 | 37.35 | 36.93 |
| 2+ sibling | 17.92 | 29.81 | 37.31 |
| Girl | 48.45 | 44.90 | 48.01 |
| N of observations | 2165 | 1352 | 1308 |

Source: 1993, 1997 and 2000 CHNS.

**Table 3. Cross Tabulation between Key Predictors and Child Education (%): CHNS 1993-2000**

| Variables | School enrollment | Grade completion | | |
|---|---|---|---|---|
| | | PS completion | MS completion | HS completion |
| Sibling composition | | | | |
| Single child | 72.87 | 91.79 | 88.33 | 40.00 |
| 1 sibling | | | | |
| (by sibling gender and order) | | | | |
| 1 older brother | 53.54 | 88.04 | 69.23 | 33.33 |
| 1 younger brother | 65.78 | 92.04 | 71.62 | 23.81 |
| 1 older sister | 68.02 | 88.30 | 80.00 | 32.00 |
| 1 younger sister | 64.30 | 84.69 | 78.08 | 25.97 |
| (by sibling density) | | | | |
| 1 sibling widely spaced | 61.51 | 90.08 | 78.02 | 30.38 |
| 1 sibling closely spaced | 63.61 | 88.26 | 72.29 | 28.33 |
| 2+ sibling | 54.81 | 82.80 | 64.97 | 17.37 |
| Girl | | | | |
| No | 61.74 | 84.89 | 68.85 | 26.98 |
| Yes | 59.83 | 83.95 | 69.57 | 27.64 |
| One-child policy strength | | | | |
| One child policy | 68.27 | 89.95 | 82.74 | 37.00 |
| Girl-exception policy | 58.95 | 87.61 | 69.51 | 17.80 |
| Two-child policy | 60.09 | 85.78 | 67.68 | 19.78 |

Source: 1993, 1997 and 2000 CHNS.

**Table 4. Logistic Regression of Current School Enrollment among Children Age 13-19, CHNS 1993-2000**

| | All children | | By age cohort | | | | By urban residence | | | | By child gender | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 13-15 | | 16-19 | | Rural | | Urban | | Boy | | Girl | |
| | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. |
| **Children's characteristics** | | | | | | | | | | | | | | |
| Sibship composition | | | | | | | | | | | | | | |
| Single child (=ref) | | | | | | | | | | | | | | |
| 1 sibling | | | | | | | | | | | | | | |
| 1 older brother | -0.65 *** | 0.13 | -0.08 | 0.23 | -0.97 *** | 0.17 | -0.61 *** | 0.15 | -0.62 * | 0.28 | -0.78 *** | 0.18 | -0.49 * | 0.20 |
| 1 younger brother | -0.13 | 0.12 | 0.26 | 0.17 | -0.31 * | 0.15 | -0.03 | 0.14 | -0.39 | 0.26 | -0.33 ^ | 0.18 | 0.09 | 0.18 |
| 1 older sister | -0.09 | 0.14 | 0.22 | 0.20 | -0.23 | 0.18 | 0.24 ^ | 0.14 | -0.40 | 0.30 | -0.21 | 0.18 | 0.09 | 0.25 |
| 1 younger sister | -0.08 | 0.13 | 0.21 | 0.20 | -0.21 | 0.15 | 0.04 | 0.15 | -0.38 | 0.26 | -0.19 | 0.16 | 0.11 | 0.21 |
| 2+ siblings | -0.35 ** | 0.11 | 0.10 | 0.15 | -0.54 *** | 0.13 | -0.01 | 0.10 | -0.64 ^ | 0.23 | -0.46 ** | 0.16 | -0.17 | 0.17 |
| Girl | -0.03 | 0.06 | -0.35 ** | 0.13 | 0.13 | 0.09 | -0.03 * | 0.05 | -0.05 | 0.16 | - | - | - | - |
| Age 16-19 (vs. age 13-15) | -2.27 *** | 0.08 | - | - | - | - | -2.29 *** | 0.09 | -2.26 *** | 0.20 | -2.46 *** | 0.11 | -2.13 *** | 0.11 |
| **Household characteristics** | | | | | | | | | | | | | | |
| Father's education | | | | | | | | | | | | | | |
| <= primary school (=ref) | | | | | | | | | | | | | | |
| Middle school | 0.32 *** | 0.08 | 0.14 | 0.14 | 0.42 *** | 0.10 | 0.33 *** | 0.09 | 0.30 | 0.20 | 0.25 * | 0.12 | 0.38 ** | 0.12 |
| Post-middle school | 0.57 *** | 0.11 | 0.26 | 0.20 | 0.72 *** | 0.14 | 0.56 *** | 0.13 | 0.68 ** | 0.24 | 0.56 *** | 0.16 | 0.57 *** | 0.17 |
| Father's occupation | | | | | | | | | | | | | | |
| Farmer(=ref) | | | | | | | | | | | | | | |
| Ordinary worker | 0.19 * | 0.09 | 0.13 | 0.17 | 0.23 * | 0.12 | 0.15 | 0.11 | 0.39 | 0.22 | 0.15 | 0.13 | 0.24 | 0.14 |
| Administrator | 0.46 ** | 0.14 | 0.20 | 0.27 | 0.54 ** | 0.17 | 0.63 *** | 0.17 | 0.36 | 0.30 | 0.37 | 0.20 | 0.59 ** | 0.21 |
| Household wealth | 0.09 *** | 0.02 | 0.12 *** | 0.03 | 0.08 *** | 0.02 | 0.08 *** | 0.02 | 0.11 ** | 0.04 | 0.07 ** | 0.02 | 0.12 *** | 0.03 |
| **Community characteristics** | | | | | | | | | | | | | | |
| One-child policy variables | | | | | | | | | | | | | | |
| One-child policy (=ref) | | | | | | | | | | | | | | |
| Girl-exception policy | -0.04 | 0.10 | -0.09 | 0.16 | -0.03 | 0.12 | -0.07 | 0.11 | -0.16 | 0.29 | -0.12 | 0.11 | 0.03 | 0.14 |
| Two-child policy | 0.18 | 0.11 | 0.16 | 0.18 | 0.19 | 0.13 | 0.16 | 0.12 | 0.13 | 0.29 | 0.06 | 0.15 | 0.27 | 0.15 |
| Percent in agriculture | -0.28 * | 0.13 | -0.39 | 0.25 | 0.02 | 0.18 | -0.41 * | 0.16 | 0.71 * | 0.36 | 0.02 | 0.20 | -0.24 | 0.21 |

(Table continues at the next page)

(Table 4 continues)

| | All children | | By age cohort | | | | By urban residence | | | | By child gender | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 13-15 | | 16-19 | | Rural | | Urban | | Boy | | Girl | |
| | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. | Coeff. | S. E. |
| Urbanization | | | | | | | | | | | | | | |
| City (=ref) | | | | | | | | | | | | | | |
| Suburb or town | -0.07 | 0.16 | -0.20 | 0.37 | -0.01 | 0.18 | 0.44 *** | 0.12 | -0.14 | 0.20 | -0.18 | 0.23 | 0.03 | 0.24 |
| Village | -0.55 ** | 0.17 | -0.46 | 0.39 | -0.59 ** | 0.20 | - | - | - | - | -0.71 ** | 0.24 | -0.36 | 0.26 |
| Region | | | | | | | | | | | | | | |
| Center (=ref) | | | | | | | | | | | | | | |
| North | -0.10 | 0.09 | -0.27 | 0.16 | 0.00 | 0.11 | -0.07 | 0.10 | -0.14 | 0.20 | 0.00 | 0.13 | -0.21 | 0.13 |
| South | -0.11 | 0.10 | -0.17 | 0.18 | -0.07 | 0.12 | -0.13 | 0.12 | -0.11 | 0.21 | -0.03 | 0.14 | -0.17 | 0.15 |
| Survey year | | | | | | | | | | | | | | |
| 1993 (=ref) | | | | | | | | | | | | | | |
| 1997 | 0.57 *** | 0.09 | 0.53 *** | 0.16 | 0.60 *** | 0.12 | 0.57 *** | 0.11 | 0.76 *** | 0.21 | 0.46 *** | 0.13 | 0.69 *** | 0.14 |
| 2000 | 0.20 * | 0.09 | 0.40 ** | 0.15 | 0.38 ** | 0.13 | 0.25 * | 0.11 | 0.76 *** | 0.23 | 0.27 * | 0.14 | 0.42 *** | 0.12 |
| Intercept | 1.59 *** | 0.22 | 1.69 *** | 0.44 | -0.76 ** | 0.25 | 1.26 *** | 0.20 | 1.26 ** | 0.42 | 2.12 *** | 0.30 | 0.97 *** | 0.32 |
| Wald Chi Square | 1381.01 | | 179 | | 410.80 | | 754.75 | | 280.29 | | 754.00 | | 641.57 | |
| Degree of freedom | 21 | | 20 | | 20 | | 20 | | 20 | | 20 | | 20 | |
| N | 4825 | | 2317 | | 2508 | | 3662 | | 1163 | | 2541 | | 2284 | |

Source: 1993, 1997 and 2000 CHNS.

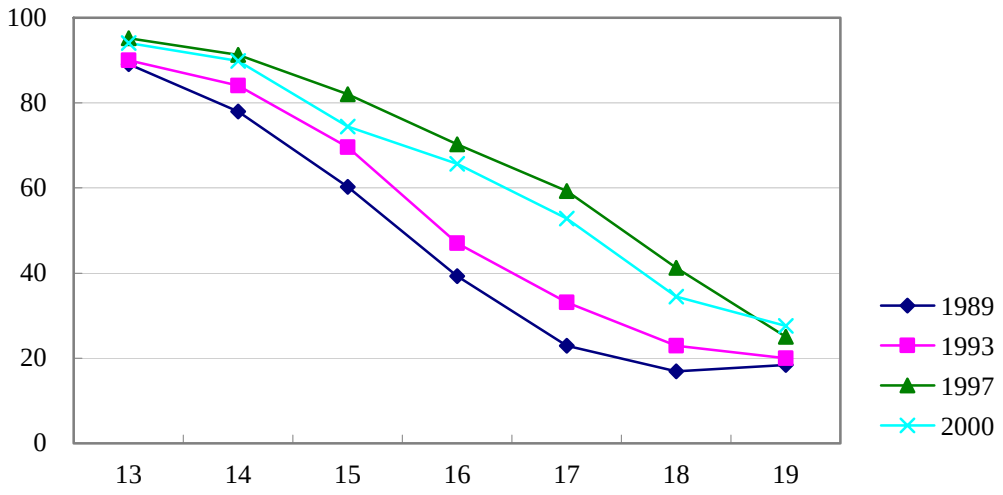
Notes: Coeff. = coefficient; SE = standard error; ***p<0.001; **p<0.01; *p<0.05; ^p<0.10.

**Table 5.Logistic Regression of Grade Completion by Levels of Education, CHNS 1993-2000**

| | PS completion | | MS completion | | HS completion | |
|---|---|---|---|---|---|---|
| | Coeff. | SE | Coeff. | SE | Coeff. | SE |
| Number of siblings | | | | | | |
| Single child (=ref) | | | | | | |
| 1 sibling | 0.26 | 0.32 | -0.30 | 0.36 | -0.52 * | 0.26 |
| 2+sibing | -0.06 | 0.36 | -0.23 | 0.38 | -0.62 * | 0.30 |
| Girl | -0.07 | 0.16 | -0.05 | 0.19 | -0.17 | 0.20 |
| **Household characteristics** | | | | | | |
| The father has primary education | -0.57 *** | 0.17 | -0.58 ** | 0.21 | -0.21 | 0.21 |
| Father is a farmer | -0.22 | 0.21 | -0.83 ** | 0.26 | -0.03 | 0.25 |
| Household wealth | 0.20 *** | 0.04 | 0.21 *** | 0.05 | 0.18 *** | 0.05 |
| **Community characteristics** | | | | | | |
| Strict one-child policy | -0.09 | 0.19 | 0.12 | 0.23 | 0.22 | 0.25 |
| Percent in agriculture | -0.70 * | 0.34 | 0.02 | 0.39 | -0.70 ^ | 0.38 |
| Urbanization | | | | | | |
| City (=ref) | | | | | | |
| Suburb or town | -0.30 | 0.53 | -1.04 | 0.78 | -0.88 * | 0.35 |
| Village | -0.52 | 0.53 | -1.67 * | 0.79 | -1.75 *** | 0.41 |
| Region | | | | | | |
| Center (=ref) | | | | | | |
| North | -0.06 | 0.22 | -0.14 | 0.26 | 0.29 | 0.25 |
| South | -0.23 | 0.21 | -0.56 ^ | 0.31 | 0.16 | 0.27 |
| Survey year | | | | | | |
| 1993 (=ref) | | | | | | |
| 1997 | 0.10 | 0.23 | 1.23 *** | 0.31 | 0.60 ^ | 0.34 |
| 2000 | 0.73 ** | 0.24 | 1.14 *** | 0.29 | 1.03 ** | 0.34 |
| Intercept | 1.52 * | 0.63 | 1.74 * | 0.87 | -0.93 | 0.59 |
| | | | | | | |
| Wald Chi Square | 122.75 | | 126.52 | | 128.35 | |
| Degree of freedom | 14 | | 14 | | 14 | |
| N | 1024 | | 711 | | 700 | |

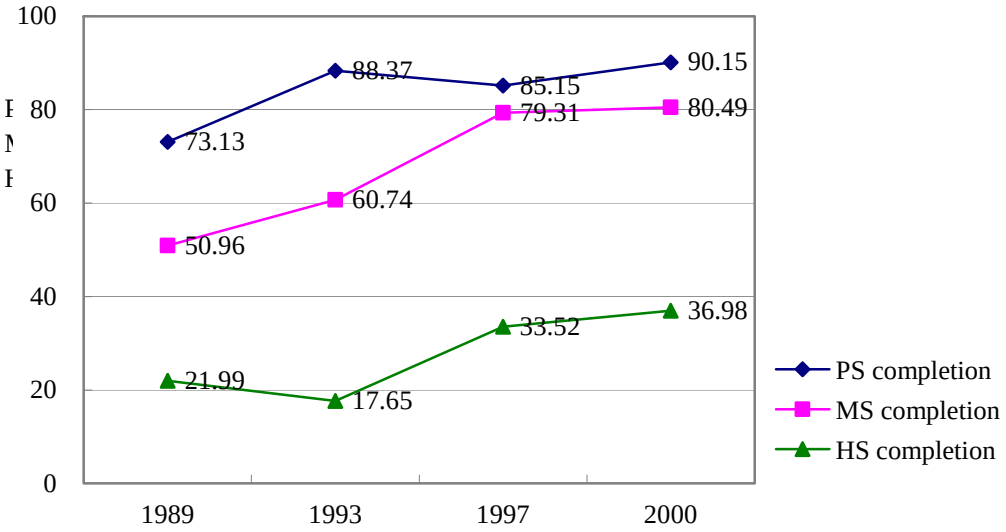
Source: 1993, 1997 and 2000 CHNS.

Notes: Coeff. = coefficient; SE = standard error; ***p<0.001; **p<0.01; *p<0.05; ^p<0.10.




Source: 1989, 1993, 1997 and 2000 CHNS.

**Figure 1. Percent of School Enrollment by Age and Year, CHNS 1989-2000**




Source: 1989, 1993, 1997 and 2000 CHNS.
Note: PS and MS completion is conditional on those who were ever enrolled; HS completion is for all children age 20.

**Figure 2. Percent of School Completion by Year, 1989-2000**