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in Jilin Province, China

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Abstract: This paper is based on data from Yanbian. Analysis of infant mortality in Yanbian sheds light on some important issues in the area of socio-economic status and female deprivation. Despite the high development level, strong son preference remains in Yanbian. In Yanbian, especially among ethnic Koreans, although higher household socio-economic status is related to lower infant mortality for both males and females, the higher the socio-economic status of families the GREATER the male-female differential in infant mortality, with males having lower infant mortality. It seems that when families have discretionary resources, they allocate them disproportionately to the welfare of boys rather than girls. Thus, female (relative) deprivation is not just a desperation or extreme poverty phenomenon. However, female infant mortality is responsive to the development level of locales. For example, female infant mortality is responsive to whether the household lives in a town rather than in a rural area, and also is sensitive to the availability of health personnel in the area. If households do not allocate discretionary resources to improve survival of baby girls, the healthfulness (i.e., quality of water and ease of access to health care) of the area in which the baby girl lives becomes especially important for her survival.

The findings in this paper have policy implications for Yanbian and other developed settings which retain a high degree of son preference. In Yanbian, as elsewhere in China and much of the rest of the world, the trend has been toward more reliance on the resources of individual households and less on public social services and social programs. Our results suggest that this kind of development is likely to lead to further improvements in the survival of infant boys, but is likely to result in much less improvement in the survival of infant girls.

Data used: 50% sample of 1990 Census of China data for Yanbian Prefecture, Jilin

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Introduction

There has been a great deal of concern about the relation of development to female deprivation. It has been assumed that there is a direct relationship between socio-economic development and improvement in all aspects of women's status. Reflective of this point of view were the discussions and arguments presented at the World Population Conference in Cairo in 1994. At that meeting, there was an expansion of population concerns beyond family planning to other areas. This was especially noted in the area of reproductive health. A more general question, however, was how the welfare of women might be improved. It was argued that altering the disadvantaged position of women was largely a matter of resource allocation. It was assumed that as overall social and economic development proceeds a highly related set of social and demographic changes will occur and that if sufficient funds are properly allocated, social well being will improve, fertility will decline, and the situation of women and minority group members will improve (United Nations, 1994).

This same general position was also strongly represented at the Beijing Women's Conference in 1995. Here again the critical issue was seen as the need to ensure development of resource allocation strategies which would support general development as a means for improving the status of women. Much earlier work on excess female infant mortality and female deprivation, such as sex differentials in access to food, education, or health care, has argued that female deprivation is the result of scarcity -- once there was not an extreme scarcity, female deprivation in the given area would disappear (cf. Basu 1989; Chen, Huq, and D'Souza 1981; Das Gupta and Visaria 1996).

Some have criticized the view that development always benefits women (Boserup 1970, Bradley 1995, Caldwell, Reddy and Caldwell 1988, Vlassoff 1990). When people discuss women's status and development, they mean two different things. Sometimes they mean that as development proceeds, the absolute situation of women improves -- as educational attainment in the society increases, the education of women also increases. Sometimes they mean that as development proceeds the position of women relation to the position of men improves -- as educational attainment in the society increases, the gap between men's and women's educational attainment lessens. There is more evidence of a positive relation between development and women's status according to the absolute view of women's status than according to the relative view of women's status. For example, as development increases, the average level of women's educational attainment tends also to increase. However, as development proceeds, the gap between men's and women's educational attainment often remains unchanged or widens.

The sex ratio at birth is the number of male births per 100 female births. In populations in which nothing is done to influence the sex ratio at birth, such as sex selective abortion or unreported female infanticide, the sex ratio of birth falls in the range 104-107 (Chahnazarian 1986). Thus, a sex ratio at birth of 115 indicates that something substantial is being done to decrease the number of female infants reported as born. In Korea and China, this is probably mainly sex-selective abortion (Anderson and Liu 1997, Kim 1994, KIHASA 1996, Park 1983, Park and Cho, Anderson and Silver 1995, Arnold and Liu 1986, Greenhalgh and Li 1993, Gu and Li 1996, Li 1994, and Zeng et al 1993).

We see the persistence of son preference in societies which have achieved a measure of economic well-being. Particularly illustrative is the Republic of Korea which is far more developed than many parts of Asia, yet it has one of the highest sex ratios at birth among all countries in that region -- above 115 in 1994.

In this paper we look at the relation of the development level of households and locales to infant mortality by sex. We want to know whether different aspects of development differentially affect infant mortality by sex. We also examine whether ethnic group membership and whether there are older siblings in the household, especially of the same gender of the infant, affects whether the infant survives.

Characteristics of Yanbian Prefecture, Jilin Province

Jilin Province is located in northeastern China and borders on North Korea. Jilin Province is the center of the Chinese automotive industry and has characteristics like a newly-industrializing country.

Within China, ethnic Koreans are concentrated in Jilin Prefecture. Yanbian Prefecture has the highest proportion of ethnic Koreans of any prefecture in Jilin. Table 1 shows the ethnic composition of Yanbian Prefecture. Almost all of the non-Koreans are Han Chinese. In this paper we shall discuss Koreans and non-Koreans. Within China, Koreans have the highest education, the lowest infant mortality rate, and the lowest total fertility rate of any ethnic group (Zhang 1994). Thus, Koreans in China exhibit extremely advanced socio-economic characteristics.

Table 1. Population of Yanbian Prefecture, 1990

Group	Number	% of Prefecture
Koreans	837,272	40.88
Han	1,141,080	55.71
Other	69,798	3.41
Total	2,048,158	100.00

Note: The number reported is the estimated total for the prefecture, obtained by multiplying the number in the 50% sample by 2.

Table 2 shows the total fertility rate for the total population, as well as for non-Koreans and Koreans in Yanbian. The Korean total fertility rate is lower than that of non-Koreans, even though, since Koreans are a small ethnic group in China, they are under less restrictive family limitation rules than Han Chinese. Table 2 also shows the sex ratio at birth for all births, for first births, and for second and later births. For second and later births, the sex ratio at birth is clearly excessively masculine, almost certainly due to use of sex-selective abortion. The high sex ratio at birth for second and later births reflects a high degree of son preference. Couples may be reluctant to abort the first pregnancy, perhaps due to a preference for a daughter rather than no children. However, couples are much more likely to proceed to a second birth if the first child is a daughter, in hopes of having at least one son (Anderson and Liu 1997).

Table 2. Some Demographic Characteristics of Yanbian Prefecture, 1990

	Total	non-Korean	Korean
Total Fertility Rate	1.49	1.52	1.46
Sex Ratio at Birth			
All births	106.8	107.5	105.5
First birth	102.7	103.8	100.8
Second or later birth	118.6	118.4	119.0

Data Used

This paper is based on a 50% sample of the data from Yanbian Prefecture from the 1990 Census of China, consisting of 1,024,111 individual cases. The sample data include information about all members of a given household. Thus data are available for 286,590 households in Yanbian Prefecture

Chinese censuses are unusual in that they collect vital-statistics type information on recent births and deaths in the household. Information is collected about children ever born and on surviving children by sex, and about births in the previous 18 months. Information is also collected on deaths in the previous 18 months. For each dead person, a variety of information is known, including the month and year of death, sex, age, marital status, education, and occupation. All of the deaths to sample households are included in the data available for this paper.

The data for all members of a given household are strung together to form a long household record. Ethnic group membership for each household member is separately recorded. In this study, we code the ethnicity of the household as that of the first listed household member, who is usually a male of working age. This is the person who normally would be designated as head of household.

The substantive focus of this paper is infant mortality. To be included in the analysis a given household needs to report that it included a child under one year of age at the time of the 1990 Census of China or needed to report that a child under one year of age had died in the year preceding the census. This analysis is performed on non-institutional households in the prefecture. There is a small proportion of "households" that are not regular households. They may be work groups, and are often extremely large. The substantive interpretations of household dynamics are not valid for these "households."

In the calculation of infant mortality for groups in this study, the numerator includes deaths in the past twelve months to a member of the household, in which the person was under one year of age at the time of death. The denominator includes all those counted as infant deaths and also all live persons in households who are under one year of age at the time of the census. In the micro-analysis of the causes of infant death, a household is assigned the value 1 if a person under one year of age died in the 12 months before the census and is assigned the value 0 if it includes a living person under one year of age at the census date.

The quality of the 1990 Census of China has generally been regarded as high (Banister 1994; Jiang, Li, and Sun 1994; Zhang and Cui 1994), but concerns have been raised about completeness of reporting

of deaths. Some scholars have argued that the completeness of reporting of deaths in the 1990 Census of China falls off very rapidly as events more than a few months in the past are reported. This argument is based on the drop-off in the number of reported infant deaths for ever more remote periods in the past for China as a whole (Tu and Liang 1994).

Table 3 shows the data upon which Tu and Liang based their argument. Table 3 also shows the number of infant deaths for 0-5 months, 6-11 months, and 12-17 months before the census date in our data for Yanbian. In Tu and Liang's data, there is a considerable fall-off in the proportion of deaths reported for 7-11 months and 12-17 months before the census date in comparison to 0-5 months before the census date. Tu and Liang argue that there should have been substantially the same number of actual infant deaths in each six month period and the smaller number farther in the past is an artifact of omissions in reported infant deaths. The data from Yanbian do not exhibit the pattern of fall-off of events reported in the past. Thus, there is no evidence of differential omission of deaths 6-11 months before the census date in the data from Yanbian. Thus, the data on deaths for the previous 12 months are used in this paper. For more discussion, see Anderson and Liu (1997) and Anderson, Kim, and Romani (1997).

Table 3. Distribution of Reported Infant Deaths by Date the Death Occurred

	Jan-June 1989	July-Dec 1989	Jan-June 1990
Tu and Liang (1994) for All of China			
Number	2294	2869	3733
Percentage	25.8	32.3	42.0
50% Sample for Yanbian			
Number	196	168	171
Percentage	36.6	31.4	32.0

Development Indicators for Households Containing a Living or Recently Dead Infant

There are two different kinds of development indicators: socio-economic characteristics of households, and ecological characteristics of locales. Socio-economic characteristics of households can differ for adjacent households, while, development characteristics of locales are shared by all households in a small geographic area.

The socio-economic characteristic of households most often thought to influence infant mortality is the education of the mother mortality (see for example, Caldwell and McDonald 1982, Wolff 1993). More educated mothers are thought to have more knowledge of childcare, to recognize signs of illness sooner and, often, to have more discretion in taking a child for medical care. Table 4 shows the distribution of the educational attainment of the woman in the childbearing ages in the household with the highest educational attainment. If there is only one such woman, she is almost certainly the infant's mother. In the kind of data being used in this paper, if there is more than one woman in the child-bearing ages in the household, it is extremely difficult to determine which woman is the infant's mother. In Yanbian Prefecture, 16% of households with a living or recently deceased infant include more than one

female age 15-49. Overall, educational attainment of these women is quite high, with 40% having complete secondary education or more. Korean women are somewhat more highly educated than non-Korean women.

Table 4. Development Indicators for Households Containing a Living or Recently Dead Infant in Yanbian Prefecture 1990

	Total	non-Korean	Korean
<u>Household Socio-Economic Characteristics</u>			
Highest Education Woman Age 15-49 in Household			
Illiterate or Semi-Literate	2.3	3.5	.1
Primary Education	12.8	18.4	2.9
Junior High	44.9	45.9	43.1
Complete Secondary or More	40.1	32.1	53.8
Total	100.0	100.0	100.0
%in non-Agricultural Households	51.8	49.7	55.4
<u>Development Characteristics of Locales</u>			
% Living in Towns	88.6	89.2	87.6
Health Personnel per 10,000 Population of Township			
0-40	42.8	44.6	39.7
41-80	25.5	28.0	21.2
81-120	16.8	17.7	15.4
121+	14.8	9.7	23.8
Total	100.0	100.0	100.0
<u>Household Composition</u>			
Children Age 1-9 in Household			
None	73.5	73.8	72.9
At Least One Boy	10.4	9.7	11.6
At Least One Girl	15.2	15.3	15.2
At Least One Boy and One Girl	.9	1.2	.3
Total	100.0	100.0	100.0

Another important socio-economic characteristic of households is whether the head of household has an agricultural occupation or not. In both towns and rural areas, some people engage in agricultural occupations, while others engage in non-agricultural occupations. About half the households containing a living or recently dead infant were agricultural and the other half non-agricultural.

Counties in China are divided into township-level units. These township-level units can be (1) towns, (2) collective or state farms, or (3) rural townships. Among township-level units, towns have the most urban characteristics. There is higher population density, more availability of services, and there

tend to be other urban amenities, such as cleaner water, in towns than in other kinds of townships. Some aspects of town life, such as quality of drinking water, affect all town residents, regardless of household characteristics or preferences. Whether a household lives in a town or not, thus, is an obvious development characteristics of a locale. In Yanbian, 89% of household with an infant lived in a town.

Table 4 also shows the distribution of the number of health personnel per 10,000 population in a township in which an infant lives. The presence of health personnel is quite high, with an average across townships in Yanbian containing a live or recently dead infant of 67 health personnel per 10,000 population. In this study, we define "health personnel" as those whose occupation in the census is reported as "doctor," "nurse," or "health technician," regardless of their educational attainment. This is different from the practice in overall official Chinese statistics on health personnel, in which a more restrictive definition of health personnel is employed, which excludes those with a low level of education. It is thought that the more readily available are health personnel, the lower infant mortality.

Another characteristic that can affect infant mortality is the number and sex composition of siblings. As shown in Table 4, in 74% of the households, there were no children age 1-9. We interpret this as meaning there were probably no living siblings. Older sisters were more common than older brothers, probably because a major reason for having a child recently was the desire to have a son when the couple already had a daughter. Higher fertility households may also have lower socio-economic characteristics. However, if there is an older sister, the household may be less motivated to assure the survival of a new infant girl.

Bivariate Analysis of Infant Mortality

Table 5 presents infant mortality rates according to the characteristics examined in Table 4, along with infant mortality by the household's ethnic group. This is shown for both sexes together, as well as for males and females separately. The ratio of female to male infant mortality is also shown.

In Table 5, generally households with higher socio-economic characteristics have lower infant mortality for both male and female infants. However, with highest household socio-economic characteristics the relation of male to female infant mortality changes. When the education of the highest educated woman in the child-bearing ages is primary school or less, females have 54% the level of male infant mortality. However, if the comparable woman has completed secondary education or more, female infant mortality is 10% higher than male infant mortality. This is plotted in Figure 1. Having a more-educated mother seems to result in greater reductions in male than in female infant mortality. Similarly, living in a non-agricultural household is related to a greater decrease in male than in female infant mortality.

Living in a more developed locale also is related to lower infant mortality for both male and female infants. However, town residence is related to greater reductions in female than in male infant mortality. This more consistent relation of the availability of health personnel to female than to male infant mortality is clear in Figure 2. Similarly living in a township with more health personnel per 10,000 population has a more consistent relation with lower female than male infant mortality.

Koreans have lower male than female infant mortality, while non-Koreans have lower female than male infant mortality. For both males and females having older siblings is related to higher infant mortality.

Table 5. Infant Mortality per Thousand Births in Yanbian Prefecture by Various Characteristics, 1990

	(1)	(2)	(3)	(4)
	Both Sexes	Males	Females	(3)/(2) Female/Male
Total	20.9	22.9	18.7	.82
<u>Household Socio-Economic Characteristics</u>				
Highest Education of Woman Age 15-49 in Household				
Primary School or Less	31.1	39.7	21.6	.54
Junior High School	20.0	23.6	17.4	.74
Secondary School or More	16.6	15.8	17.4	1.10
Live in a Non-Agricultural HH				
No	27.3	31.2	23.1	.74
Yes	15.0	15.2	14.7	.97
<u>Development Characteristics of Locales</u>				
Residence in Town				
No	29.8	37.6	32.0	.85
Yes	19.8	22.3	17.0	.76
Health Personnel per 10,000 Population				
0-40	27.6	30.7	24.5	.80
41-80	21.1	22.2	20.0	.90
81-120	11.6	12.0	11.1	.93
121+	11.6	14.3	8.8	.62
<u>Ethnic Group Membership and Household Composition</u>				
Ethnic Group				
Korean	21.3	21.2	21.5	1.01
non-Korean	20.6	23.9	17.1	.72
Children Age 1-9 in Household				
None	18.4	20.9	15.8	.76
At Least One Boy	27.4	30.6	24.3	.79
At Least One Girl	30.6	30.9	30.5	.99

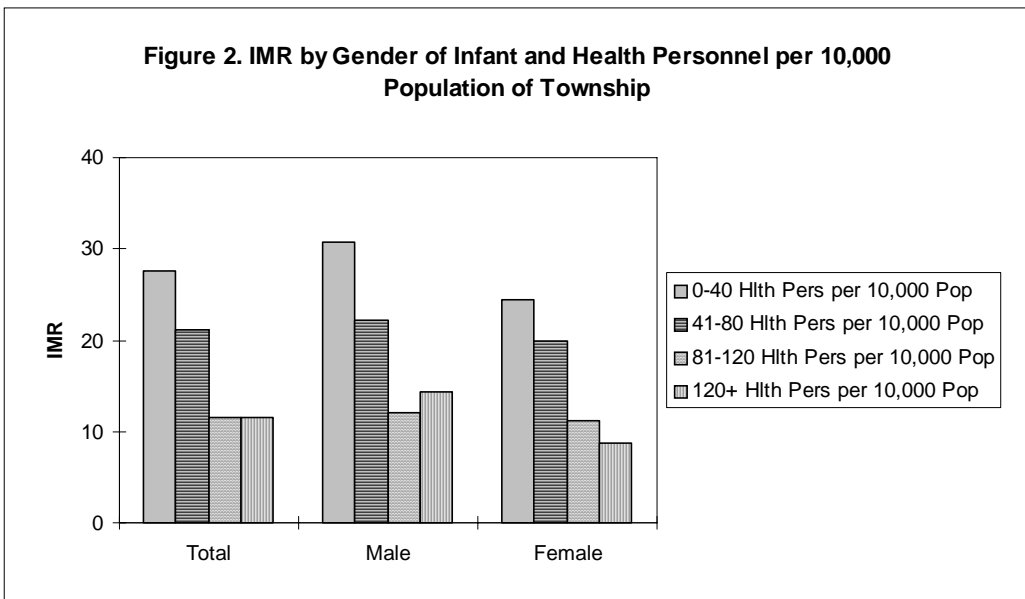
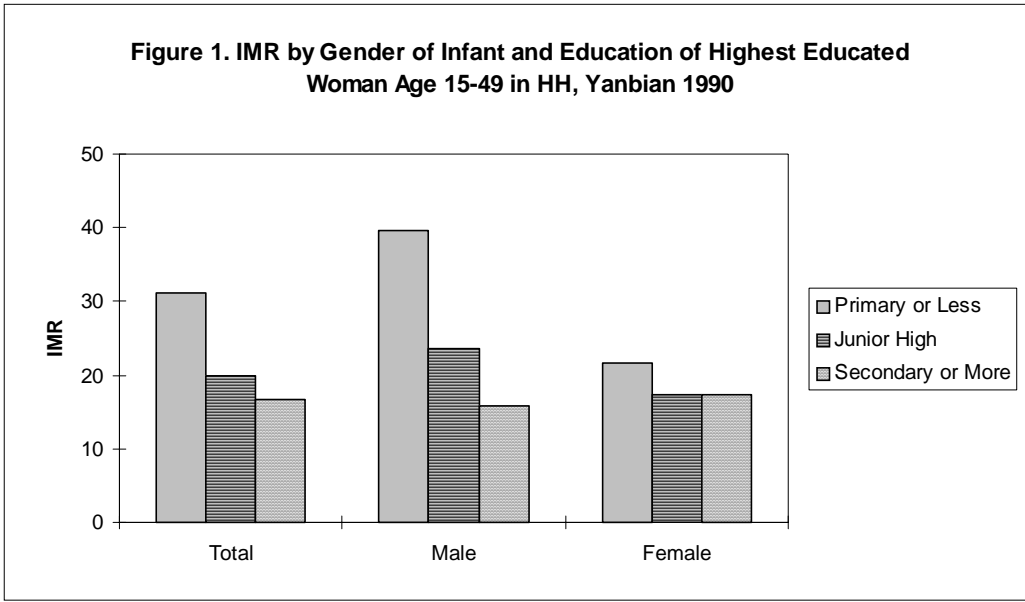


Table 5 showed only bivariate relations. Households with higher socio-economic characteristics tend to reside in locales with more developed characteristics. In addition, health personnel are more likely to be found in areas with more developed households. Households with more children also may be more common in less developed locales and in households with lower socio-economic characteristics. All these expectations are shown to be true in Table 6. Thus a multivariate analysis of the relation of all of these characteristics to the chance of infant death is important.

Table 6. Pearson Correlations of Female Education, Health Personnel per 10,000 Population in Township, and Number of Children Age 1-9 in Household, Yanbian, 1990

	(1)	(2)	(3)
(1) Education of Highest Educated Woman Age 15-49 in Household, 4 categories			
(2) Health Personnel per 10,000 Population in Township	<u>.402</u> (<.001)		
(3) Number of Children Age 1-9 in Household	<u>-.169</u> (<.001)	<u>-.183</u> (<.001)	

N=17424

p values in parentheses, two-tailed test

Multivariate Analysis of Infant Mortality

Table 7 shows five different logistic regression analysis separately for male and female infants. Model 1 includes only the household socio-economic characteristics, Model 2 includes only the development characteristics of locales, Model 3 includes ethnic group membership and household composition measures. Model 4 includes the household socio-economic characteristics and the development characteristics of locales, and Model 5 includes all of the variables.

All of the models are overall statistically significant for both males and females. Given the correlations shown in Table 6, it is not surprising that Models 1,2, and 3 are all significant overall. What is more interesting is the significance of the addition to the X^2 when variables are added to models. For Model 4, the X^2 change from Model 1 tests whether the model is significantly improved when the development characteristics of locales are added to the household socio-economic characteristics. The X^2 change from Model 2 tests whether the model is significant improved when household socio-economic characteristics are added to the development characteristics of locales.

For males, adding the development characteristics of locales to the household socio-economic characteristics does not significantly improve the fit of the model, while adding the household socio-economic characteristics to the development characteristics of locales significantly improves the fit of the model. Thus, once one knows the characteristics of the household in which an infant boy lives, the overall characteristics of the locale are irrelevant for predicting whether the boy will die as an infant.

The opposite is true for girls. For girls, the development characteristics of locales are important, and knowing the socio-economic characteristics of the household in which the girl lives are irrelevant for predicting whether the girl will die as an infant.

Table 7. Logistic Regression Analysis of Factors Related to Infant Death, Yanbian Prefecture 1990

Dependent Variable: Whether Child Under One Year of Age Alive at the 1990 Census or Had Died at Age Under One Year in Previous 12 Months (0=Alive, 1=Died)

Males	(1)	(2)	(3)	(4)	(5)
Household Socio-Economic Characteristics					
Woman Age 15-49 in Household with Junior High Education (0=No, 1=Yes)	<u>-.3555</u> (.045)			-.3397 (.056)	-.3229 (.084)
Woman Age 15-49 in Household with Secondary Education or More (0=No, 1=Yes)	<u>-.5549</u> (.012)			<u>-.5135</u> (.021)	<u>-.5290</u> (.024)
Live in a Non-Agricultural Household (0=No, 1=Yes)	<u>-.5430</u> (.002)			-.3676 (.072)	-.3238 (.117)
Development Characteristics of Locales					
Live in a Town (0=No, 1=Yes)		.1235 (.570)		.1647 (.449)	.1838 (.400)
41-80 Health Personnel per 10,000 Persons in Township		<u>-.3588</u> (.042)		-.0973 (.618)	-.0826 (.672)
81-120 Health Personnel per 10,000 Persons in Township		<u>-.9868</u> ($<.001$)		<u>-.5937</u> (.041)	<u>-.5739</u> (.048)
121+ Health Personnel per 10,000 Persons in Township		<u>-.8131</u> (.001)		-.3598 (.223)	-.3607 (.226)
Ethnic Group Membership and Household Composition					
Korean Ethnicity (0=Not Korean, 1=Korean)			-.1235 (.411)		.0581 (.721)
Girl Age 1-9 in Household (0=No, 1=Yes)			<u>.3945</u> (.019)		.1740 (.322)
Boy Age 1-9 in Household (0=No, 1=Yes)			.3909 (.053)		.1915 (.355)
Constant	-3.1713	-3.5468	-3.8395	-3.2692	-3.3932
X ²	<u>32.403</u> ($<.001$)	<u>24.440</u> ($<.001$)	<u>8.580</u> (.035)	<u>37.653</u> ($<.001$)	<u>39.339</u> ($<.001$)
X ² change from Model (1)				5.250 (.263)	6.935 (.436)
X ² change from Model (2)				<u>13.214</u> (.004)	<u>14.899</u> (.021)
X ² change from Model (4)					1.685 (.640)
d.f.	3	4	3	7	10
d.f. change from Model (1)				4	7
d.f. change from Model (2)				3	6
d.f. change from Model (4)					3
N	8942	8942	8942	8942	8942

Table 7. (Continued)

Females	(1)	(2)	(3)	(4)	(5)
Household Socio-Economic Characteristics					
Woman Age 15-49 in Household with Junior High Education (0=No, 1=Yes)	-2703 (.218)			-2322 (.290)	-3320 (.150)
Woman Age 15-49 in Household with Secondary Education or More (0=No, 1=Yes)	-.0918 (.134)			-.0383 (.879)	-.1601 (.552)
Live in a Non-Agricultural Household (0=No, 1=Yes)	<u>-.4598</u> (.020)			-.0797 (.725)	-.0737 (.747)
Development Characteristics of Locales					
Live in a Town (0=No, 1=Yes)		-.3982 (.072)		-.3994 (.073)	-.3579 (.109)
41-80 Health Personnel per 10,000 Persons in Township		-.1018 (.609)		-.0836 (.711)	-.0644 (.773)
81-120 Health Personnel per 10,000 Persons in Township		<u>-.6826</u> (.016)		<u>-.6704</u> (.036)	<u>-.6404</u> (.044)
121+ Health Personnel per 10,000 Persons in Township		<u>-.9228</u> (.005)		<u>-.9341</u> (.012)	<u>-.9957</u> (.007)
Ethnic Group Membership and Household Composition					
Korean Ethnicity (0=Not Korean, 1=Korean)			.2360 (.146)		<u>.3663</u> (.039)
Girl Age 1-9 in Household (0=No, 1=Yes)			<u>.6636</u> ($<.001$)		<u>.5275</u> (.007)
Boy Age 1-9 in Household (0=No, 1=Yes)			.3806 (.146)		.2248 (.332)
Constant	-3.5919	-3.4042	-4.2264	-3.2860	-3.5490
X ²	<u>9.894</u> (.020)	<u>22.786</u> ($<.001$)	<u>14.621</u> (.002)	<u>25.246</u> ($<.001$)	<u>36.507</u> ($<.001$)
X ² change from Model (1)				<u>15.352</u> (.004)	<u>26.613</u> ($<.001$)
X ² change from Model (2)			(.483)	2.460 (.033)	<u>13.720</u>
X ² change from Model (4)				(.010)	<u>11.260</u>
d.f. 3	4	3	7	10	
d.f. change from Model (1)				4	7
d.f. change from Model (2)				3	6
d.f. change from Model (4)					3
N	8482	8482	8482	8482	8482

For Model 5, adding the ethnic group to which the boy's household belongs and whether there are older siblings does not significantly improve the explanation of infant death. In fact, once the three household socio-economic characteristics are in the model, the other seven variables as a whole do not significantly improve the model. For girls, examining Model 5, adding ethnic group membership and whether there are older siblings significantly improves the model. Korean girls and girls with an older sister are significantly more likely to die, even after household and locale development characteristics have been taken into account.

Conclusions and Implications

Figures 3-6 show predicted infant mortality rates based on Model 5 of Table 7. These are shown in Figures 3 and 4 for a low development setting and in Figures 5 and 6 for a high development setting. In Figures 3 and 5 the education of the "mother" is varied, and in Figures 4 and 6 the number of health personnel per 10,000 population in the township in which the infant resides is varied.

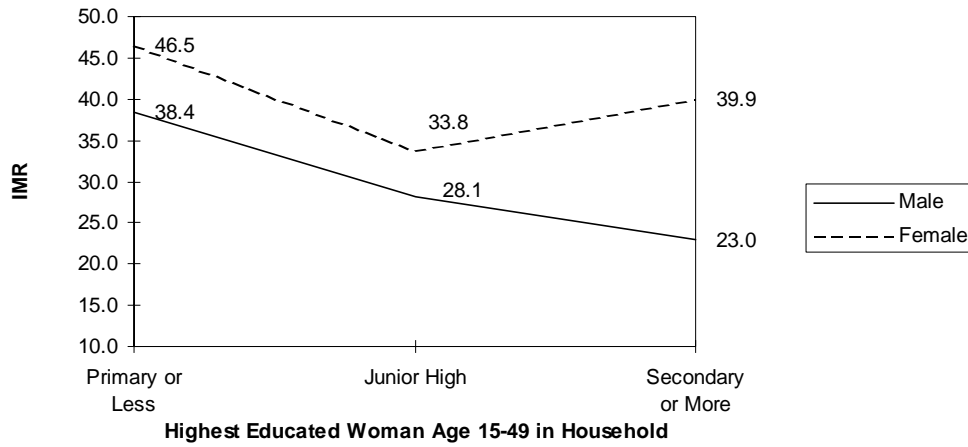
In Figure 3, female infant mortality is higher than male infant mortality regardless of the education of the mother. Also, education above the primary level is related to some lowering female infant mortality, but there is not a monotonic relation. The overall picture is similar in Figure 5, although in that version, female infant mortality is lower than male infant mortality. That is primarily due to the high number of health personnel per 10,000 population of the township specified in the profile used in Figure 5.

The results overall indicate that in Yanbian, for boys, household socio-economic characteristics can protect infant boys from an undesirable environment, while for girls, the socio-economic characteristics of the household are of little importance; what is more important are the development characteristics of the locale, whether the household is Korean, and whether there is an older sister.

How does this happen? In a strong son preference setting, households may be much more willing to invest resources of time and money in promoting the survival of baby boys than baby girls. For example, if the mother is more educated, she may know that clean water is important for babies and that boiling water will make it safer. If the household has more disposable income, fuel for boiling water will be more available than if there is less disposable income. If a household with an educated mother and with plentiful fuel boils water for infant boys, then it will not matter if there is cleaner town water or more polluted rural water. If the household is less likely to boil water for baby girls, the quality of the local water supply will be more important for the survival of infant girls than of infant boys.

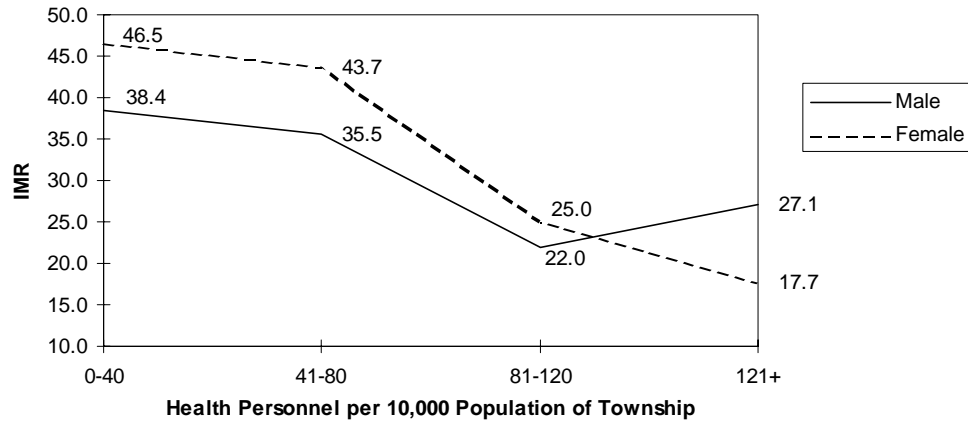
Recall that the availability of health personnel is quite high in Yanbian generally. Concerned families may take an infant boy for medical treatment whether they need to walk one-tenth a kilometer or one kilometer. In that situation, increases to very high availability of health personnel will make little difference in whether a sick baby boy receives medical assistance. However, if infant girls are less valued, and the household is less willing to go to the trouble of taking a sick baby girl for medical care, whether they need to travel one-tenth kilometer or one kilometer may make a great deal of difference in whether the baby girl receives medical care.

Figure 3. Predicted IMR by Education, Low Development Version

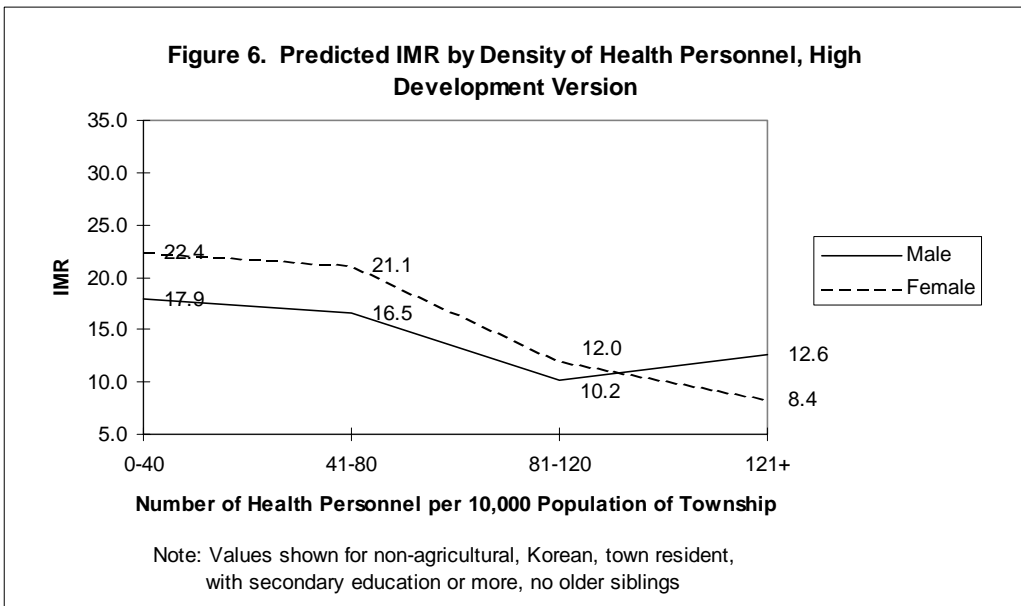
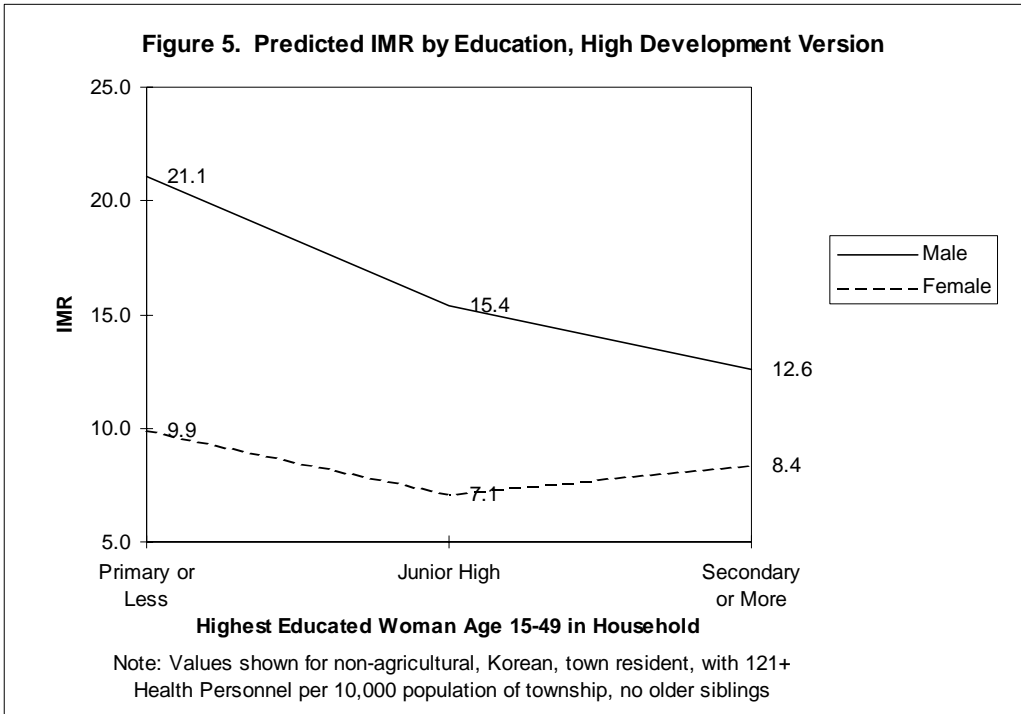


Note: Values shown for agricultural, non-Korean, not town resident, with 0-40 health personnel per 10,000 population, older sister

Figure 4. Predicted IMR by Density of Health Personnel, Low Development Version



Note: Values shown for agricultural, non-Korean, not town resident, with primary education or less, older sister



What does this mean for the possible effects of continued development in Yanbian? Research on excess female infant and child mortality has often shown that as the economic resources of a family increase and as the health system improves, excess female infant and child mortality declines. D'Souza

and Bhuiya (1982) have shown for Bangladesh that with increasing socio-economic status of the family excess female infant and child mortality disappears. This argues that female children are seriously disadvantaged only when there is a large and clear lack of overall resources, but that once families are above this fairly low threshold, females are not disadvantaged.

In Yanbian, the high sex ratios at birth for second and later births shown in Table 2, and the high sex ratios at birth in Korea indicate the persistence of a high level of son preference even as a high level of socio-economic development has been reached. In the strong son preference setting of Yanbian, it seems that when families have discretionary resources, they allocate them disproportionately to the welfare of boys rather than girls. Thus, female (relative) deprivation is not just a desperation or extreme poverty phenomenon. In Yanbian, as elsewhere in China and much of the rest of the world, the trend has been toward more reliance on the resources of individual households and less on public social services and social programs. Our results suggest that this kind of development is likely to lead to further improvements in the survival of infant boys, but is likely to result in much less improvement in the survival of infant girls.

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