

**Effects of Son Preference on Contraception, Abortion, and Fertility in Central Asia:
The Case of Uzbekistan**

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Abstract

Research on sex preference for children has largely focused on Southern and Eastern Asian countries and overlooked the region of formerly Soviet Central Asia. Using the 2002 Uzbekistan Health Examination Survey and qualitative data collected in 2005 and 2006, I explore the preference for male births as it affects contraception, abortion, and fertility in a country well into its fertility transition. Findings indicate that, while son preference has a small influence on current contraceptive prevalence, the overall sex ratio at birth may mask substantial parity-specific differences. For births at certain orders, the calculated sex ratio does not fall in the normal range and may indicate the presence of an artificial intervention. Further, results of proportional hazards models indicate a substantial effect of son preference on fertility. I use focus group and individual and expert interview data to explain this phenomenon in economic and cultural terms.

Effects of Son Preference on Contraception, Abortion, and Fertility in Central Asia: The Case of Uzbekistan

Evidence of gender preferences for children, usually in favor of sons, has been found in many diverse contexts worldwide (Arnold 1997). The bulk of previous work has focused on North Africa and Southern and Eastern Asia, where son preferences appear to be most dramatic. Results on the effects of son preference are mixed, but in some contexts a preference for male births can have a substantial effect on fertility and the use of contraception and abortion (Arnold 1997; Leone 2003; Rahman and DaVanzo 1993). Although some scholars have discussed a persistent preference for sons throughout Central Asia (see, e.g., Hortaçsu et al. 2001; Tabyshalieva 2000), there has been no systematic analysis of this phenomenon in the region. Using the Uzbekistan Health Examination Survey (UHES) and qualitative data collected in 2005 and 2006, I explore the preference for male births as it affects contraception, abortion, and fertility in a country well into its fertility transition.

Son preference can have a wide range of effects on contraceptive use, fertility, and abortion in different regions and at different times (Arnold 1997; Haughton and Haughton 1995; Pong 1994; Rahman and DaVanzo 1993). Preference regarding children's sex have most often been assumed to be associated with lower contraceptive use and higher fertility, as women dissatisfied with the sex composition of their children continue to give birth, or give birth at a faster rate, in order to achieve the desired number of sons and/or daughters. However, estimating the effects of sex preference for children is complicated by the fact that such analyses tend to operate on an aggregate level (McClelland 1979). Sex preferences are likely to be at least somewhat heterogeneous within a given population and the level of this heterogeneity is generally unknown. Further, even in a context of completely homogeneous sex preferences for children, at certain parities and sex compositions of children, some couples may determine that

the risk of producing an even more unfavorable outcome outweighs the potential benefit from having a child of the desired sex (McClelland 1979). This leaves us with couples taking opposite courses of action in their reproductive behavior based on identical motivations.

Where present, sex preference for children tends to become stronger as fertility declines (Bairagi 2001; Das Gupta et al. 2003; Park and Cho 1995). The trend of sex preference becoming more visible in low fertility settings occurs because individuals are forced to make increasingly hard decisions about how to achieve the desired number of sons and/or daughters without exceeding the number of children they want or are able to support. As sex preference for children is observed in such a wide range of settings, it is unlikely that any set combination of basic variables will explain its existence in a particular context. Arnold (1997:2) describes son preference linked to “economic, religious, social, and psychological” cost-benefits analysis in which male and female children may be seen as more or less helpful or costly in each area. Das Gupta (2003) notes that several countries with very high son preference (Northern India, China, South Korea) share a patrilineal and patrilocal nature, wherein resources are passed down from father to son and households follow paternal lines. The Uzbek family/clan structure also shares these characteristics.

The Uzbek Context

During the Soviet Period, Uzbek society was extremely pro-natalist, with government officials making conscious attempts to encourage population growth through public policy. Mothers who gave birth to at least seven children were honored with the governmental distinction of “mother-heroes.” This award was accompanied by many financial and social benefits (Barbieri et al. 1996; Buckley 1998; Karimov 1997). Family planning was not encouraged during this period, and abortion was common (Barbieri et al. 1996). For the last

decade, however, the Uzbekistan Ministry of Health has actively promoted the use of governmentally-provided and privately-marketed family planning services in order to meet unmet contraceptive need and improve maternal and child health (Karimov 1997).

Since declaring independence in 1991, Uzbekistan has experienced a rapidly changing demographic situation. Emerging demographic trends include a dramatic drop in growth rate and absolute population growth in the last few years. These changing trends are due, partially, to a sharp decline in birth rate, especially among the rural population. The fall in birth rate has been largely attributed to changing fertility preferences in rural areas (Ubaidullaeva and Umarova 2001). The composition of the population of Uzbekistan has also changed considerably in recent years. Following the breakup of the Soviet Union, much of the Russian and Russian-speaking population departed, while people from nearby Central Asian states migrated into Uzbekistan (Ubaidullaeva and Umarova 2001).

Governmental action, international contraceptive aid, and reductions in the demand for children all contributed to improvements in reproductive health in the 1990s (Buckley et al. 2004). Between 1996 and 2002, the percentage of married women using a modern method of contraception at the time of survey increased from 51.3% to 62.8%. Ever use of modern contraception increased from 64.9% to 82.4% among married women, but the IUD continued to be used almost exclusively (Asadov et al. 1996; Sullivan and Kamilov 2004a). Induced abortion was widely used throughout the USSR (David 1999), and high reliance on abortion persisted following the breakup (Henshaw et al. 1999), although abortion rates have undergone a “steady and significant decline” since the early 1990s (Sullivan and Kamilov 2004b). Use of abortion within Soviet Central Asia was much more common among Russians and other Europeans than the ethnic Central Asians, and Agadjanian (2002) found that this difference has persisted in

independent Kazakhstan. In 1996, Uzbeks also had lower abortion and contraceptive rates than Russians and other Europeans living in Tashkent (Agadjanian and Makarova 2003). In the geographically closest examination of sex-specific desired fertility, Hortaçsu et al. (2001) found evidence of son preference in stated desire for children among women and, especially, men in neighboring Turkmenistan. Some observers have noted anecdotal evidence of the persistence of a traditional preference for sons throughout Central Asia. Tabyshalieva (2000) discusses the desire for sons in Central Asia as traditionally influenced by “tangible social, economic, and environmental reasons, including high infant mortality and the need to maintain large families to support the natural economy and to wage war... Many women who have only daughters keep bearing until the birth of a son, often not only under the pressure of the husband and relatives but also because of custom.”

Data and Method

In this paper, quantitative and qualitative methodologies work together to describe and explain the impact of sex preference for children on contraception, abortion, and fertility in Uzbekistan. The quantitative analysis will yield a generalizable picture of broad patterns at work on the national level, but, because of the nature of the analysis, can add little to explanations of the presence of sex preferences. The qualitative component of the research is necessary in order to understand how observed phenomena are affected by social and cultural processes. Further, women and men are given the freedom to discuss, qualify, and contextualize responses, allowing me to go beyond study indicators to examine the conscious/unconscious nature of sex preferences and their impact on reproductive behavior.

Quantitative Analysis

The quantitative part of the project uses women’s data from the 2002 Uzbekistan Health

Examination Survey (UHES) to examine trends in fertility and the use of contraception and abortion. The UHES is a multistage stratified cluster sample drawn to be nationally representative of women ages 15 to 49 living in Uzbekistan and includes data on fertility, abortion, and family planning. The 2002 sample consists of 5,463 women.¹ In the analysis of current contraceptive use, I restrict the sample to married, non-pregnant women with complete information, reducing the working sample to 3,485. When examining sex ratio at birth and abortion, I use the constructed birth file and restrict the sample to births between 1993 and 2002 (n=4,989 live births, 6,766 pregnancies). Sampling weights are applied to the data, and cluster effects are corrected using Stata 9's survey analysis commands. I begin by discussing parity-specific estimates of sex ratio at birth. To examine the influence of sex preference on contraception and abortion, I analyze rates of current contraceptive use and abortion 1993-2002 by number and sex composition of surviving children. Because of right censoring caused by surveying women who have not completed their fertility, survival analysis is often used in order to gauge the impact of sex preference on variations in the length of the interval between two births (Arnold et al. 1998; Haughton & Haughton 1995; Rahman and DaVanzo 1993). I use proportional hazards models to explore the effect of sex composition of surviving children on the risk of having a subsequent birth after the first, second, third, and fourth live births. Because the UHES data do not contain information on desired number of children, methods requiring knowledge of whether or not the woman plans to have more children could not be used.

Operationalization of Model Variables. The dependent variable in the Cox proportional hazards models is the time to subsequent birth, measured in months. Separate models are run for each parity 1 to 4, with the time interval beginning at the time of the index birth. A set of dummy variables identifies sex composition of children surviving at the start of the interval, including

the index child. At parity 1, the hazard of having a subsequent birth for those with no surviving sons is compared to that for those with one surviving son. In the remaining models, those with no sons and those with all sons are compared to the reference category, those with at least one son and one daughter surviving at the start of the interval.

Additional covariates included in the models include survival status of older children, education, residence status, ethnicity, age at the start of the interval, decision-making score and co-residence with a parent-in-law. Survival status of older children is included as a time-varying covariate that takes the value of 1 in the month when any older child who was alive at the start of the interval (including the index child) dies before the end of the interval. Mothers with at least some university or institute education are compared to those with less education, rural residents are compared to urbanites, and non-Uzbeks are compared to ethnic Uzbeks. Mother's exact age at the start of the interval is a continuous predictor measuring mother's age at the time of the index birth. The decision-making scale ranges from 0 to 8 and provides a count of the number of decisions a woman makes alone or jointly with someone else including decisions involving her own health care, large household purchases, daily household purchases, visits to family, visits to friends, what food to prepare, women's work or money, and contraceptive use.

Qualitative Analysis

After establishing the presence of son preference in Uzbekistan and discussing its consequences, I use qualitative data to explore the sources of the preference for male children. Although reproductive health behaviors are often thought of as ultimately private decisions, family planning practices are adopted socially and for a variety of reasons. Observing group interaction and perceptions of public norms and sanctions is critical for understanding the adoption of family planning practices stemming from perceptions of others' positive or negative reactions. Between

January and August 2006, focus group discussions and interviews were conducted with women and men in Tashkent and in a village in the Jizzak oblast' of Uzbekistan. Eight focus groups (5 in Tashkent and 3 in Jizzak) were conducted with eight to ten participants each. All participants had at least one child. Group divisions were selected both to facilitate open conversation between participants and to allow for meaningful comparisons across groups. Groups were divided by gender and language. Separate groups were conducted by preferred language in Uzbek and Russian in Tashkent; all participants in village groups spoke only Uzbek. The Uzbek-speaking women's groups were further divided by family status (mother-in-law or daughter-in-law). After marrying, a woman was defined as a daughter-in-law until one of her children married and she became a grandmother. The same focus group protocol was used with each of the groups in order to examine views on family size and composition, contraception, and abortion. Each group was conducted by a native Russian or Uzbek speaker, and I observed all women's groups.² All sessions were audio recorded and transcribed into Russian. Purposive sampling was used to select participants over age 18 with children who did not know one another, and informed consent was obtained from all participants. Before each group, participants also completed a short questionnaire to collect background information.

I conducted semi-structured follow-up interviews with a total of 28 male and female participants from each of the focus groups between March and September 2006. The interviews were planned with the goal of adding depth to explanations of family planning behavior and probing issues that emerged during the focus groups. To gain perspective on phenomena discussed in the focus groups and interviews, I also interviewed 15 doctors, nurses, and NGO workers. I conducted these interviews in Russian, audio-recorded them, and transcribed them into English. After transcribing the interview and focus group recordings and translating them

into English, I used NVivo7 to code responses 1) demonstrating basic awareness of son preference in the population, 2) characterized by preference for gender balance in children, 3) linking sex preference for children to contraception use, 4) discussing sex-selective abortion, and 5) describing how sex preference influences individual women's fertility through prolonged childbearing. I also coded a 6th umbrella category for all responses dealing with potential influences on son preference. The 6th category was later split into specific codes associated with types of influences presented in this paper.

Results

Evidence of Gender Preference for Children

As a first effort to identify evidence of son preference in Uzbekistan, I examine the sex ratio at birth. Table 1 presents sex ratio at birth (SRB) for all births 1993 up to the survey in 2002 by live birth order overall and separately by residence.³ Although the overall estimate for 1993-2002 of 107.7 does not fall significantly outside the range of SRB generally considered to be normal (102-107) (Arnold 1997), this number masks significant variation by birth order. SRB estimates for both first (117.1) and third (126.7) live births are quite large. In the case of third births, the estimate differs significantly from 107, with a 95% confidence interval ranging from 110.4 to 145.5. Interestingly, the sex ratio for second births is 90.7 males per 100 females in this sample, though its 95% confidence interval reaches 102.7.

Table 1 Here.

Next, I present SRB by rural and urban status, revealing substantial differences by residence. Within both groups, overall SRB is again not substantially different from the normal range. The estimate of SRB for first births in rural areas is quite large, at 124.3 male births for each 100 female births, but the SRB for first births in urban areas is 106.7. In urban areas, SRB

appears normal for first and second births, but grows markedly for births ordered third and higher. The point estimate of SRB for third births in urban areas is a very high 144.0, with 95% confidence interval bounds at 112.5 and 184.2. Finer distinctions of SRB by sex composition of surviving children for the most recent time period would be useful, but further splitting the sample size does not allow even large differences in SRB to be noted as significant. Although ancillary analyses examining SRB for five year periods before the survey reveal a steady increase in SRB overall (from 100.1 1983-1987 to 109.5 1998-2002), no clear pattern of change within birth orders emerges, and small sample size prevents determining in which periods SRB potentially differed significantly from the normal range. It is unlikely that variations in SRB detailed above are caused by underreporting of female births specific to certain birth orders. Any potential misreporting involving failing to identify as live births those dying in the neonatal period would likely bias sex ratios downwardly and cannot account for unusually high ratios.

Qualitative evidence indicates that the gender preference for children evidenced by unusual sex ratios at birth is both conscious and pervasive. Preferences for sex composition of children, and especially the necessity of having at least one or preferably two sons, were discussed concretely and spontaneously in all of the rural focus group discussions and in three of the five discussions in Tashkent. When these ideas were followed up in in-depth individual interviews with focus group participants, opinions about appropriate sex composition of children were strongest among rural respondents and Uzbek-speaking respondents in Tashkent.

...[A]t the very least it is necessary to have three children for the Uzbek people. Sometimes it is possible to have four children – two boys and two girls... [I]t is necessary that there are two [sons]... It is not even necessary to have daughters, if only there are two sons.

-- 40-year-old Uzbek daughter-in-law with 7 children, Jizzak, individual interview

Russian-speaking respondents in Tashkent rarely expressed the belief that having a son is crucial and only did so in the context of expressing a preference for a balanced sex composition of children. Although the necessity of a son is primary for both older and younger women in Jizzak and Uzbek-speaking women in Tashkent, many of these respondents also said that, ideally, a family will include a daughter as well.

Information collected during individual interviews may also provide some insight on the high sex ratio at birth for first-ordered births. Both in Tashkent and in Jizzak, respondents indicated a special preference for boys as first births, occurring soon after marriage.

[I]f you have a girl, you want a boy, right? And if you have a boy, you want a girl. But for the very first birth, husbands want, probably 100%, boys. 100%. If his friends will ask he will say, “Oh... it is a girl...,” but if it is a boy, he will tell everyone that he has a boy.

-- 33-year-old Uzbek daughter-in-law with 2 children, Tashkent, individual interview

Particularly in rural areas, the desire to have a first birth, especially a male birth, very soon after the wedding, is linked to the need of a young daughter-in-law to prove her worth and loyalty to her new family. Young women have a rare opportunity to increase their status within the family in this way.

Consequences of Gender Preference for Reproductive Behavior

Contraception. Table 2 presents current use of modern contraception for non-pregnant, married women by number and sex composition of surviving children. I show contraceptive use separately by rural and urban residence. Overall prevalence of contraceptive use for non-pregnant, married women is almost 67%. Perhaps reflecting successes of family planning programs targeting women in rural areas, current contraceptive use is somewhat higher in rural than in urban regions. Use of modern contraception is quite low (under 5%) for both rural and

urban women without children, but approaches 55% for those with one child and exceeds 70% for those with two or more.

Table 2 Here.

Examining contraceptive use by sex composition of children shows substantial variation, especially for births ordered 3 or higher. Although differences in contraceptive use by sex composition of children are not always large, the patterns are pervasive, especially for women living in rural areas. For respondents with one living child, current contraceptive use is 7.2% higher for women with a son than for those with a daughter. There is little variation in contraceptive use by children's sex composition for women with two living children in urban areas, but the difference between the lowest (no sons) and highest (one son) categories of use in rural areas is 11.2%. The most dramatic difference by sex composition of living children seen in this table is for rural women with three or more living children. Among this group, current modern contraceptive use is 30% higher for women with one son than for those with no sons. The difference between the lowest (no sons) and highest (two sons) use category for urban women with three or more children is also substantial at 8.4%.

For women with two or more living children, note that having only sons is never associated with the highest level of contraceptive use for married rural or urban women in this sample. Except among urban women with two children, the lowest levels of contraceptive use are persistently found among women with no sons. Taken together, this table provides evidence for a commonly-noted set of preferences (Arnold 1997), a primary son preference and a secondary gender balance preference. Arnold (1985) pioneered a method for estimating the effect of gender preference on contraceptive use. Based on the assumption that, at each parity, the highest levels of use will be observed among women most satisfied with the gender

composition of their existing children, this method calculates predicted contraceptive prevalence if all women of a particular parity use contraception at the highest level of use observed by a subgroup at that parity. I used this method to determine expected use in the absence of sex preference for the entire sample and for rural and urban women separately. As presented in Table 2, contraceptive use could be expected to increase by 3.1% overall, 3.3% in rural areas, and 2.1% in urban areas if sex preference for children were eliminated. This difference is modest, especially considering the high levels of observed prevalence, indicating that son preference has only a small effect on overall contraceptive prevalence in Uzbekistan. In logistic models estimated separately by number of living children (1, 2, 3+), I find that, with or without sociodemographic controls, sex composition of living children significantly affects the odds of current contraceptive use only for women at parity three or higher. At parity of three or higher, having no sons is significantly different ($e^{\hat{\beta}} = 0.55$, $p < .01$) from the reference category of one son in terms of contraceptive use, controlling for mother's age, education, residence, and work status.⁴

It is important to note that this method of estimating the effect of sex preference on contraceptive use does not represent a complete characterization. In contexts with heterogeneous sex preferences for children, each sex composition category is likely to contain a mix of satisfied and dissatisfied women with regard to the sex distribution of their children. In such cases, these conflicting preferences effectively cancel each other out, leading to a poor estimation of the influence of sex preference (McClelland 1979). Relatedly, the concept of risk may come into play here, as it presents a challenge to the assumption inherent in Arnold's (1985) method that highest contraceptive use is observed among women most satisfied with the sex distribution of their children. If women perceive the risk associated with having an additional child of the

“wrong” sex as greater than the potential benefit of having a child of the preferred sex, contraceptive use may be *higher* for women when they are very dissatisfied with the gender composition of their children than for those who are less dissatisfied.

Indeed, this possibility is supported by individual interview data; one motivation to use contraception is aversion to the possibility of undergoing a risky behavior (high parity pregnancy) for uncertain rewards in terms of increasing desirability of the sex composition of children:

My sister has five daughters. Five...daughters. She gives birth to a daughter, she gives birth to a daughter. Her husband says, “Bear a son. Give me a son. I need a son.” I tell her that her health is leaving her. She talked with doctors and they helped my sister so that she will not give birth anymore. Her husband does not know... Medicine has helped her...
-- 58-year old Uzbek mother-in-law with 5 children, Tashkent,
Individual Interview

Other respondents indicated the utility of contraception for maintaining a satisfactory (usually balanced) sex composition of children. A gynecologist from Jizzak oblast’ asserted that delivery hospital staff consider the sex composition of a woman’s children when giving her medical advice, noting that contraception is suggested to women once they have both a son and a daughter.

Abortion. Son preference may affect use of induced abortion in at least two ways. First, similar to contraception, women most satisfied with the present sex composition of their children may be more likely to use abortion to prevent additional births. This may be especially true in Uzbekistan, where abortion was used as the main method of contraception during the Soviet period (David 1999) and many people continue to think of contraceptives and abortion in one conceptual category. The second type of potential influence of sex preference involves the use of sex-selective abortions to interrupt pregnancies determined to be of an undesired sex.

Table 3 Here.

Table 3 displays the percentage of pregnancies ending in induced or spontaneous abortion in the 10 years preceding the survey by number and sex composition of older surviving children at pregnancy end. Overall, 19.4% of pregnancies ended in induced abortion during this period – 15% in rural areas and 26% in urban areas. Abortions of first children are rare, a result that is not surprising given the commonly-expressed attitude that abortion before the first birth is dangerous for the mother and her future children. Especially at low parities, induced abortion is far more common in urban than in rural areas. Of all reported pregnancies to women with two living children between 1993 and 2002, 12.3% of rural pregnancies and 35% of urban pregnancies ended in induced abortion. The rural/urban differences are even more striking when comparing births with one surviving sibling: 17.8% of these pregnancies in urban areas were aborted, more than 3.5 times higher than the 4.9% aborted in rural areas.

The results presented in Table 3 are consistent with the idea that gender preference influences abortion in a way similar to contraception. However, we see much larger differences by sex composition of children with abortion, which is less normative than contraceptive use. As was the case for contraceptive use, the lowest rates of abortion within categories of number surviving siblings are found among births to women with no living sons. This is true at all birth orders for urban pregnancies and at birth orders of two or higher for rural pregnancies. Although the percentages of rural births aborted with one surviving child do not vary by the sex of the surviving child, rural sex composition differences are larger than urban differences at higher birth orders. For pregnancies to rural women with two surviving children, abortion is over three times more common if there is one son surviving than if there are none. The percentage of pregnancies to urban women with one son and one daughter ending in abortion is 67% higher

than pregnancies to women with two daughters. Also similar to the results for contraception, the most dramatic difference in abortion use by sex composition of living children is found among rural births to women with three or more children; pregnancies to rural women with three or more living children end in abortion 13 times more often if the surviving children are both male and female than if they are only female. The percentage of urban women's pregnancies aborted is also higher (30% higher) if sons and daughters are among the three or more surviving children than if these children are all girls.⁵

Widespread availability of ultrasound technology and anecdotal evidence of sex-selective abortions justify further examination. Turning back to the sex ratios at birth presented in Table 1, it should be stressed that differential use of contraception or abortion or fertility decisions cannot impact the sex ratio at birth of all births at a particular order. In the absence of reporting bias, SRB can be influenced through biological processes, variation in prenatal mortality chances, or an artificial intervention. Typical biological patterns, such as a slight inverse relationship between birth order and SRB (Tremblay et al. 2003), do not provide a satisfactory explanation for the skewed sex ratios at birth at certain birth orders in these data. Unfortunately, it is very difficult to quantify the impact of sex-selective abortion with the present data, as direct information on motivations for abortion or the use of ultrasound for sex screening is not available. One indirect tactic used in the past has been to examine sex ratios at birth for live births immediately preceded by abortions. For births over all years reported by respondents to the 2002 UHES, these results are suggestive. The sex ratios at birth for live births immediately preceded by a spontaneous or induced abortion is 135.8 for first live births, 122.1 for second births, 100.1 for third births, and 108.0 for births ordered four or higher. However, even when including all births, the sample size is fairly small (1047 abortions/miscarriages immediately

preceding a live birth), and the 95% confidence intervals for these SRB estimates include 100 in each case.

While qualitative data cannot be used to estimate the prevalence of sex-selective abortion, they do indicate that there are widespread perceptions of its use, both among health professionals and regular men and women in rural and urban areas. In focus group discussions and interviews, all participants knew that it is possible to determine the sex of a child before birth, even though some older men and women did not know just how this was done. Although no respondent reported having an abortion because of the sex of the child, many in both Tashkent and Jizzak knew others who had done so, and some women discussed worrying that they would be encouraged by husbands to have an abortion after finding out that they were pregnant with a girl. Several Tashkent doctors described their experience with the phenomenon:

They have such politics that if the woman gets pregnant and they do an ultrasound and find that the child is not a boy but a girl – she must have at least one son, and God forbid if she has given birth first to a daughter, second to a daughter, and the third is shown to be a girl again, he tells her to go and have an abortion... [W]hen we stood in the room where they do the ultrasound, they would do the ultrasound and say, “Oh, you have a girl,” and that poor woman would just sink, because it is a girl and it needed to be a boy. It is already understood that she will go and have an abortion...

-- Pediatrician, Tashkent, individual interview (discussing her gynecological residency in medical school)

Additional folk and medical treatments thought to encourage the conception of boys were identified but not fully explored in the qualitative component of this research. A kinnacha/tabib (spiritual and folk healer) in a rural village in Jizzak oblast', noted that pregnant women routinely ask her to determine the sex of their children: “Those women ask me to recite over them so that they will have a miscarriage. I refuse them.” Some women also believe that they

can favorably influence the sex of their children by eating well and keeping warm or by getting “hot shots” (calcium injections).

Fertility. Finally, in order to gauge the impact of son preference on fertility, I use Cox proportional hazards models to assess the effect of sex composition of living children on the risk of a subsequent birth. Table 4 presents four separate models for women at parities 1, 2, 3, and 4 at the beginning of the interval. Each model is limited to intervals that began with index births in the calendar year 1993 or later, and risk is measured up to five years after the index birth. In each model, a woman becomes at risk for a subsequent birth after the index birth, and the interval is closed by a subsequent live birth (failure), at the date of the interview,⁶ or after reaching 60 months of exposure without being censored or experiencing a failure. Index births occurring simultaneously with the birth under observation (multiple births) are dropped from the analysis, as the transition from the parity of interest to the parity of interest + 1 occurs at the start of the interval. However, multiple births are included as “failure” events if the observed birth closing the interval is multiple. For instance, if a woman at parity 1 gave birth to twins, the multiple birth does close the interval (1 to 2) with a failure, but the woman is considered never to be at risk from moving from parity 2 to parity 3. Women at parity 1 experienced a median time at risk of 25 months before the close of the interval. The median time at risk was 33 months for women at parity 2, 38 months at parity 3, and 39 months at parity 4. 65.8% of women at parity 1, 40.9% at parity 2, 25.4% at parity 3, and 23.3% at parity 4 had a subsequent live birth in the interval of observation.

Table 4 Here.

In Table 4, model 1 estimates the effects of covariates on the hazard of experiencing a subsequent live birth for women who have had one live birth. Net of the effects of other

variables in the model, the hazard of having a second live birth within 5 years is 12% higher for women whose first live birth was a daughter, and the effect is marginally significant ($p < .1$). In model 2, the estimated hazard function for those with no living sons following the second live birth is 85% higher than that for those with both a son and a daughter surviving. The hazard of moving from parity 2 to parity 3 for those with only sons is not significantly different from that for women with both a son and a daughter. The third model examines risk of having a fourth live birth within five years of the third live birth. The hazard of having a fourth live birth is almost 2.5 times higher for women with no living sons at the start of the interval than for those with at least one son and one daughter. Again, having all sons does not differ significantly from having living children of both sexes. The final model in Table 4 demonstrates that having no sons increases the hazard of moving from parity 4 to parity 5 by 2.6 times over that for those with both sons and daughters.

Overall, this table demonstrates that sex composition of living children significantly affects the risk of having a subsequent birth within five years. In each model, having no living sons was associated with an increased hazard of giving birth again. Although this effect holds across all parities, it increases in size and significance as parity increases. Those with all sons do not appear to be at substantially different risk of giving birth in the interval than those with both sons and daughters at each parity.

Focus groups and interviews also yielded evidence of the strategy of continuing to bear children, even beyond preferred family size, until the desired sex composition of children was reached. Although this strategy was mentioned by Uzbek-speaking men in Tashkent, most references to continuing to bear children until reaching the desired number of sons were made by rural women in both age groups.

I have a daughter-in-law... who has six daughters. When she had three daughters, she wanted to give birth to a son. The daughters became four, then five, and then six. She says that she will give birth while she has not given birth to a son. If she had given birth to a son after two daughters, she would have fastened herself (been sterilized).

-- 66-year-old Uzbek mother-in-law with 9 children, Jizzak, individual interview

Other accounts described women giving birth to more than 10 children, solely in an effort to achieve a male birth. A related strategy for achieving the desired sex composition of children expressed occasionally by men and women in Jizzak involves shortening intervals following female births to increase the likelihood of having a male birth. Family members, usually husbands and mothers-in-law, may directly influence the length of intervals between births and progression from one parity to the next. Rural and Tashkent (Uzbek-speaking) men and women discussed the role of other family members in reproductive behavior:

FGD Participant 1: Of course there are... cases when people from the older generation interfere. For example, if the daughter-in-law has given birth to two daughters and does not plan to give birth anymore, her mother-in-law can tell her to still try to give birth to a son, as many families want sons.

FGD Participant 2: I agree. Even husbands themselves always want to have a son and in such cases they will insist that she not stop and give birth to a son.

-- Uzbek men (39-year-old with 4 children and 60-year-old with 7 children), Jizzak, focus group discussion

Influences on Gender Preference for Children

Several potential causes of the observed gender preferences for children seen in Uzbekistan are suggested by data collected in focus group discussions and individual interviews. Desires for particular sex compositions of children may be driven simultaneously by social and cultural norms and traditions, current material context, and personal preferences. Although these

factors are overlapping, I discuss potential explanations for gender preferences in terms of social, economic, and psychological influences.

Social influences. The most commonly mentioned reason for women wanting to bear sons listed by women and men in Tashkent and the Jizzak village centered on obligations to the husband and his family. In addition to motivations of personal feelings of responsibility and duty, husbands and mothers-in-law were seen as applying pressure on women, usually to bear sons. Female respondents stressed that everyone wants sons, but that this desire is strongest for men.

My husband says to me, “Rano,⁷ one son is not a son. Come on and bear me one more.” You understand? He does not tell me to have a daughter, but to have a son. But how can I? It is from God. If I give birth to a daughter, what will happen? “Well, okay, then have a daughter and then again have a son.” Not likely! You understand? He wants me to bear him a son.
-- 40-year-old Uzbek mother-in-law with 3 children, Tashkent,
individual interview

Having children, especially male children, is often seen as a rare opportunity for young women to prove their worth to their husbands’ families. Men and women also noted occasional sanctions against women who did not or could not comply with the wishes of their husbands or husbands’ families regarding childbearing. Potential consequences for wives failing to produce sons included divorce, expulsion, beating, or having the husband take a second wife in an attempt to have a son. The general consensus among male and female respondents was that this sort of behavior should not be seen as acceptable and reflects a lack of education and understanding on the part of the husband. However, many participants asserted that such behavior continues.

A second often-noted social justification for son preference involves the importance of sons for the continuation of the family line. The patrilineal nature of Uzbek society dictates that family name, and with it the existence of the family itself, is passed down from father to son.

When women marry, they become part of the family of the husband and cease to be part of the father's family. This influence on desired sex composition is very much related to pressure from husbands, as continuing the family line is especially important to men:

The goal of life itself for a man – it is to leave after him a continuation of his line, and therefore all men want to have sons... [Daughters are] good, but as they subsequently marry people from other lines they cannot continue the line of their father.
-- 24-year-old Uzbek man with 1 child, Tashkent, focus group discussion

The idea that the family line can only be continued through a son extends to material resources as well. Although it was occasionally noted that there is no reason that a daughter cannot be an heir, the consensus reached by most respondents is that money, cars, homes, businesses, and other goods should be passed down from father to son.

If in a family there is no boy and one girl, then it is as though the father lived his life for nothing. Even if he is very rich, his riches do not make him happy. Because there is no boy, it means that there is no one to leave the inheritance or pass on his business. If in a family there is only a girl, then she will grow up, mature, and they will give her in marriage to another family.
-- 60-year old Uzbek man, Jizzak, individual interview

Economic Influences. In addition to the social importance of having a suitable heir, men and women are concerned with economic difficulties that may be aggravated or alleviated depending on the sex composition of their children. On par with the previous two influences on sex preferences, many respondents from Uzbek-speaking groups in Tashkent and Jizzak discussed how expectations of functional and financial care in their old age impacts the desire for sons and daughters. Following marriage, girls move out of their parents' home and usually live with their husbands' families. If there are several sons in a family, the older sons may leave the family home to live separately with their wives and children as the younger sons marry and bring their

wives to live in the family home. In most cases, it is the youngest son and his wife who are expected to remain and care for his parents.

A son feeds his parents; a daughter leaves. Therefore we Uzbeks love sons... [We] think that tomorrow, the day after tomorrow, I will grow old and he will watch after me. I will die and he will bury me.
-- 55-year-old Uzbek mother-in-law with 9 children, Jizzak, individual interview

Less often, respondents noted financial difficulties associated with raising daughters, including the purchase of household items for the daughter and her husband before and after the wedding. Others noted that reaching the desired number of sons was not an issue in the past, but has become problematic as worsening economic conditions have reduced the total number of children a family can afford to raise.

Nilyufar: First I had a daughter and then five sons.
Moderator: Did you plan that in advance?
Nilyufar: Oh, no, of course not. What God gave, so I gave birth. We did not have thoughts about having abortions. Life was good for us – we were not in need of anything. Therefore, and without deliberation, we gave birth.
-- 56-year-old Uzbek mother-in-law with 9 children, Jizzak, focus group discussion

Psychological Influences. Some respondents also described psychological difficulties involved with raising a daughter. Because of the importance of protecting a girl's honor and ensuring that she stays a virgin until marriage, some parents in Tashkent and Jizzak felt that they had to devote more energy to worrying about a daughter. Others, especially older women, noted concern over sending young daughters off to live with unknown families. They worried about how their daughters would be treated by their new mothers-in-law, and expressed a feeling of powerlessness over the daughters' future lives.

Contrastingly, mostly men said that they did not feel close to daughters, who were only temporary members of their families. A young man in Tashkent expressed the idea succinctly:

If I have a boy, he is mine. If a girl is born, when she is given in marriage her blood becomes different – she is not mine. She is not my blood.
-- 28-year old Uzbek man with 3 children, Tashkent, individual interview

This was sometimes expressed as a feeling that girls were “different” or “foreign,” even as children. One mother-in-law from the rural focus group discussion even referred to daughters as “soldiers of enemies.” A final emotional cause of son preference for children also stems from Uzbek society’s patrilocal nature. In addition to providing material care for parents in their old age, sons are seen as providing companionship. Without sons, the parents are left alone. Respondents also viewed sons as giving support and protection in many forms.

Discussion and Conclusion

These analyses, taken together, provide an important first step in examining gender preference in Uzbekistan. The skewed sex ratios at birth within certain birth orders combined with focus group and interview responses describing the importance of having male children provide strong evidence for son preference in Uzbekistan. Analyses of the use of contraception and abortion by number and sex composition of children reveal pervasive patterns, especially at higher parities. Finally, hazards models were used to demonstrate that women without sons face a greater hazard of subsequent birth than do those with a son, especially at higher parities.

The unusually high sex ratio of first live births is largely driven by rural areas, while the sex ratios at birth reach high levels only after the third birth order in urban regions. In urban areas, qualitative evidence indicates that raising large families can be more difficult, age-specific fertility rates are lower (Kamilov et al. 2004), and gender preference appears to affect sex ratios

at birth mainly at higher ordered births. While rural residents also appear to be facing strains associated with raising larger families, the strongest apparent affect of gender preference on sex ratio at birth occurs for first births. This is supported by qualitative results indicating that the need to provide a son for the husband and his family as soon as possible in order to demonstrate worth and quality is especially strong in rural areas. The very unusual sex ratio at birth among first births, especially in rural areas, is difficult to explain and merits further investigation. Although qualitative results indicate the widespread use of sex-selective abortions, many respondents expressed the fear that having an abortion before giving birth would make it impossible to give birth in the future, and reported abortions of first births are low in the UHES. Further, while respondents often noted the benefits of having a male as the first child, having a daughter first was presented as less of a problem than delaying the first birth. These inconsistencies make sex-selective induced abortion a less than satisfactory explanation for the high proportion of male to female live first births, and, in addition to estimating the use of sex-selective abortion more directly, future analysis should consider a further exploration of both alternative interventions influencing sex ratio at birth and sources of reporting error.

Contraceptive use is less prevalent among women with no sons (and usually with no daughters) than women with both sons and daughters. However, estimating the expected contraceptive use in the absence of gender preference reveals only a slight impact on overall prevalence. Estimating the effect of gender preference on use of abortion is more difficult, as it seems likely that at least some amount of sex-selective abortion does occur. However, patterns of abortion use appear to vary similarly to patterns of contraceptive use by sex composition of living children. These results combined with qualitative evidence indicate a strong son preference with a secondary preference for at least one daughter. One potentially fruitful

direction for future research is the examination of the effects of sex composition of children on use of contraception by method choice. If fertility intentions were available in the UHES, it would also be useful by to examine these directly and to evaluate differences in contraceptive use for stopping childbearing by number and sex composition of existing children. Sex preferences may have a large impact if women with few sons are using contraceptives disproportionately for spacing births while postponing use for stopping until they have reached the desired number of sons. Further, sex preference for children may extend beyond pre-pregnancy or pre-natal interventions, and additional work should be done to examine the potential impact of sex preference on child mortality, disease status, nutrition, and health care.

Decisions about reproductive behavior are made within a larger cultural context, taking into account the social position of boys and girls (and men and women). Social, economic and psychological explanations provided for preference for sons reflects women's position in modern Uzbek society, which continues to be strongly patrilineal and patrilocal. Preferences for sex composition of children (or evaluation of risks versus potential achievement of preferences) are not necessarily uniform within a marital dyad or larger family structure. When ideas about how to proceed regarding reproductive behavior diverge, women do not always have the final say. Young women, particularly those who have recently entered a new family, may find it difficult to resist efforts to convince them to bear children with quantities, compositions, or time frames suitable to their husbands or elder members of the husbands' families. Policymakers and organizations working to improve reproductive and sexual health in the region should take note of this aspect of the present research, as it may help in the identification and understanding of a particularly persistent set of obstacles to improving women's health.

Notes

1. Although this survey also collected data on men, I use only the women's data in these analyses.
2. Based on the advice of local colleagues and given the sensitive nature of the information discussed, I left the discussion room before the start of the men's groups.
3. In order to take into account sample weights and clustering, point estimates and confidence intervals for SRB at each birth order were calculated by estimating a logit regression with no predictor variables for male births within each category of live births. The antilog of the intercept and upper and lower bounds of the confidence interval for the intercept are reported here.
4. Because these models do not add substantially to the analyses presented here, they are not shown in the interests of space. The model output is available from the author.
5. Although Arnold's (1985) method used above to estimate the effect of sex preference on contraception has also been applied to abortion, I do not use it here. The logic of the method is that, if sex of existing children did not influence contraceptive use, rates of use would be equal to those for the group most satisfied with the sex composition of their existing children. It is assumed that this is the highest rate of contraceptive use for a given parity. As Bairagi (2001) has noted, this assumption is problematic in contexts where sex-selective abortion may be used.
6. Events (births) and exposure in the month of interview are not considered in the analysis.
7. Participant names have been changed.

References

- Agadjanian, Victor. 2002. "Is 'Abortion Culture' Fading in the Former Soviet Union? Views about Abortion and Contraception in Kazakhstan." *Studies in Family Planning*, 33(3):237-248.
- Agadjanian, Victor and Ekaterina Makarova. 2003. "From Soviet Modernization to Post-Soviet Transformation: Understanding Marriage and Fertility Dynamics in Uzbekistan." *Development and Change*, 34(3): 447-473.
- Arnold, Fred. 1997. *Gender Preferences for Children*. DHS Comparative Studies, No. 23. Calverton, MD: Macro International Inc.
- Analytical and Information Center, Ministry of Health of the Republic of Uzbekistan [Uzbekistan], State Department of Statistics, Ministry of Macroeconomics and Statistics [Uzbekistan], and ORC Macro. 2004. *Uzbekistan Health Examination Survey 2002*. Calverton, Maryland, USA: Analytical and Information Center, State Department of Statistics, and ORC Macro.
- Asadov, Damin A., Farida M. Ayupova, Feruza T. Faizieva, and Mila A. Li. 1997. "Contraception." pp. 47-68 in Institute of Obstetrics and Gynecology [Uzbekistan] and Macro International Inc. 1997. *Uzbekistan Demographic and Health Survey, 1996*. Calverton, Maryland: Institute of Obstetrics and Gynecology and Macro International Inc.
- Bairagi, Radheshyam. 2001. "Effects of Sex Preference on Contraceptive Use, Abortion and Fertility in Matlab, Bangladesh." *International Family Planning Perspectives*, 27(3):137-143.
- Barbieri, Magali, Alain Blum, Elena Dolkigh, and Amon Ergashev. 1996. "Nuptuality, Fertility, Use of Contraception, and Family Policies in Uzbekistan." *Population Studies*, 50: 69-88.
- Buckley, Cynthia. 1998. "Rural/Urban Differentials in Demographic Processes: The Central Asian States." *Population Research and Policy Review*, 17:71-89.
- Buckley, Cynthia, Jennifer Barrett, and Yakov P. Asminkin. 2004. "Reproductive and Sexual Health Among Young Adults in Uzbekistan." *Studies in Family Planning*, 35(1):1-14.
- Das Gupta, Monica, Jiang Zhenghua, Li Bohua, Xie Zhenming, Woojin Chung, and Bae Hwa-Ok. 2003. "Why is Son Preference so Persistent in East and South Asia? A Cross-Country Study of China, India, and the Republic of Korea." *The Journal of Development Studies*, 40(2):153-187.
- David, Henry P. (ed.) 1999. *From Abortion to Contraception: A Resource to Public Policies and Reproductive Behavior in Central and Eastern Europe from 1917 to the Present*. Westport, CT: Greenwood Press.

- Henshaw, Stanley K., Susheela Singh, and Taylor Haas. 1999. "The Incidence of Abortion Worldwide." *International Family Planning Perspectives*, 25(supplement):S30-S38.
- Hortaçsu, Nuran, Sharon S. Bastug, and Ovezdurdi B. Muhammetberdiev. 2001. "Desire for Children in Turkmenistan and Azerbaijan: Son Preferences and Perceived Instrumentality for Value Satisfaction." *Journal of Cross-Cultural Psychology*, 32(3): 309-321.
- Haughton, Jonathan, and Dominique Haughton. 1995. "Son Preference in Vietnam." *Studies in Family Planning*, 26(6): 325-337.
- Institute of Obstetrics and Gynecology [Uzbekistan] and Macro International Inc. 1997. *Uzbekistan Demographic and Health Survey, 1996*. Calverton, Maryland: Institute of Obstetrics and Gynecology and Macro International Inc.
- Kamilov, A.I., J. Sullivan, and Z.D. Mutalova. 2004. "Fertility." pp.43-52 in Analytical and Information Center, Ministry of Health of the Republic of Uzbekistan [Uzbekistan], State Department of Statistics, Ministry of Macroeconomics and Statistics [Uzbekistan], and ORC Macro. 2004. *Uzbekistan Health Examination Survey 2002*. Calverton, Maryland, USA: Analytical and Information Center, State Department of Statistics, and ORC Macro.
- Karimov, Shavkat I. 1997. "Introduction." pp. 1-11 in Institute of Obstetrics and Gynecology [Uzbekistan] and Macro International Inc. 1997. *Uzbekistan Demographic and Health Survey, 1996*. Calverton, Maryland: Institute of Obstetrics and Gynecology and Macro International Inc.
- Leone, Tiziana, Zoë Matthews, and Gianpiero Dalla Zuanna. 2003. "Impact and Determinants of Sex Preference in Nepal." *International Family Planning Perspectives*, 29(2):69-75.
- McClelland, Gary H. 1979. "Determining the Impact of Sex Preferences on Fertility: A Consideration of Parity Progression Ratio, Dominance, and Stopping Rule Measures." *Demography*, 16(3): 377-388.
- Park, Chai Bin and Nam-Hoon Cho. 1995. "Consequences of Son Preference in a Low-Fertility Society: Imbalance of the Sex Ratio at Birth in Korea." *Population and Development Review*, 21(1): 59-84.
- Pong, Suet-ling. 1994. "Sex Preference and Fertility in Peninsular Malaysia." *Studies in Family Planning*, 25(3): 137-148.
- Rahman, Mizanur and Julie Da Vanzo. 1993. "Gender Preference and Birth Spacing in Matlab, Bangladesh," *Demography*, 30(3):315-332.
- Sullivan, J.M., and A.I. Kamilov. 2004a. "Contraception." pp. 53-62 in Analytical and Information Center, Ministry of Health of the Republic of Uzbekistan [Uzbekistan], State Department of Statistics, Ministry of Macroeconomics and Statistics [Uzbekistan], and ORC Macro. 2004. *Uzbekistan Health Examination Survey 2002*. Calverton, Maryland,

- USA: Analytical and Information Center, State Department of Statistics, and ORC Macro.
- Sullivan, J.M., and A.I. Kamilov. 2004b. "Induced Abortion." pp. 63-69 in Analytical and Information Center, Ministry of Health of the Republic of Uzbekistan [Uzbekistan], State Department of Statistics, Ministry of Macroeconomics and Statistics [Uzbekistan], and ORC Macro. 2004. Uzbekistan Health Examination Survey 2002. Calverton, Maryland, USA: Analytical and Information Center, State Department of Statistics, and ORC Macro.
- Tabyshalieva, Anara. 2000. "Revival of Traditions in Post-Soviet Central Asia." Pp. 51-57 in Marina Lazreg, ed. *Making the Transition Work for Women in Europe and Central Asia*. World Bank Discussion Paper No. 411. Washington, DC.
- Tremblay, Marc, Helene Vezina, Louis Houde, and Robert Chung. 2003. "Demographic Determinants of the Sex Ratio at Birth in the Saguenay Population, Quebec." *Population*, 58(3): 383-394.
- Ubaidullaeva, R. and N. Umarova. 2001. "The New Demographic Situation in Uzbekistan." *Sociological Research*, 40(3): 49-55.

Table 1. Sex Ratios at Birth by Birth Order and Residence Status, Uzbekistan 1993-2002

Total				
Live Birth Order	SRB	[95% Confidence interval for SRB]		N
1	117.1	104.9	130.8	1579
2	90.7	80.1	102.7	1409
3	126.7	110.4	145.5	983
4+	107.2	89.6	117.6	1018
Total	107.7	100.9	115.0	4989

Rural Only				
Live Birth Order	SRB	[95% Confidence interval for SRB]		N
1	124.3	107.8	143.3	967
2	90.7	77.1	106.9	851
3	117.6	100.3	138.0	618
4+	96.3	82.4	112.5	744
Total	106.5	98.4	115.1	3180

Urban Only				
Live Birth Order	SRB	[95% Confidence interval for SRB]		N
1	106.7	89.7	126.8	612
2	90.5	74.8	109.5	557
3	144.0	112.5	184.2	365
4+	122.1	93.0	160.2	274
Total	109.9	97.8	123.5	1809

Source: 2002 Uzbekistan Health Examination Survey

Note: Sex ratio at birth (SRB) is defined as the number of live male births per 100 live female births.

Table 2. Current Use of Modern Contraception for Non-pregnant, Married Women by Number and Sex Composition of Surviving Children, Uzbekistan 2002

	Total			Rural			Urban		
	N	avg age	% mod. method	N	avg. age	% mod meth	N	Avg Age	% mod. method
0 children	208	26.6	4.9	123	24.5	4.8	85	29.7	5.0
1 child	485	25.8	54.5	274	24.4	56.0	211	27.7	52.6
0 sons	225	26.0	52.5	118	24.5	53.5	107	27.6	51.4
1 son	260	25.7	56.3	156	24.4	57.9	104	27.7	54.0
2 children	870	29.7	75.1	457	28.1	80.5	413	31.4	69.0
0 sons	157	29.0	72.4	83	26.8	74.2	75	31.5	70.4
1 son	453	30.1	76.5	246	28.6	82.5	208	31.7	69.4
2 sons	259	29.4	74.2	129	27.8	80.8	131	30.9	67.7
3 + children	1922	37.4	73.1	1266	37.2	74.8	656	37.8	69.8
0 sons	126	34.6	63.2	72	34.3	60.8	55	35.0	66.4
1 son	532	36.5	74.8	332	35.5	79.1	200	38.0	67.5
2 sons	720	37.2	75.8	487	37.1	77.6	233	37.6	72.0
3+ sons	545	39.3	70.1	376	39.5	69.9	169	38.8	70.7
Total	3485	33.2	66.9	2120	32.9	69.5	1365	33.8	62.9
Total use expected without son preference			69.0			71.9			64.2
% difference in prevalence due to sex preference			3.1			3.3			2.1

Source: 2002 Uzbekistan Health Examination Survey

Notes: Modern contraceptive methods here are female sterilization, oral contraceptives, IUD, injectables, foam/jelly, male condom, and lactational amenorrhea. Expected use in the absence of sex preferences is calculated using Arnold's (1985) method.

Table 3. Percentage Distribution of Pregnancies Ending in Induced or Spontaneous Abortion by Number and Sex Composition of Living Children at Pregnancy End, Uzbekistan 1993-2002

	Total			Rural			Urban		
	n preg.	% ind. abort.	% spont. abort.	n preg.	% ind. abort.	% spont. abort.	n preg.	% ind. abort.	% spont. abort.
No children living	1942	2.5	8.43	1194	1.3	8.6	747	4.5	8.2
1 child	1768	10.4	5.1	1007	4.9	5.2	762	17.8	4.9
1 son	954	11.5	5.1	539	4.9	5.3	415	20.2	5.1
0 sons	815	9.2	5.0	468	4.9	5.1	347	14.9	4.7
2 children	1342	22.4	5.8	745	12.3	5.3	597	35.0	6.4
2 sons	359	23.4	5.9	209	14.0	7.1	150	36.5	4.3
1 son	605	27.1	6.0	336	15.9	4.9	270	41.0	7.3
0 sons	378	14.0	5.4	200	4.7	4.0	177	24.5	7.0
3 + children	1713	45.4	4.6	1136	40.3	4.4	578	55.7	5.0
All sons	158	46.2	5.2	87	44.3	5.1	71	48.6	5.4
Sons/Daughters	1330	49.7	4.3	912	45.4	4.0	418	59.0	5.0
0 sons	225	20.0	6.2	137	3.5	6.9	88	45.5	5.1
Total	6766	19.4	6.1	4082	15.0	6.0	2684	26.1	6.2

Source: 2002 Uzbekistan Health Examination Survey

Table 4. Cox Proportional Hazards Model Results for Subsequent Live Births, Uzbekistan 1993-2002

	Parity							
	1		2		3		4	
	HR	SE	HR	SE	HR	SE	HR	SE
Sex composition of living children at interval start								
No sons	1.12+	0.75	1.85***	0.22	2.47***	0.42	2.63***	0.55
Sons and daughters	-		1		1		1	
All sons	1		1.19	0.15	1.18	0.26	0.86	0.33
Child died in interval	2.84***	0.57	3.66***	0.74	3.8***	0.79	3.24***	1.04
Education								
≤ Some higher (ref)	1		1		1		1	
≥ Some higher	0.81	0.11	0.89	0.16	0.79	0.23	0.91	0.4
Residence								
Urban (ref)	1		1		1		1	
Rural	1.16	0.11	1.34*	0.18	1.45+	0.28	1.48	0.38
Ethnicity								
Uzbek (ref)	1		1		1		1	
Non-Uzbek	0.71**	0.09	0.82	0.13	1.51+	0.34	1.5	0.49
Mother's age at start of interval	0.97*	0.01	0.96**	0.02	0.95+	0.03	0.93*	0.03
Decision-making scale	0.98	0.02	0.93**	0.02	0.94*	0.03	0.94	0.04
Coresident parent-in-law	1.23*	0.11	1.02	0.11	0.74*	0.1	0.91	0.21
N	1542		1373		965		512	
-2LL (full model)	13468.67		7177.57		2861.03		1235.31	
Δ-2LL (from model excluding sex composition variables)	3.20+		38.35***		29.09***		16.59***	

***= $p < .001$, **= $p < .01$, *= $p < .05$, += $p < .1$

Source: 2002 Uzbekistan Health Examination Survey

Notes: ref=reference category. HR=hazards ratio. SE=standard error.