IN THE PURSUIT OF SONS: SEX-SELECTIVE ABORTION AND DIFFERENTIAL STOPPING IN PAKISTAN

Batool Zaidi

A thesis submitted to the faculty at the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Arts in the Department of Sociology in the College of Arts and Sciences.

Chapel Hill
2013

Approved by:

S. Philip Morgan

Ted Mouw

Yong Cai

ABSTRACT

Batool Zaidi: In the Pursuit of Sons: Sex-Selective Abortion and Differential Stopping in Pakistan
(Under the direction of S. Philip Morgan)

Even though Pakistan is a highly patriarchal society, it has not featured prominently in studies focusing on son preference and sex ratios at birth. But with fertility declining and given strong son preference (Pakistan has one of the highest desired sex ratios in the world), how will Pakistani families respond? Using data for 2006-07, I show clear evidence of both sex selection practice and differential stopping behavior. An earlier survey (1990-91) shows only modest evidence of differential stopping behavior. The comparison of the two survey rounds also supports the increasing role of son preference in fertility behavior in Pakistan. With increasing access to contraceptive and sex selection technology, both differential stopping and sex selection are likely to continue increasing for some time.

ACKNOWLEDGEMENTS

I would like to thank my advisor, S. Philip Morgan, and my committee members, Yong Cai, and Ted Mouw, for their guidance and feedback. I would also like to thank my friend, Ali S. Pracha, for proofreading this document and for his constant support during this project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CI	confidence interval
CPR	contraceptive prevalence rate
DHS	Demographic Health Survey
DSRB	desired sex ratio at birth
EFB	expected female births
FB	female births
LB	live births
MB	male births
NIPS	National Institute of Population Studies
PDHS	Pakistan Demographic Health Survey
SRB	sex ratio at birth
SRLB	sex ratio at last birth
SSA	sex-selective abortion
TFR	total fertility rate
UN	United Nations

CHAPTER 1: INTRODUCTION

Given Pakistan's geo-political importance, the future of its population is of great interest to academics as well as policymakers. Even if Pakistan's fertility continues to decline and reaches replacement level in the next 30 years, its population will have increased by a 100 million to around 275 million. This growth will make it the fifth most populous nation in the world (United Nations [UN], Department of Economic and Social Affairs, Population Division 2011). If son preference continues to be a strong determinant of fertility behavior, fertility levels will be increased by the pursuit of a male birth, making it harder for Pakistan to reach replacement fertility. Alternatively, if couples respond by using sex-selective abortion, Pakistan will experience skewed sex ratios possibly leading to additional social problems. A continuingly low contraceptive prevalence rate (CPR) of 35 percent (National Institute of Population Studies [NIPS] and Macro International 2013) and an elevated sex ratio at birth (SRB) (Guilmoto 2009) suggest both scenarios are unfolding.

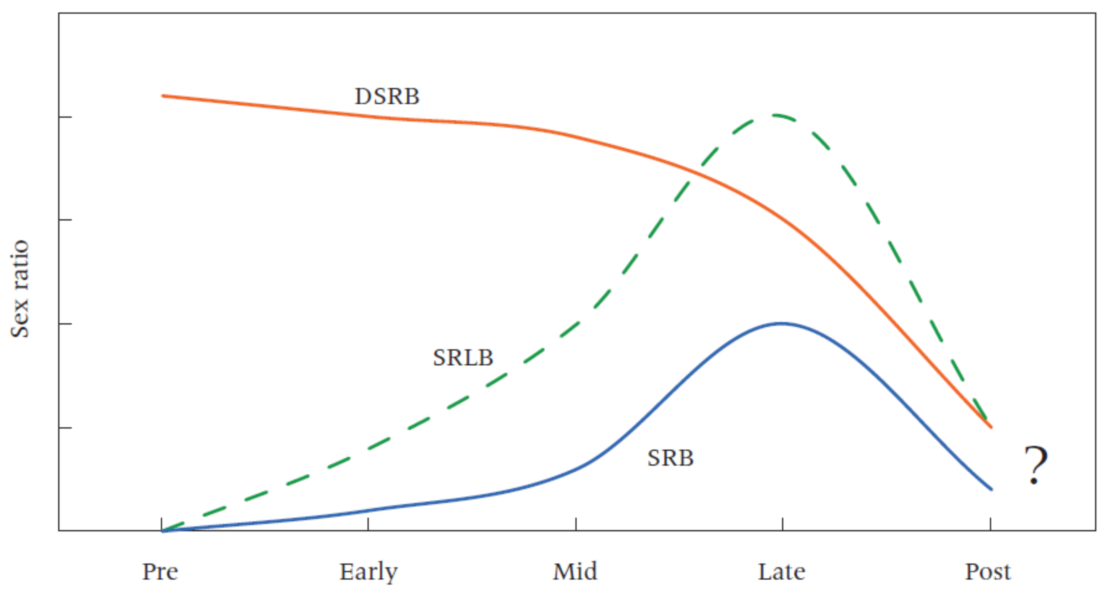
Son preference in a highly patriarchal society like Pakistan is not surprising. My focus is on how the son preference is changing (or persisting) in the face of the current socioeconomic and demographic changes popularly viewed as development and/or modernization. Analyzing changes in demographic factors (such as fertility behavior) can provide clues to changes in institutionalized gender stratification that are less influenced by normative response bias (Pollard and Morgan 2002). Studying changes in son preference (operationalized through the propensity to continue childbearing given the gender composition of previous children) presents an opportunity to better understand theories linking gender norms and processes of modernization to demographic transition theories.

This paper aims to address the following questions: what is the pattern and strength of son preference in Pakistan over time, i.e. since the beginning of the fertility transition? Is this preference for sons leading to higher fertility through differential stopping behavior or to skewed sex ratios through sex selective abortions? Or both?

CHAPTER 2: THE FERTILITY TRANSITION AND SEX PREFERENCE

The link between fertility and son preference changes over the course of the demographic transition. At the beginning of the transition when fertility control is low and women are having a large number of children, son preference is not a strong determinant of fertility behavior, even in patriarchal societies. As contraceptive technology becomes widely available and fertility starts declining, the preference for sons becomes an increasingly central factor in couples' fertility decisions in such societies. This has been referred to by some as the "intensification effect" of fertility decline on gender bias – when the fertility starts to decline "the total number of children couples desire falls more rapidly than the total number of desired sons" (Das Gupta and Bhat 1997). Bongaarts' (2013) paper shows the changing relationship between the fertility transition and the desire and observed preference for sons (see Figure 1).

Figure 1: Expected patterns of sex ratios over the course of the transition in son preference



Source: Bongaarts 2013

At higher parities, the probability of having at least one son is very high (Dyson 2012). However, as family size gets smaller, the probability of having a son gets smaller. When the average family size is six children, the probability of being sonless is one percent. However, when the average family size falls to three children, the probability of being sonless increases to 12 percent (Bongaarts and Potter 1983). The probability of being sonless doubles with every one child reduction in the average family size (Guilmoto 2009). In other words, in order to ensure at least one son, women would need to have 1.94 births on average, and in order to have at least two sons, they would need to have 4.38 births on average (Bongaarts and Potter 1983). Guilmoto (2009) argues that as low fertility norms set deeper into society the marginal costs of additional children become increasingly untenable. In order to ensure both size and compositional goals couples resort to sex-selective abortion.

Higher than normal sex ratios at birth are "unambiguous evidence" that couples are practicing sex-selective abortions (Bongaarts 2013). Note that differential stopping behavior – when women stop childbearing through contraceptive use if they have achieved the desired number of sons or continue childbearing till they have the desired number of sons– does not translate to skewed sex ratios at birth. This is because the probability of having a son or daughter remains largely fixed, regardless of parity.[1]In contrast, sex-selective abortion alters the number of boys being born, thus producing skewed sex ratios at birth.

Over the last decade and half skewed sex ratios at birth have been reported in several Asian countries. Much of the research on sex ratio imbalances focused on South Korea, India and China where national sex ratios at birth deviated from normal levels of 106 to as high as 115, 119, and 110, respectively, (Hesketh and Xing 2006). Since then, elevated sex ratios have been reported in other Asian countries including Vietnam (Guilmoto 2012), Azerbaijan, Armenia, Georgia, and Albania (Duthé et al. 2012). All countries experiencing elevated sex ratios at birth have low fertility and abortion technology widely available.

[1]There is evidence of a slight dependence of sex of birth to sex composition of previous births – this is discussed in greater detail in the Methods and Measures chapter.

Even though Pakistan continues to be a highly patriarchal society, it has not featured prominently in studies focusing on son preference and sex ratios at birth because, until recently, fertility rates (including wanted fertility) remained high and abortions were believed to be rare due to the absence of legal abortion services. In the following paragraphs, I demonstrate how women in Pakistan are ready, willing, and able to practice sex selection.

CHAPTER 3: THE PAKISTANI EXPERIENCE

3.1 Fertility Squeeze

While most of its neighboring countries began experiencing fertility decline before the 1980s, fertility rates in Pakistan remained above six births per woman until the late 1980s/early 1990s. It is widely accepted that the fertility transition in Pakistan began at this point (Sathar and Casterline 1998). Despite a significant drop after the onset, overall fertility in Pakistan declined slowly throughout the 1990s, and reached 4.8 births per woman by 2000–01.

Given the high number of children women were having, it is not surprising that son-preference did not translate into high sex ratios at birth (Hesketh and Xing 2006) during this time period. In the last decade however, Pakistan's total fertility rate (TFR) has declined further and is estimated to be around 3.8 births per woman, and is as low as 3.2 in urban areas (NIPS and Macro International 2013). Women in Pakistan are now facing the fertility squeeze that makes achieving sex preferences difficult without preferential behavior.

3.2 Son Preference

Despite modest improvements, gender inequality and the preferential treatment of sons is still ubiquitous in Pakistani society. Gender differentials in children's health and education outcomes are lessening, but remain stark. Nearly twice as many young women (15–24) never attend school as young men, enrollment rates at both primary and secondary levels are lower for girls, and girls drop out of school at a higher rate than boys (Zaidi et al. 2012). Boys have better health outcomes as well; child mortality is lower for boys than girls and the most common causes of under-five deaths for boys are related to neonatal complication, while they are infectious disease related for girls. Preferential treatment for boys begins before birth.

Using data from the Pakistan Demographic Health Survey (PDHS), Bharadwaj and Lakdawala (2013) find that women are more likely to get prenatal checkups and take iron pills when pregnant with a boy. The magnitude of discrimination is larger in areas with more son preference.

It is not surprising then, that of 61 countries, Pakistan has the second highest desired sex ratio at birth (DSRB), a measure of the preference for sons calculated using reported ideal number of male and female offspring by couples in Demographic and Health Surveys (Bongaarts 2013).

3.3 Availability of Technology

For the high DSRB to translate into high SRB, couples need to have the means to identify the sex of a fetus and have access to abortion services (Bongaarts 2013). Contrary to expectations, abortion rates in Pakistan are unexpectedly high for an Islamic country that forbids abortion under all, but extreme circumstances. A national study found abortion rates in Pakistan to be much higher than expected; an estimated 890,000 abortions took place in 2002 – amounting to 29 abortions per 1,000 women of reproductive age (Sathar, Singh, and Fikree 2007). According to a study of women hospitalized for post-abortion complications, 20 percent of women who had an abortion had 0–2 children, and another 30 percent had 3–4 children (Vlassoff, Singh, and Suarez 2009). Given that the ideal family size was close to four children, it is likely that not all of these abortions were for limiting family size.

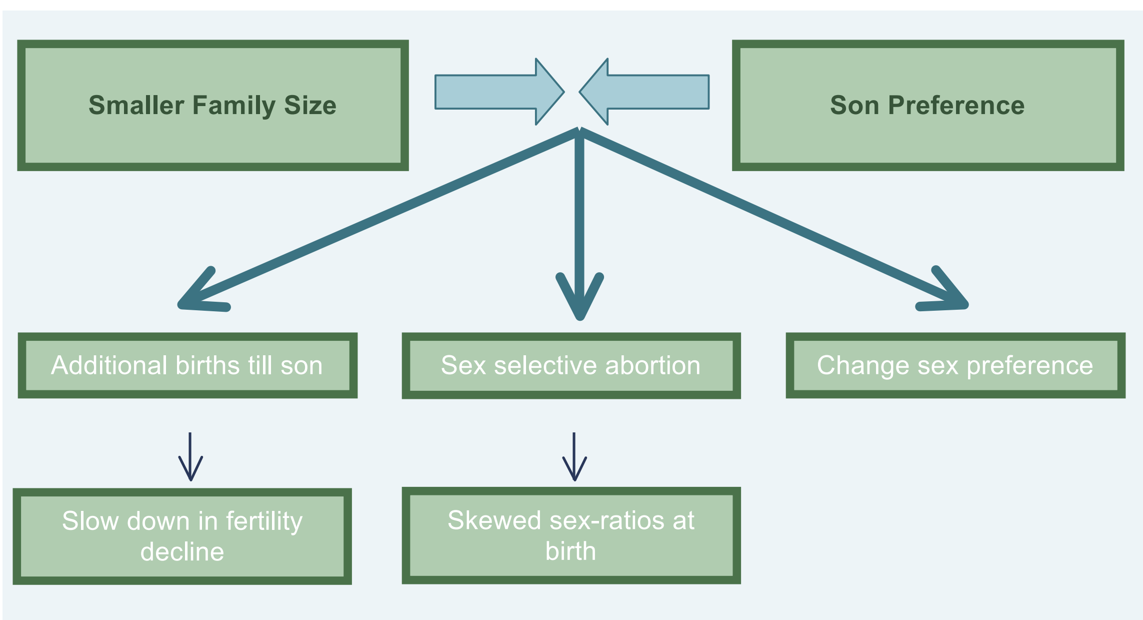
The 2007 PDHS shows that ultrasound technology is widely available in urban and rural areas – 66 percent of women had an ultrasound check during antenatal checkup for their last pregnancy (NIPS and Macro International 2008). These findings indicate both the availability of services and women's willingness to seek abortions despite cultural taboos – a trend that is likely to have increased over the last decade.

The trends discussed above indicate that all the prerequisites for sex-selective practice are in place. Family size is getting smaller, abortions are taking place albeit illegally and unsafely, and the preferential treatment of boys remains prevalent. However, these prerequisites do not guarantee sex-selective abortions; it is possible that Pakistani women may be differentially choosing to continue childbearing in order to achieve compositional goals.

According to Bongaarts' study (2013), Pakistan also had the fifth highest sex ratio at last birth (SRLB). A high SRLB is a very sensitive indicator of differential stopping behavior, and can be explained entirely by differential contraceptive use. The CPR increased rapidly from around 11 percent in 1991 to 33 percent by 2003. But by 2007, it had not increased further and had in fact declined slightly to 29 percent. The latest round of the DHS (2012–13) reports a CPR of 35 percent. Stalling CPRs and the consequent slowdown of fertility decline indicate that women may be continuing childbearing in the pursuit of sons.

As fertility continues to fall and women get closer to achieving their desired family size but son preference remains pervasive, the role of compositional goals in fertility decisions is expected to continue to increase. So in the face of persistent son preference, but changing family size norms, are Pakistani women ignoring cultural pressures and compositional goals, having more children, or getting an abortion to meet both size and compositional fertility goals (Figure 2)?

Figure 2: Possible responses to conflicting pressures of smaller family size and bearing a male offspring



In understanding fertility change, Davis and Blake (1956) argue that people choose those means of change that involve the least institutional organization and reorganization. Given that patriarchy is deeply entrenched in Pakistani society and institutions, I hypothesize that in the relative short term, women will respond by either continuing to have additional births until they have the desired number of sons, or they will resort to prenatal sex selection to ensure the desired number at lower parities.

CHAPTER 4: DATA

In the absence of recent census data, I study these questions by using data from two rounds (1990–91 and 2006–07) of the PDHS. Data from demographic and health surveys has been used in several international research studies on son preference and prenatal sex selection (Arnold, Kishor, and Roy 2002; Ebenstein 2007; Garenne 2008; Bongaarts 2013).

The demographic and health surveys collect data on the reproductive history, behavior, and intentions for women of reproductive age (15–49). The PDHS sample for 1990–91 comprised of 6,611 ever-married women (15–49) and their birth history data for 27,369 births[2]. The 2006–07 sample was larger, containing information on 10,032 ever-married women (15–49) and all their births (39,049).

The birth history data provide the gender and birth order of each birth allowing for the estimation of parity progression ratios by gender composition of previous births. The data on intentions allow for a more prospective analysis of the relationship between son-preference and fertility. The detailed background indicators collected in the PDHS provide an opportunity to study these patterns across various population subgroups. And importantly, the two rounds of the survey allow for a comparison of these measures over the time Pakistan has experienced the fertility transition.[3]

---

[2]The 1990–91 DHS data was argued to have severely underestimated fertility rates (Juarez and Sathar 2001). The re-interview survey conducted to check data reliability did find evidence of underreporting of births, but none for sex differentials in consistency of reporting (Curtis and Arnold 1994). These problems suggest caution in interpreting the 1990–91 results but do not suggest a particular bias in key results presented here.

[3]Fieldwork for another round of the PDHS has reached completion and findings/data will be made available by December 2013. The analysis done on the 1990–91 and 2006–07 data will be replicated for this upcoming round, as soon as the data is accessible.

CHAPTER 5: METHODS AND MEASURES

The bulk of the analysis in the paper is based on the sex of a child being a random event with relatively fixed probabilities of being a boy (0.512) or a girl (0.488)[4]. I use Bongaarts and Potter's (1983) work on expected probabilities of achieving particular compositional fertility goals in the absence of pre-selection to test whether the observed compositional (based on gender) distribution at each parity is different from the expected distribution, and whether these differences have changed over time. I use the binomial test to check for statistical significance of the differences between observed and expected. The binomial test is appropriate with small samples where approximations of continuous distribution breakdown. Differences in the expected and observed proportions could be a result of either sex-selective stopping behavior or sex-selective abortions, or both; I measure these responses next.

I calculate sex ratios at birth by education, rural-urban residence, household wealth status, and birth parity for all births in the five years previous to the survey for both time periods.[5] These differentials help highlight the prevalence of sex ratio imbalances in groups most at risk of practicing prenatal sex-selection, as shown in previous studies on countries with high sex ratios (Guilmoto 2007; Filmer, Friedman, and Schady 2009). Comparing the sex ratios across the two survey rounds helps determine whether sex ratios are increasing or not, thereby offering evidence for, or against the use of sex-selective abortion.

[4]In the initial analyses, I made use of the slight dependency for the sex of the next birth to be like that of prior births (i.e., P_s= 51.45+ 0.3N_s - 0.5N_d, where P_s = percent sons; N_s = number of prior sons; N_d=number of prior daughters, see Bongaarts and Potter 1983: 204). However, because the probabilities under the assumption of independence lead to more conservative estimate of preferential treatment than those under the assumption of slight dependency, we only present the results for the former.

[5]Similar to other studies (Guilmoto 2007; 2009), I limit the calculation to births five years before the survey to capture more recent trends in sex-selection.

Estimating the SRB can be difficult due to this statistical indicator's sensitivity to sample size (Guilmoto 2009). The SRB needs to be calculated using a large number of births to avoid fluctuations within large confidence intervals. A sex ratio of 106 calculated using survey data with a sample of 10,000 has a 95 percent confidence interval of 102–110 (Arnold, Kishor, and Roy 2002). The confidence intervals for a normal sex ratio of 106, given the sample size, are calculated for each subsample to check whether the estimated SRB is outside this range. I also used the alternative approach – the one-tailed binomial test – for testing whether the calculated sex ratios at births are significantly different from 106. Even though my hypotheses are directional in nature (more boys than girls, i.e. higher than normal SRBs) and thus subject to one-tailed tests, only confidence intervals are presented in this paper because they offer a more conservative estimate of significance. Additionally, chi-square tests are applied to test whether the elevated SRBs were statistically different from other SRBs across different parities.

The second part of the analysis focuses on measuring differential stopping. I look at how the gender composition of previous children influences the probability of continuing childbearing (parity progression ratios) as well as the probability of using contraception. Alongside this, I include a more prospective approach similar to that of Pollard and Morgan (2002) for analyzing the link between son-preference and fertility outcomes by studying fertility intentions.

Logistic regression models are used to statistically test the effect of sex composition of previous siblings/children on fertility behavior (progression and contraceptive use) and intentions of currently married women. Logistic regression models control for background characteristics including place of residence, women's educational attainment, household wealth status, age, etc. In order to test whether the effect of son preference has changed between the two time points, I pool the data and use an interaction term for year and sex composition of previous births. Similarly, in order to identify which demographic groups are more responsive to sex preference, interaction terms between gender composition and education and place of residence are also included in the models.

CHAPTER 6: RESULTS

6.1 Expected Probabilities

I present some trends in the differences in expected versus actual distribution of women across different sex composition combinations as this measure indicates behavioral response—in the form of differential stopping or sex-selective abortion—to son preference. The probability of a certain compositional goal can be calculated using the basic underlying probabilities of having a boy or a girl (Bongaarts and Potter 1983). Therefore, in a three-child family, the probability of having three sons would be 0.136 in the absence of sex preference. If there were no sex preferential behaviors occurring in Pakistan, the proportion of women having three boys would not be statistically different from this proportion.

Table 1: Probability of achieving compositional fertility goals and the actual proportions of various compositions at each parity over time

	Expected [1]	Actual 1991	Actual 2007
Parity one			
Boy	0.515	0.512	0.538**
Girl	0.485	0.488	0.462**
Parity two			
2 boys	0.265	0.267	0.288**
1 boy, 1 girl	0.500	0.510	0.495
2 girls	0.236	0.223	0.217**
Parity three			
3 boys	0.136	0.131	0.158***
2 boys, 1 girl	0.386	0.417**	0.421***
2 girls, 1 boy	0.364	0.333**	0.330***
3 girls	0.114	0.119	0.090***
Parity four			
4 boys	0.070	0.059*	0.074
3 boys, 1 girl	0.265	0.264	0.278
2 boys, 2 girls	0.374	0.388	0.405***
3 girls, 1 boy	0.235	0.237	0.198***
4 girls	0.056	0.052	0.045**

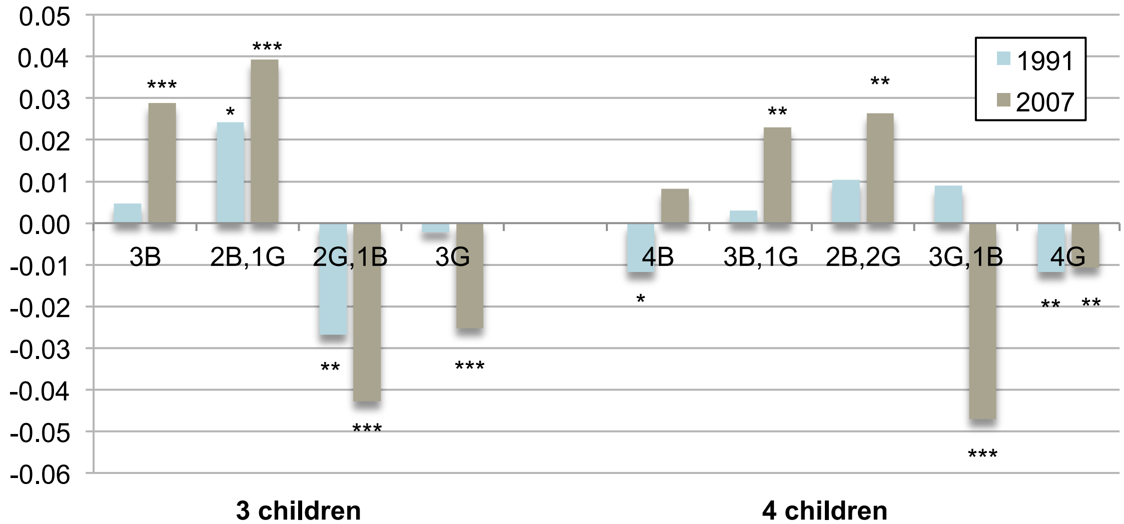
[1] Assuming the probability of a boy is 0.5145 and independent of gender composition of previous births.

Table 1 shows the proportions of women with specific gender compositions across parities one to four over time. We find that while most of the observed proportions were not statistically different from the expected probabilities in 1991, the situation changes dramatically in 2007. In the later time period, the proportion of women having all, or a majority of daughters within each family size is significantly lower than would be expected, given the fixed probabilities of having a girl or a boy[6]. The differences between expected and observed proportions is highest at parity three and parity 4 four. The proportion of women with three children who have only daughters is expected to be 0.114; in 1991, the observed proportion is 0.119, very close to the proportion (and not statistically different). However, by 2007, this proportion has decreased to 0.09. The difference is even more pronounced for women who

[6]See footnote 4.

have two girls and one boy – 0.330 compared to the expected 0.366. For women with four children, once again, there are fewer women with a majority of girls (three or more) than expected in 2007. These differences can be seen more clearly in Figure 3.

Figure 3: Difference between expected and observed distribution gender composition by parity



* p < 0.1; ** p < 0.05 ; *** p < 0.01

While the disproportionate small proportion of families with no or one son point towards some sort of sex preferential behavior, it does not tell us whether this is a result of differential stopping behavior or sex selective abortion. For example, it may be that couples with no sons go on to the next parity while those two sons stop. This would lead a fewer two daughter families and more two son families among two children families. I present evidence on both responses in the following sections.

6.2 Evidence of Sex Selection

Table 2 shows that the SRB for the five years preceding the survey increased from 101 in 1991 to 110 in 2007. The shift from normal to elevated SRB corresponds to the timing of the decline in fertility rates – as noted in the introduction, fertility decline in Pakistan began in the early 1990s and had declined dramatically by 2007. It should be noted that I find no clear evidence of elevated sex ratios for any sub-population (e.g., by region, parity, or education) in 1991. Even though most of the elevated SRBs in 2007 are not significant due to small Ns, the uniform increase is consistent with the emergence of sex-selective abortion.

Table 2: Sex ratios at births for women in the five years prior to the survey, by background characteristics

		1991				2007			
		n	*SRB*	*95% CI for 106*		*n*	*SRB*	*95% CI for 106*	
Overall		6,426	**101**	100.9	111.3	9,112	**110**	101.7	110.4
Region	Urban	3,373	**100**	99.1	113.4	3,116	**115****	98.8	113.7
	Rural	3,053	**104**	98.7	113.8	5,996	**108**	100.7	111.5
Mother's education	None	4,878	**102**	100.2	112.1	6,178	**112****	100.8	111.4
	Primary 1–5	634	**95**	90.7	123.9	1,224	**102**	94.7	118.6
	Secondary 6–10	828	**104**	92.5	121.5	1,163	**104**	94.5	118.9
	Higher 10+	86	**(-)**	69.2	163.2	547	**118**	89.6	125.4
Birth order	1	1,126	**115**	94.3	119.2	1,880	**108**	96.8	116.0
	2	1,021	**106**	93.7	119.9	1,673	**110**	96.3	116.7
	3	944	**99**	93.3	120.5	1,397	**125****	95.4	117.7
	4	817	**94**	92.4	121.6	1,165	**113**	94.5	118.9
	5+	2,518	**97**	98.0	114.6	2,997	**105**	98.7	113.9

CI = confidence interval
Assuming independence p (boy) = 0.5145
*p<0.1; **p<0.05 → 106 significantly different from SRB

One would expect that the sex ratio would increase first in urban areas given that women in these areas desire fewer children and have relatively greater access to facilities providing prenatal screening and abortion services (Guilmoto 2007; Filmer et al. 2009). The analysis of the demographic and health survey data supports this hypothesis. Over time, the SRB has increased significantly in urban areas, rising from 100 in 1991 to 115 for the 2002–06 birth cohorts. The analysis of sex ratios by women's educational attainment shows higher sex ratios in the latter round for women at both ends of the spectrum – no education and higher education. While the SRB of 112 for women with no education is significantly different from

106, the SRB of 118 for women with higher education is not. This is due to the smaller sample size of the higher education group.

Looking at sex ratio by birth-order provides stronger evidence of sex-selection in Pakistan. While sex ratios have remained largely unchanged for lower parities (one or two) and high parities (five or more), sex ratios have increased substantially at third and fourth births, coinciding with the reported ideal number of children. Even with a sample size of less than 1,400 births, a SRB of 125 at third births is significantly higher than normal levels. And although the SRB of 113 at parity four in 2007 is not statistically different from 106, it is substantially larger than the SRB of 94 in 1991.

In Table 3, I calculate SRB by birth-order and the number of previous sons. These calculations allow us to look for evidence of elevated sex ratios where one would most expect to find them – among those with several children but no sons. The estimates in Table 3 confirm our suspicion in the 2006–07 data. The sex ratio is significantly different from 106 and highest (134) for those with three children but no previous sons. Depending on how significance is calculated, SRBs are significantly elevated at parity two and three births with one previous son[7]. This again hints at a preference for two boys among Pakistani couples. A chi-square statistic of 12.4 indicates that the SRB of 134 is also significantly different from the sex ratio for all other parities combined.

[7]Had I assumed that the probability of a male birth was dependent on sex of previous births, the elevated SRBs would have been even more significant. I do not present those confidence intervals and binomial tests results and follow the more conservative estimates of significance.

Table 3: Sex ratios at births in the five years prior to the survey, by number of previous siblings that are boys (2007)

	Birth order	n	SRB	95% CI for 106	
No previous sons	1	1,880	108	96.8	116.0
	2	810	100	92.3	121.7
	3	346	134**	85.8	131.0
	4+	230	98	81.8	137.6
1 previous son	2	863	119	92.7	121.2
	3	662	121	91.0	123.5
	4+	878	117	92.8	121.0
2 or more previous sons	3	389	125	86.9	129.4
	4+	3,054	105	92.7	121.2

Assuming independence p (boy)=0.5145
*p<0.1; **p<0.05→ 106 significantly different from SRB

Estimating the number of sex-selective abortions taking place is a relatively simple task given the total number of births, normal SRB, and observed SRB (Kulkarni 2007). The number of sex-selective abortions is equal to the difference between the expected number of female births and actual number of female births, where the expected number of female births is just the normal SRB multiplied by the number of expected male births (expected male births and actual male birth are equal, assuming no male sex-selective abortions). Actual male births can be calculated using the observed SRB. Assuming an observed sex ratio of 110, if 1,000 women give birth, 524 of these births will be male and 476 female births. The expected number of female births with 524 male births under a normal SRB of 106 would be 494. This implies that there 18 missing females/sex-selective abortions per 1,000 births. With an SRB of 134, the estimated number of sex-selective abortions per 1,000 births would increase to 113.

Table 4: Calculation for number of sex-selective abortions for different levels of sex ratios at birth

SRB	110	115	120	125	134
LB	1,000	1,000	1,000	1,000	1,000
MB = LB*SRB/(100 + SRB)	524	535	545	556	573
FB = LB - MB	476	465	455	444	427
EFB = MB*100/106	494	505	515	524	540
SSA = EFB - FB	18	39	60	80	113
Abortions proportion	**1.80%**	**3.9%**	**6.0%**	**8.0%**	**11.3%**

SRB = Sex ratio at birth; LB = live births; MB = male births; FB = female births; EFB = Expected female births; SSA = sex-selective abortions

6.3 Evidence of Stopping Behavior

6.3.1 Parity progression

In order to assess the level of stopping behavior I turn to an analysis of parity progression ratios. I limit my sample to women who have had no birth in the last five years so that the progression ratios reflect fertility behavior of women who have likely completed their desired family[8].

The differences in parity progression ratios by sex composition of previous births for the two time periods are presented in Table 5. Three interesting patterns emerge from this table. First, progression ratios among women with all or majority daughters are higher than for those with all or majority sons. In 1991, the ratio of moving from parity two to parity three was .894 for women with only boys and .903 for those with only girls (a ratio of 1.01), these ratios changed to .890 and .917 in 2007 (1.03 ratio).

[8]Analysis is limited to women with no births in the last five years in order to capture women who have completed finished childbearing. In the 2007 sample, only 15 percent of women with no birth in the last five years intended to have another child.

Table 5: Parity progression ratios for currently married women with no birth in the last five years, by parity and gender composition of previous children

	1991	2007
p1 to p2		
Boy	0.931	0.939
Girl	0.907	0.940
Total	**0.919**	**0.940**
p2 to p3		
2 boys	0.894	0.890
1 boy, 1 girl	0.876	0.882
2 girls	0.903	0.917
Total	**0.887**	**0.892**
p3 to p4		
3 boys	0.855	0.803
2 boys, 1 girl	0.787	0.797
2 girls, 1 boy	0.847	0.852
3 girls	0.863	0.905
Total	**0.828**	**0.828**
p4 to p5		
4 boys	0.816	0.754
3 boys, 1 girl	0.783	0.717
2 boys, 2 girls	0.744	0.744
3 girls, 1 boy	0.765	0.824
4 girls	0.800	0.848
Total	**0.769**	**0.762**

This brings us to the second interesting pattern; differences in parity progression by gender composition have become more acute over the two time periods. While the difference was less than 0.009 in 1991, it increased to 0.023 in 2007. The increase in son preference over time is seen in progression from three to four children even more starkly; in 1991, the difference between progression ratios for three girls and three boys was 0.008 (0.863–0.855). This increased to 0.102 (0.905–0.803) in 2007. Thirdly, there is some evidence of a preference for a few boys and at least one daughter – progression ratios from parity three to four are lower for those women two boys and one girl in both time periods. This mixed preference is observed for progression ratios from p2 to p3, and p4 to p5, as well.

The results for the logistic regression analysis in Table 6 (model 1s) show that women who have majority girls (2–3 girls at parity three; and 3–4 girls at parity four) are more likely to progress to the next birth by 30 percent and 44 percent, respectively, even when controlling for background characteristics. Although in the right direction, the result is not significant when progressing from two to three births. The results also demonstrate that the decrease in family size across all parities also persists after controlling for other characteristics.

Table 6: Odds ratios for progressing to next birth

		Progression to 3rd birth		Progression to 4th birth		Progression to 5th birth	
Variables		*Model 1*	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*
Sex preference	Majority boys	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)
	Majority girls	0.939	0.910	1.299***	1.162*	1.439***	1.164
Survey year	1991	(Ref)		(Ref)	(Ref)	(Ref)	(Ref)
	2007	0.749***	0.730***	0.870***	0.798***	0.819***	0.741***
Majority girls × survey year	Majority boys × 2007				(Ref)		(Ref)
	Majority girls × 2007		1.052		1.208*		1.433***
Educational attainment	None	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)
	Primary	0.806***	0.806***	0.848**	0.848**	0.900	0.897
	Secondary	0.628***	0.627***	0.647***	0.644***	0.561***	0.558***
	High	0.269***	0.269***	0.182***	0.182***	0.211***	0.209***
Place of residence	Rural	(Ref)		(Ref)	(Ref)	(Ref)	(Ref)
	Urban	1.195***	1.195***	1.073	1.074	1.140*	1.142*
Household Wealth Index	Poorest	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)
	Second	1.036	1.035	1.063	1.063	0.977	0.975
	Third	1.222**	1.223	1.114	1.115	0.930	0.925
	Fourth	1.040	1.040	1.013	1.015	0.835*	0.833*
	Richest	0.930	0.930	0.819*	0.822*	0.661***	0.661***
Respondent's age		1.184***	1.184***	1.134***	1.134***	1.123***	1.123***
Constant		0.029***	0.029***	0.051***	0.053***	0.049***	0.0526***
Observations		12,247	12,247	10,027	10,027	7,750	7,750

*** p<0.01, ** p<0.05, * p<0.1

I ran models that tested for interaction between having majority girls (measure of son preference) and year, respondents' education and place of residence. However, there was no significant interaction between number of previous sons and respondent's education or place of residence – the effect of gender composition of previous children did not differ for urban and rural residents or for women with varying education levels. But the effect of son preference on progression to next birth is higher in 2007 than 1991 when progressing from three to four births (at the 90 percent significance level only) and four to five births (model 2s in Table 6).

6.3.2 Current use

If women are using sex preferential stopping behavior to achieve their desired compositional goals then there should be differentials in contraceptive use by sex composition of previous births. Table 7 shows current use of contraception by gender composition of previous births for 1991 and 2007. The differentials are as expected; contraceptive use is higher for women with all or majority sons than for women with all or majority daughters. While contraceptive use rates increase substantially over time, the differentials in use are strong for both years. Once again, there is evidence of a slight preference for boys with at least one daughter – contraceptive prevalence is highest for women with one boy and one girl among two children families, two boys and one girl among three children families, and three boys and one girl among four children families.

Table 7: Current Use of contraception, by gender composition of children

	1991		2007	
	%	*N*	*%*	*N*
One child				
Boy	3.6	421	14.0	663
Girl	6.2	406	12.0	573
Total	**4.8**	**827**	**13.1**	**1,236**
Two children				
2 boys	8.5	211	27.2	386
1 boy, 1 girl	12.8	406	27.4	676
2 girls	7.3	178	19.1	298
Total	**10.4**	**795**	**25.5**	**1,360**
Three children				
3 boys	15.0	120	36.1	202
2 boys, 1 girl	20.1	369	36.7	556
2 girls, 1 boy	11.3	301	32.2	422
3 girls	12.8	109	25.9	116
Total	**15.6**	**899**	**34.2**	**1,296**
Four children				
4 boys	22.0	50	39.1	92
3 boys, 1 girl	21.7	221	47.2	339
2 boys, 2 girls	18.5	330	44.9	497
3 girls, 1 boy	17.0	200	31.2	250
4 girls	14.0	43	39.7	58
Total	**19**	**844**	**42.1**	**1,236**

The results of the logistic regression analysis in Table 8 show that this differential stopping behavior persists even when controlling for other characteristics. Model 1 shows that the odds of using contraception with only one son or two or more sons are 1.28 ($e^{0.249}$) and 1.87 ($e^{0.628}$) times the odds with no sons, when controlling for year, parity, place of residence, woman's educational attainment and age, and household wealth status.

Table 8: Logistic regression coefficients for current use of contraception

Variables		Model 1	Model 2
Number of sons	0 sons	(Ref)	(Ref)
	1 son	0.249***	0.0987
		(0.0889)	(0.164)
	2+ sons	0.628***	0.368**
		(0.0926)	(0.152)
Survey year	1991	(Ref)	(Ref)
	2007	1.158***	0.853***
		(0.0495)	(0.163)
No. of sons × survey year	0 sons × 2007		(ref)
	1 son × 2007		0.211
			(0.192)
	2+ sons × 2007		0.368**
			(0.172)
Total number of children	One	(Ref)	(Ref)
	Two	0.667***	0.660***
		(0.101)	(0.101)
	Three	1.045***	1.032***
		(0.105)	(0.105)
	Four	1.426***	1.415***
		(0.110)	(0.109)
	Five	1.504***	1.496***
		(0.112)	(0.111)
Educational attainment	None	(Ref)	(Ref)
	Primary	0.453***	0.456***
		(0.0659)	(0.0660)
	Secondary	0.736***	0.739***
		(0.0684)	(0.0684)
	High	0.936***	0.946***
		(0.103)	(0.103)
Place of residence	Rural	(Ref)	(Ref)
	Urban	0.274***	0.275***
		(0.0523)	(0.0524)
Household Wealth Index	Poorest	(Ref)	(Ref)
	Second	0.521***	0.523***
		(0.0847)	(0.0848)
	Third	0.834***	0.838***
		(0.0834)	(0.0835)
	Fourth	1.205***	1.208***
		(0.0855)	(0.0856)
	Richest	1.564***	1.567***
		(0.0942)	(0.0943)
Respondent’s age		-0.00650*	-0.00667**
		(0.00338)	(0.00338)
Constant		-4.496***	-4.268***
		(0.146)	(0.183)
Observations		13,836	13,836

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Similar to progression results, I found an interaction effect between number of previous sons and year (model 2, Table 8): even though women in 2007 were more likely to be using contraception than those in 1991 ($e^{0.853}$ = odds ratio of 2.3), the effect of having sons (versus having no sons) on the odds of contraceptive use was greater in 2007. These results are in the expected direction – as family size gets smaller, the preference for sons becomes harder to realize and there is greater pressure for preferential behavior.

6.3.3 Intentions

Another way to measure stopping behavior is to look at differentials in intention to stop childbearing, i.e., have no more children. Table 9 shows that women with only daughters are less likely to report the intention to have another child in the future than if they have one or more sons. Once again, there is a preference for at least one girl along with one or more boys – the intention to have no more children is highest for women at that gender composition of children. This preference is unchanging over time.

Table 9: Intention to have no more children, by gender composition of previous children

	1991		2007	
	%	*N*	*%*	*N*
One child				
Boy	6.7	405	10.7	653
Girl	6.1	395	4.9	566
Total	**6.4**	**800**	**8.0**	**1,219**
Two children				
2 boys	23.3	206	33.2	376
1 boy, 1 girl	25.6	383	36.7	660
2 girls	8.3	168	12.2	287
Total	**21.1**	**757**	**30.4**	**1,323**
Three children				
3 boys	38.8	116	58.6	198
2 boys, 1 girl	47.0	349	66.6	539
2 girls, 1 boy	29.6	294	47.1	414
3 girls	21.1	104	18.3	115
Total	**36.8**	**863**	**54.6**	**1,266**
Four children				
4 boys	57.1	49	65.2	89
3 boys, 1 girl	59.5	215	84.1	333
2 boys, 2 girls	57.5	320	82.6	483
3 girls, 1 boy	43.7	192	63.5	241
4 girls	15.0	40	28.6	56
Total	**52.7**	**816**	**75.4**	**1,202**

This table also demonstrates the overall decrease in desired family size – at all parity levels in 2007, a larger proportion of women intend to stop childbearing than their counterparts did in 1991. However, the difference in intention over time is less pronounced for women with only daughters. For example, 37 percent of women with three children in 1991 intended to have no more children, this proportion increased by almost 20 percentage points to 55 percent for women in 2007. Yet, the percent of women with three daughters intending to stop childbearing actually decreased by three percentage points from 1991 to 2007 – from 21 percent to 18 percent.

Table 10: Logistic regression coefficients for intention to stop (have no more) childbearing

Variables		Model 1	Model 2
Number of sons	0 sons	(Ref)	(Ref)
	1 son	1.166***	1.278***
		(0.0962)	(0.153)
	2+ sons	1.846***	1.278***
		(0.0973)	(0.146)
Survey year	1991	(Ref)	(Ref)
	2007	0.887***	0.134
		(0.0485)	(0.175)
No. of sons × survey year	0 sons × 2007		(Ref)
	1 son × 2007		0.530***
			(0.195)
	2+ sons × 2007		0.920***
			(0.184)
Total number of children	One	(Ref)	(Ref)
	Two	1.003***	0.979***
		(0.108)	(0.108)
	Three	1.547***	1.506***
		(0.109)	(0.109)
	Four	2.154***	2.119***
		(0.114)	(0.114)
	Five	2.564***	2.541***
		(0.115)	(0.115)
Educational attainment	None	(Ref)	(Ref)
	Primary	0.322***	0.330***
		(0.0767)	(0.0770)
	Secondary	0.593***	0.604***
		(0.0822)	(0.0822)
	High	0.232*	0.262**
		(0.120)	(0.121)
Place of residence	Rural	(Ref)	(Ref)
	Urban	0.191***	0.189***
		(0.0572)	(0.0574)
Household Wealth Index	Poorest	(Ref)	(Ref)
	Second	0.291***	0.298***
		(0.0721)	(0.0724)
	Third	0.409***	0.416***
		(0.0750)	(0.0753)
	Fourth	0.748***	0.753***
		(0.0821)	(0.0824)
	Richest	0.918***	0.921***
		(0.0962)	(0.0963)
Respondent's age		0.0853***	0.0855***
		(0.00365)	(0.00365)
Constant		-7.023***	-6.524***
		(0.172)	(0.198)
Observations		13,381	13,381

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10 shows the multivariate logistic regression results for intention to continue childbearing. In the additive model (model 1), the odds of intending to have no more births if a woman has two sons are more than six times the odds ($e^{1.85}$) if she has two or more sons, when controlling for parity and other background characteristics. Even if a woman has one son, the odds of intending to stop childbearing are three times higher ($e^{1.17}$) than if she had more sons. Similar to contraceptive use, there were no significant interactions between number of previous sons and urban-rural residence or education level for intention to stop childbearing, thus those models are not included in the paper. But once again, the differentials in intention to stop by number of previous sons have increased between the two survey rounds. The coefficients for the interaction term between year and number of previous sons are positive and highly significant for both no son and one son.

CHAPTER 7: DISCUSSION

Son preference serves as an indirect measure of gender discrimination in a society. When fertility falls son preference is more visible and becomes a useful indicator of gender discrimination as well as an important factor affecting contraceptive uptake, fertility levels, and thereby sex ratios. The findings of this paper indicate that in Pakistan evidence of gender discrimination is unmistakable and is playing an increasingly important role in fertility behavior and in altering sex ratios.

Overall, the analysis presented provides strong evidence that women are using selective stopping behavior to achieve their desired compositional goals. Pakistani women are more likely to intend to go on to have another child and/or be a non-user of contraception if they do not have the desired number of sons (one or two). Moreover, the abnormally high SRB for those with no or one son (shown in Table 3) is as Bongaarts says “unambiguous evidence” of sex selective abortion taking place. An abnormal SRB of 110 implies that of the 140 abortions for every 1,000 pregnancies that take place in Pakistan (Vlassoff et al. 2009), 13 percent are sex-selective abortions to achieve desired gender composition (see Table 4 for calculation of the number of sex-selective abortions).

This evidence holds strong implications for future challenges facing Pakistan’s population. If imbalances in sex ratios at birth are reflective of reality and are left unaddressed, they may rise to the levels in neighboring India, and Pakistan will face even greater social, economic, and political challenges than it presently does. On the other hand, continued reliance on differential stopping to achieve desired number of sons will also have direct and indirect consequences for society. On a more immediate level, continuing childbearing differentially will slow down fertility decline, impeding reductions in population growth and exacerbating the already acute problems of insufficient public services, including energy, water, and schooling.

Moreover, differential stopping will intensify gender inequality because girls will belong to larger households disproportionately because families with girls are the ones that continue childbearing until a son is born. The reduction in resources available to each child in larger families will thus affect girls more.

The results of this paper are relevant not only for Pakistan's future but also for other patriarchal societies, especially those currently experiencing fertility declines. The strong evidence of skewed sex ratios at birth suggests that lack of legal and safe abortion services are not sufficient in protecting against the practice of sex-selective abortions. Patriarchal institutions and pressures favoring sons seem to outweigh the health risks and social/religious stigma of seeking abortion for women resorting to this practice. Finally, demographers need to rethink their blind advocacy for low fertility rates (arguably only to replacement levels) without paying attention to unintended negative consequences of the fertility transition. The below replacement fertility crisis faced by several industrialized countries should have taught us the importance of accounting for context and culture in our prescriptions for reaching that elusive happy equilibrium. The skewed sex ratios being experienced by an increasing number of developing countries is the very same lecture, just in different packaging.

REFERENCES

Arnold, Fred, Sunita Kishor, and T. K. Roy. 2002. "Sex-Selective Abortions in India." *Population and Development Review* 28(4): 759–85. doi: 10.1111/j.1728-4457.2002.00759.x.

Bharadwaj, Prashant and Leah K. Lakdawala. 2013. "Discrimination Begins in the Womb: Evidence of Sex-Selective Prenatal Investments." *Journal of Human Resources* 48:71–113.

Bongaarts, John and Robert G. Potter. 1983. *Fertility, Biology, and Behavior: An Analysis of the Proximate Determinants.* New York: Academic Press.

Bongaarts, John B. 2013. "Implementation for Preferences for Male Offspring." *Population and Development Review* 39(2): 185–208. doi: 10.1111/j.1728-4457.2013.00588.x.

Das Gupta, Monica and P. N. Mari Bhat. 1997. "Fertility Decline and Increased Manifestation of Sex Bias in India." *Population Studies* 51(3): 307–15. Retrieved November 12, 2013 (http://www.jstor.org/stable/2952474).

Davis, Kingsley and Judith Blake. 1956. "Social Structure and Fertility: An Analytic Framework." *Economic Development and Cultural Change* 4(3): 211–35. Retrieved November 12, 2013 (http://www.jstor.org/stable/1151774).

Duthé, Géraldine, France Meslé, Jacques Vallin, Irina Badurashvili, and Karine Kuyumjyan. 2012. "High Sex Ratios at Birth in the Caucasus: Modern Technology to Satisfy Old Desires." *Population and Development Review* 38(3): 487–501. doi: 10.1111/j.1728-4457.2012.00513.x.

Dyson, Tim. 2012. "Causes and Consequences of Skewed Sex Ratios." *Annual Review of Sociology* 38: 443–61. Retrieved November 12, 2013 (http://www.annualreviews.org/doi/abs/10.1146/annurev-soc-071811-145429).

Ebenstein, Avraham Y. 2007. "Fertility Choices and Sex Selection in Asia: Analysis and Policy." Working Paper. Social Science Research Network (SSRN), Rochester, NY. Retrieved November 12, 2013 (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=965551).

Filmer, Deon, Jed Arnold Friedman, and Norbert Schady. 2009. "Development, Modernization, and Childbearing: The Role of Family Sex Composition." *World Bank Economic Review* 23(3): 371–98. doi: 10.1093/wber/lhp009.

Garenne, Michel. 2008. "Situations of Fertility Stall in Sub-Saharan Africa." *African Population Studies* 23(2): 173–88. Retrieved November 12, 2013 (http://www.uaps-uepa.org/downloads/Situation%20of%20Fertility%20Stall%20in%20Sub%20Sahara%20Africa.pdf).

Guilmoto, Christophe Z. 2007. "Characteristics of Sex Ratio Imbalance in India and Future Scenarios." Paper presented at the Fourth Asia and Pacific Conference on Sexual and Reproductive Health and Rights, October, Hyderabad, India. Retrieved November 12, 2013 (http://www.unfpa.org/gender/docs/studies/india.pdf).

------. 2009. "The Sex Ratio Transition in Asia." *Population and Development Review* 35(3): 519–549. doi: 10.1111/j.1728-4457.2009.00295.x.

------. 2012. "Son Preference, Sex Selection, and Kinship in Vietnam." *Population and Development Review* 38(1): 31–54. doi: 10.1111/j.1728-4457.2012.00471.x.

Hesketh, Therese and Zhu Wei Xing. 2006. "Abnormal Sex Ratios in Human Populations: Causes and Consequences." *Proceedings of the National Academy of Sciences of the United States of America* 103(36): 13271–5. Retrieved November 12, 2013 (http://www.pnas.org/content/103/36/13271.full).

Kulkarni, P. M. 2007. "Estimation of Missing Girls at Birth and Juvenile Ages in India."United Nations Population Fund (UNFPA)-India, New Delhi, India. Retrieved November 12, 2013 (http://india.unfpa.org/drive/MissingGirlsatBirthpaper-August2007Kulkarni.pdf).

National Institute of Population Studies (NIPS) (Pakistan) and Macro International Inc. 2008. *Pakistan Demographic and Health Survey 2006–07.* Islamabad: National Institute of Population Studies and Macro International Inc. Retrieved November 12, 2013 (http://www.measuredhs.com/pubs/pdf/FR200/FR200.pdf).

------. 2013. *Pakistan Demographic and Health Survey 2012–13 Preliminary Report.* Islamabad: National Institute of Population Studies and Macro International Inc. Retrieved November 12, 2013 (http://www.measuredhs.com/pubs/pdf/PR35/PR35.pdf).

Pollard, Michael S. and S. Philip Morgan. 2002. "Emerging Parental Gender Indifference? Sex Composition of Children and the Third Birth." *American Sociological Review* 67(4): 600–13. Retrieved November 12, 2013 (http://www.jstor.org/stable/3088947).

Sathar, Zeba A. and John B. Casterline. 1998. "The Onset of Fertility Transition in Pakistan." *Population and Development Review* 24(4): 773–96. Retrieved November 12, 2013 (http://www.popcouncil.org/pdfs/councilarticles/pdr/PDR244Sathar.pdf).

Sathar, Zeba A., Susheela Singh, and Fariyal F. Fikree. 2007. "Estimating the Incidence of Abortion in Pakistan." *Studies in Family Planning* 38(1): 11–22. Retrieved November 12, 2013 (http://www.jstor.org/stable/20454380).

United Nations (UN), Department of Economic and Social Affairs, Population Division. 2011. *World Population Prospects: The 2010 Revision, Volume I: Comprehensive Tables.*

ST/ESA/SER.A/313. Retrieved November 12, 2013 (http://esa.un.org/wpp/Documentation/pdf/WPP2010_Volume-I_Comprehensive-Tables.pdf).

Vlassoff, Michael, Susheela Singh, and Gustavo Suarez. 2009. *Abortion in Pakistan.* In Brief No. 2. New York: Guttmacher Institute. Retrieved November 12, 2013 (http://www.guttmacher.org/pubs/IB_Abortion-in-Pakistan.pdf).

Zaidi, Batool, Zeba Sathar, Minhaj ul Haque, and Fareeha Zafar. 2012. *The Power of Girls' Schooling for Young Women's Empowerment and Reproductive Health.* Islamabad: Population Council. Retrieved November 12, 2013 (http://www.popcouncil.org/pdfs/2012pgy_girlschooling.pdf).