The impact of son preference and sex composition of children on fertility behavior in the occupied Palestinian territory

Introduction:

Internationally, fertility declines have become commonplace, albeit at differing speeds. Much of the literature highlights the importance of the role of developments in women's education, labor force participation, increased autonomy, urbanization, decreased infant mortality, and improved access to contraception on fertility. In some developing country contexts, particularly in East Asia, however, son preference has been found to play a role in fertility behavior and at times result in higher levels of fertility than would be expected. In other countries like South Korea and China, sex-selective abortion has resulted in a highly skewed sex ratio at birth (Basu & De Jong 2010; Das Gupta et al 2002; Larsen et al 1998) in a context of below-replacement level fertility. For example, according to the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat data (2010), the sex ratio at birth for the 2005-2010 period is 110 males to every 100 females in South Korea. In China, the sex ratio at birth is 120 males to every 100 females. In the occupied Palestinian territory (oPt), according to the same data source, the sex ratio at birth is 105 males to every 100 females, which is in line with the normal range for the sex ratio at birth.

Examining the sex ratios at birth for the oPt; one is not left with a clear impression of highly pronounced son preference resulting in a skewed sex-ratios at birth. Skewed sex ratios would not be expected where sex selective abortion was not practiced. Additionally, , because of the a relatively high total fertility rate of 4.6 in 2006 (PCBS 2007), ranging between 4.1 in the West Bank and slightly over 5 children in the Gaza Strip, it is likely that women would have had at least one male birth out of the average of 4 or 5 births. While

various explanations of Palestinian fertility have been put forward, the role of son preference in impacting Palestinian fertility has not been studied empirically in this context despite qualitative studies (Kaaneh 2002[1]) and field observations indicating that women can be under great pressure to give birth to a son. Anecdotes of women continuing to have children, despite having reached their desired level of fertility, until a son is born or at times a second son[2] is born are not uncommon.

This paper aims to understand the role son preference and sex distribution of current children play in individual fertility behavior in the occupied Palestinian territory (oPt), both in terms of timing of fertility and progression to subsequent parity levels. The primary objective of the analysis is to examine whether son preference and the sex distribution of children have a significant effect on the timing and probability of a subsequent birth.

Theory and Prior Findings:

As various studies have shown, there is evidence of a strong preference among parents in some parts of the world to have at least one son (Das Gupta et al 2002). This preference has manifested itself in various forms: sex-selective abortion, discrimination against daughters or preferential treatment of sons in terms of access to household resources; as well as an increased propensity to continue having children in the absence of a male child (or perhaps a healthy male child) even after the couple's desired number of children has been reached (Basu & De Jong 2010; Clark 2000; Das Gupta et al 2002; Larsen et al 1998).

[1] Also unpublished data from the Institute of Community and Public Health at Birzeit University to this effect
[2] Based on field observations and work in clinics, women often discuss the pressure to have one son or in other instances a "brother for the son."

In addition to studies examining the manifestation of son preference through sex-induced abortion, others have focused on differential stopping behavior and variations on fertility timing in relation to the sex composition of children (Basu and De Jong 2010; Yount et al 2000). Some studies have shown that son preference has been expressed in shorter birth intervals following the birth of a daughter compared to the birth of a son, while other studies have also shown an increased propensity to use contraception following the birth of a son compared to the birth of a daughter at similar levels of parity (Clark 2000; Yount et al 2000).

In the oPt sex-selective abortion is uncommon. What may be termed as mild son preference is expected to be manifested through decisions on birth timing as well as subsequent parity. This analysis focuses on the timing of births to assess the extent to which son preference is expressed in individual fertility behavior in the occupied Palestinian territory, primarily through focusing on differential stopping behavior and length of birth intervals in relation to the sex composition of children at the beginning of the interval. In this paper, son preference is examined through the impact of sex composition of current surviving children at different parity levels. In general, we test whether having more sons at any given parity level impacts the odds of having a subsequent birth.

Data:

Birth histories from a household surveys conducted in the oPt in 2006, the 2006 Palestinian Family Health Survey, were used for the analysis. The survey was undertaken by the Palestinian Central Bureau of Statistics (PCBS). The survey is representative at the

national and governorate level. This survey is a Demographic Health Survey (DHS)-type household surveys and is based on a similar survey design.

Stratified random samples were drawn using a sampling frame based on an updated frame for the 2006 survey. The updated frame was based on the 1997 survey followed by an update in 2003. The survey was further stratified by governorate (within the two main regions of West Bank and Gaza Strip) and type of locality. In total, 13,238 households were surveyed, with a total of 10,648 ever-married women between the ages of 15 and 54 captured by the survey. The overall household response rate for the survey is 88% (PCBS 2007). The survey includes complete birth histories for ever-married women between the ages of 15-54.

For the purposes of this study, variables from three questionnaires will be combined. These include: the roster file, which includes age, education, current marital status, and employment information for the members of the household (these variables will be matched by the women's identification numbers); the ever-married women questionnaire, which includes information on women's marital history, maternal healthcare seeking behaviors for pregnancies in the past 5 years, current and ever-use of contraception, and knowledge of sexually transmitted diseases (the primary use of this questionnaire for the purposes of this study is to derive women's age at marriage); the birth history calendar file, which includes each birth as a separate observation matched to the mother through the household identification number and then woman's identification number in the household.

<u>Study Sample:</u>

The study population of interest to this analysis includes all women between the ages of 15 and 54. Given the interest in the impact of sex preference on subsequent births, the study population was further limited to women, who were currently married who have had at least one live birth, and for whom there are complete birth histories. This limitation results in a sample size of 8,993 women. An additional 67 women were excluded from the analysis due to improbable birth date information, probably due to data entry errors, that could not be verified (for example mother's birth date at a later date than the child's). The final analysis included a total of 8,926 women who have had at least one birth; 8,273 women who have had two births; 7,245 who have had three births; 6,058 who have had four births; and 4,783 women who have had at least five births.

Variables of Interest:

There are two main dependent variables of interest, the probability of a subsequent birth at a given parity, and time to subsequent birth (calculated based on the birth date of the index child and birth date of the subsequent child). The exposure period for the outcome of interest is the time from previous birth. The exposure period is measured in months.

The main independent variable of interest will be sex composition of living children a woman has given birth to. Other control variables will include women's age at given parity, education, locality of residence (in this context, urban, rural, or refugee camp dwelling), region of residence (West Bank or Gaza Strip). The analysis is conducted separately at each parity level, beginning with parity 1 up to parity 5. Table 1, below, provides an overview of the variables included in the analyses.

Table 1: Variable Definitions	
Variable	**Definition/explanation**
Duration	Dependent variable of interest, measures time to birth since index birth. Measured in months
Birth Interval 0	Duration of birth interval measured using time from marriage to first birth in months. Used to account for fecundity
Age	Age of woman measured in months at beginning of each interval
Education	Woman's education in years
Husband's Education	Husband's education in years
Region/West Bank	Region variable, indicates residence in West Bank or Gaza Strip
Type of Locality	Includes three possible locality types: urban, rural, or refugee camp
No boys	Dummy variable to indicate if woman has given birth to any boys prior to birth at the end of interval
One boy	Dummy variable indicating woman has given birth to one son prior to birth at the end of interval
Two boys	Dummy variable indicating woman has given birth to 2 sons prior to birth at the end of interval
Three boys	Dummy variable to indicate if woman has given birth to three boys prior to birth at the end of interval
Four boys	Dummy variable indicating woman has given birth to four sons prior to birth at the end of interval
All boys	This is the reference variable for sex composition included in the analysis and indicates that the woman has only given birth to sons.
Birth	Variable indicating that woman has ended the interval with a birth

Hypotheses:

Table 2 provides an overview of the hypotheses tested in the analyses for this paper and the expected direction. Son preference is expected to be manifested through various mechanisms:

1) Birth intervals among women who have not given birth to any sons are expected to be shorter and the hazard of having a subsequent birth greater compared to women who have given birth to one or more sons at each parity level;
2) The hazard of having a subsequent birth is expected to be inversely associated with the number of sons a woman has given birth to, regardless of parity
3) In terms of socio-demographic characteristics:
    - Holding age constant, higher education is expected to be significantly associated with longer birth intervals;
    - Women residing in the Gaza Strip are expected to have significantly shorter birth intervals and an increased propensity to have a subsequent birth compared to women living in the West Bank with similar characteristics;
    - Residence in a rural area is expected to be associated with significantly shorter birth intervals and an increased propensity to have a subsequent birth compared to women living in urban areas and refugee camps, holding all else constant.

Table 2: Variables used to test hypotheses

Variable	Expected Direction
Education	Inverse association with shorter duration and lower hazard for more education
Husband's Education	Inverse association with duration and lower hazard for more education
Region/West Bank	West Bank expected to be associated with longer duration and lower hazard of birth
Type of Locality	Camp and rural locality expected to be associated with shorter duration and higher hazard of birth
Number of boys	Expected longer duration and lower hazard compared as number of sons increases. Women who have all sons expected to have lowest hazards of having a subsequent birth compared to other women at each parity level.

Analysis:

Prior to running the regression models, a Kaplan Meier survival analysis was conducted at each parity level. The survival plots are also included in the appendix to this paper. The analysis for this paper relies primarily on a series of Weibull hazard regressions. The assumptions for the Weibull distribution were checked and the results confirmed the appropriateness of using a Weibull distribution (for detailed plots and results, refer to appendix). Only parities 1+ were included in the models. The analysis was conducted separately at each parity level. In total, five models are included in table 4 of the results section of this paper. The models include women's socio-demographic characteristics; the length of the woman's first birth interval to account for potential fertility problems; and the number of sons a woman has given birth to. In all models, having all sons is the reference category (where the number of sons is equal to parity level). A total of 8,926 observations were included in model 1; 8,273 in model 2; 7,245 in model 3; 6,058 in model 4; and 4,783 in model 5.

Descriptive statistics:

Table 3 provides an overview of additional descriptive statistics by women as well as by births. The mean age for the women in the sample is about 34.75 years. The median level of education for women in the sample is about 9.66 years, and about 10.04 years for women's husbands. Almost 61% of the sample resides in the West Bank, and about 53.7% reside in urban dwellings.

The average woman in the sample has had about five births. The median lengths of birth intervals based on Kaplan Meier survival estimates are included in the table below for each parity level. For women with one child at the beginning of the interval, the median length of the birth interval is 19 months (between the births of the first and second child), and 20 months for women moving from parity 2 to parity 3. The length of the birth interval appears to increase more substantially between parity 2 and 3, where the median length of the birth interval is 24 months. The median length of birth intervals at parity 4 and 5 are 25 and 26 months, respectively.

The Kaplan Meier survival curves at each parity level, taking into account the sex composition of births, are included in the appendix (Figures 1-5). Overall, the plots indicate that women who have not given birth to any sons have the shortest birth intervals, while women who have had only sons have the longest birth intervals. While the differences between categories are statistically significant at the $p<0.001$ level based on the log-rank test for equality of the survivor functions at each parity, differences appear to be more pronounced among women at parity 3 or higher.

Table 3: Descriptive statistics

	Mean	**Std. Dev**
Age	34.75	9.02
# of children	5.19	2.85
# of boys	2.65	1.77
# of girls	2.54	1.88
Education (yrs)	9.66	3.60
Husband's education(yrs)	10.04	4.09
Median Duration of Birth Interval (based on KM estimate)	**Months**	**N**
Parity 1	19	8,926
Parity 2	20	8,273

Parity 3	24	7,245
Parity 4	25	6,058
Parity 5	26	4,783

	%	N
Region		
West bank	60.88	5,434
Gaza strip	39.12	3,492
Type of locality		
Urban	53.72	4,795
Rural	29.35	2,620
Refugee camp	16.93	1,511
N	8926	

Results:

Socio-demographic characteristics:

Table 4 presents the results of the multivariate Weibull hazard analyses. The results indicate that an older age at the beginning of the interval is associated with a lower likelihood (hazard) of having a subsequent birth across all parity levels. Higher women's education is associated with a decreased likelihood of having a subsequent birth for women at who have two or more children at the beginning of the birth interval. An older age at marriage was also found to be positively associated with the hazard of having a subsequent birth across all parity levels. Women who married later generally had shorter birth intervals and were more likely to have a subsequent birth, irrespective of parity.

Place of residence was found to associated with the likelihood of moving on to the next parity level. Residence in the West Bank (compared to the Gaza Strip) is associated with a lower hazard of having a subsequent birth across all parities. Among women with one child, for example, women in the West Bank are about 8% less likely to go on to a

subsequent birth compared to women in the Gaza Strip; among women with three children, women in the West Bank are about 25% less likely to move on to a subsequent birth compared to women in the Gaza Strip. Type of locality of residence is also associated with the hazard of having a subsequent birth, albeit in a less straightforward fashion. Residence in a rural area is associated with an increased hazard of having a subsequent birth compared to residence in an urban area among women with one, three, four or five children. This association is not statistically significant for women with two children. Residence in a refugee camp is associated with an increased hazard of having a subsequent birth compared to residence in urban dwellings among women with one child. Among women with three children, residence in a refugee camp is associated with a decreased hazard of having a subsequent birth. Conversely, among women with 4 or 5 children, residence in a refugee camp is associated with an increased hazard of having a subsequent birth compared to women residing in urban dwellings.

Sex composition of children:

For women who have given birth to one child (parity 1), women who have not given birth to a son (i.e. have one daughter) are about 15.5% more likely to move on to a subsequent parity compared to women who have given birth to a son. For women at parity 2, women who have no sons are about 16.8% more likely to move on to the next parity compared to women who have two sons. Women who have one son and one daughter are about 12.4% more likely to have a subsequent birth compared to women with two sons. [3]

[3] The differences in the hazard ratios between women who have no boys and women who have no boys compared to women with all boys are not statistically significant.

Among women at parity 3, women who have not given birth to any sons are about 22.6% more likely to have a subsequent birth compared to women who have only given birth to sons; similarly women who have given birth two one son and two daughters are about 14.8% more likely to have a subsequent birth. Both associations are significant at the $p<0.001$ level. Women who have given birth to two sons and one daughter were not found to have a statistically significantly different hazard of having a subsequent birth compared to women with three sons.

For women at parity 4, we find a similar pattern where women who have not given birth to any sons have the highest hazard of having a subsequent birth, about 66.1% higher than women who have all sons. Women who have one son are about 33.8% more likely to move on to the next parity compared with women with all sons, and women with two sons are 17.7% more likely to move on to the next parity compared with women with all sons. The difference in the hazard of having a subsequent birth between women with three sons and women with all sons was not found to be statistically significant. However, the differences in the hazard ratios among women with one son, two sons, and three sons were found to be statistically significantly different from each other.[4]

Among women at parity 5, there is a slight change in the general pattern that we see among women at other parity levels. Women with no sons are still statistically more likely to have a subsequent birth compared to women with all sons (hazard ratio is 1.348), however the hazard ratio among this group is not the highest compared to other categories of women. Women with no sons have a 34.8 % more likely to have a subsequent birth compared to

[4] This is based on additional statistical tests that were conducted (not presented in the text of the paper)

women with all sons; women with one son were found to be 71.3% more likely to have a subsequent birth compared to women with all sons; women with two sons were found to be 43.4% more likely to have a subsequent birth compared to women with all sons; and women with three sons were found to be 19.4% more likely to have a subsequent birth. All of these differences were found to be statistically significant.

Furthermore, the differences in the hazard of having a subsequent birth between women with one son and all other groups were found to be statistically significant. The differences in the hazard ratios between women who have two sons and women who have three, and four sons, respectively, were also found to be statistically significant. Women with four sons, however, were not found to have a statistically different hazard of having a subsequent birth compared to women with five sons.

	Parity 1			Parity 2			Parity 3			Parity 4			Parity 5		
	Haz. Ratio	S.E.		Haz. Ratio	S.E.		Haz. Ratio	S.E.		Haz. Ratio	S.E.		Haz. Ratio	S.E.	
First Birth Interval	0.999	0.001		0.997	0.001	***	1.001	0.001		1.002	0.001		1.001	0.001	
Age at Interval	0.989	0.001	***	0.988	0.000	***	0.993	0.000	***	0.994	0.000	***	0.995	0.000	***
Age at marriage	1.106	0.012	***	1.124	0.007	***	1.053	0.006	***	1.070	0.006	***	1.047	0.007	***
Education (yrs)	1.005	0.004		0.975	0.003	***	0.980	0.004	***	0.948	0.004	***	0.979	0.005	***
Husband's education	1.018	0.003	***	1.021	0.003	***	0.998	0.003		0.997	0.003		0.985	0.004	***
Locality Type (Urban ref)															
Rural	1.071	0.028	**	1.037	0.029		1.095	0.033	**	1.333	0.045	***	1.154	0.043	***
Camp	1.063	0.033	*	0.940	0.031		0.911	0.032	**	1.214	0.047	***	1.141	0.050	**
West Bank (Gaza Ref)	0.917	0.022	***	0.903	0.023	***	0.750	0.021	***	0.625	0.020	***	0.714	0.025	***
Sex Distribution of children [i]															
No boys	1.155	0.025	***	1.168	0.037	***	1.226	0.060	***	1.661	0.126	***	1.348	0.164	*
One boy				1.124	0.031	***	1.148	0.045	***	1.338	0.077	***	1.713	0.160	***
Two boys							1.017	0.040		1.177	0.066	**	1.434	0.129	***
Three boys										1.110	0.065		1.194	0.108	*
Four boys													1.157	0.108	
N	8926			8273			7245			6058			4783		

***p<0.05 **p<0.01 ***p<0.001**

[i]: Note that in all analyses, all boys is reference category for examination of sex distribution

Discussion & Conclusions:

To our knowledge, this is the first empirical examination of the impact of son preference on individual fertility behavior and birth timing in the oPt. Son preference in this paper is measured through the impact of the sex composition of children on the likelihood of a woman (couple) to have an additional child. We hypothesized that the number of sons a couple has is inversely associated with the likelihood of having a subsequent birth, and that women without any sons (i.e. all daughters) were the most likely to have a subsequent birth compared to women with all sons.

The results of the analyses conducted indicate that son preference does have an effect on fertility behavior. For women with one to four children, we find that women without any sons are the most likely to have a subsequent birth compared to women with all sons, indicating a drive to continue having children until a male child is born. We also find that there is an inverse association between the number of sons a woman has and the likelihood that she will have an additional birth (compared to women with all sons); this association was found to be statistically significant except for women with one daughter and the rest sons at parities three and four (i.e. women with two sons and one daughter, and women with three sons and one daughter respectively). For women with five children, we find a similar trend where women with only sons and women with one daughter and the rest sons are the least likely to move on to a subsequent birth. Here, it should be noted that unlike other parity levels women with no sons are not the most likely to move on to having a subsequent birth, although they are still at greater odds of having a subsequent birth compared to women with all sons. For women at this parity level, we find that women with

one son and four daughters have the greatest hazard of having a subsequent birth compared to women with all sons. Aside from this exception, we find the same trend where the number of sons (beyond 0) is inversely associated with the hazard of having a subsequent birth. In general, the results of the analysis indicate the presence of son preference and its impact on individual fertility behavior. Given that this preference is expressed in a context of relatively high fertility where sex-selective abortion is not practiced, we do not expect it to result in highly skewed sex ratios at birth, as is the case in some East Asian countries (Clark 2000; Das Gupta et al 2002; Larsen et al 1998).

In addition to the effect of the sex composition of children on the likelihood of having a subsequent birth, we also find that some socio-demographic characteristics impact fertility behavior. As we would expect, we find that women's age is inversely associated with the likelihood of having a subsequent birth. Similarly, for women with two or more children, we find that higher education is inversely associated with the likelihood of having an additional child. Conversely to what was hypothesized, we find that women who married at later ages were actually more likely to have an additional birth. This may be indicative of a catching-up effect, where women were still attempting to have a certain number of children within a shorter reproductive window. Viewed within a context of desired high fertility (Fargues 2000; Khawaja et al 2009), this finding is less surprising. The findings presented in this paper also affirm previous findings (Khawaja et al 2009) pointing to regional variations in fertility behavior between the West Bank and Gaza Strip. Similarly to other studies pointing to consistently higher total fertility rates in the Gaza Strip, the results of this study show that holding for all else constant, women in the Gaza Strip are more likely to go on to the next parity level compared to women in the West Bank.

In sum, we find that even within the context of high fertility and a relatively normal sex-ratio at birth in the oPt; the sex composition of children has an impact on individual fertility behavior where women with no sons or fewer sons are more likely to have subsequent children.

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