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The Impact of Terrorism on Fertility: Evidence From Women of Childbearing Age in Pakistan

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Abstract: Direct and indirect exposure to terrorist attacks can have a significant impact on major life decisions, including the choice of whether to have a child. This study aims to investigate how terrorist attacks affect fertility. By pooling data from three years of cross-sectional surveys conducted between 2010 and 2015 by the Pakistan Bureau of Statistics, our findings reveal a positive correlation between terrorist attacks and fertility among women of childbearing age in Pakistan. Specifically, the probability of giving birth two years following a terrorist attack in one's home district, all else equal, is 64 percent, compared to the probability of a woman not giving birth two years following a terrorist attack, which is 36 percent. Furthermore, our analysis demonstrates that persistent terrorist attacks, that is, domestic and non-suicide incidents, result in higher probabilities of giving birth during a particular year. Conversely, less common and more prominent terrorist attacks – transnational and suicide incidents – result in lower probabilities of giving birth during a particular year. Additionally, we find that women from above-average-income households, those with higher education levels, older mothers, and those residing in rural areas are more likely to adjust their fertility upwards in response to terrorist attacks.

Keywords: Fertility · Terrorist attacks · Conflict · Childbearing · Pakistan

1 Introduction

Tens of thousands of people die in terrorist attacks globally each year (*Herre et al.* 2023), and many more are exposed to risk from terrorist attacks. Exposure to terrorism influences realized fertility and therefore warrants in-depth research (*Torrisi* 2020). The issue has implications for how countries provide resources for pre-natal care and medical professional education and training if there is persistent terrorist activity in the area. To explore the connection between terrorism and fertility, we use Pakistan as a case study. The persistent exposure to terrorist attacks

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and heterogeneous population of Pakistan make the country an appropriate context to explore the impacts of terrorism on realized fertility. In Pakistan, there were four terrorist attacks in 2000. This increased to 144 attacks in 2010 alone and then decreased to 23 attacks in 2016. Over the period from 2000 to 2016, these attacks resulted in 19,407 deaths and 32,831 injuries (*National Consortium for the Study of Terrorism and Responses to Terrorism (START*) 2015).

Our study is related to two streams of academic literature: population economics and the economics of conflict. This study builds on the work of *Torrisi* (2020) and *Berrebi* and *Ostwald* (2015). We employ a micro-level analysis using data on individual women. The existing literature uses the total fertility rate and crude birth rate to examine this relationship. In their global analysis, *Berrebi* and *Ostwald* (2015) suggest that the negative effect of terrorism on fertility is driven by high-income economies that suffered terrorist attacks during the analyzed 1970-2007 period. In high-income economies, children may be treated as a cost, and like a "normal" good. Furthermore, consumption is reduced when uncertainty increases (*Black et al.* 2013). However, in lower-income economies, parents treat children as financial insurance to secure their livelihoods in old age (*Agadjanian/Prata* 2002). These dynamics suggest a financial security hypothesis, where there is a positive relationship between fertility and uncertainty, such as terrorism.

We explore the terrorism–fertility relationship along various socioeconomic categories: age, education level, spousal occupation, household disposable income, and residential location. We employ a logistic regression approach on individual-level data to understand the relationship between terrorism and fertility.

The rest of the paper is organized as follows. Section 2 reviews relevant literature on terrorism and fertility and covers the context of Pakistan as it relates to terrorism and fertility. Sections 3 and 4 elaborate on the data and methodology used. Sections 5 and 6 describe the results and conclude the paper.

2 Terrorism and Fertility

Terrorism can influence fertility in numerous ways. This issue has been the focus of research covering different contexts over diverse time periods. The literature shows that – depending on circumstances and context – terrorism can lead to both increases and decreases in fertility.

Torrisi (2020) estimates the impact of armed conflict on fertility outcomes in post-independence Azerbaijan using micro-level data from 2006, finding that women who experience violent conflict have a higher probability of having a second child. Similarly, Boko Haram attacks from 2011 to 2017 positively influenced the fertility choices of Nigerian households in order to overcome unexpected future shocks (*Rotondi/Rocca* 2021). Their result gives credence to the security hypothesis that parents use children as financial insurance to secure their livelihoods in old age. Evidence from Colombia in the 2000s also shows a positive link between internal armed conflict and fertility: *Castro Torres* and *Urdinola* (2019) find higher fertility rates in rural municipalities with conflict compared to territories without conflict.

However, they find no significant relationship between fertility and conflict in urban areas.

Across these contexts, the constant threat of terrorism stimulates an increase in fertility as households seek to compensate for the additional risks that terrorism brings. These impacts include increased unemployment (*Malik/Zaman* 2013), lower economic growth (*Gupta et al.* 2004), and lower investment (*Efobi/Asongu* 2016). Persistent terrorism attacks may mean that more children are needed in the household, as household members may be killed in terrorist attacks at any time (*Chamarbagwala/Morán* 2011). A decline in alternative sources of income, as a result of terrorist activities, also increases the likelihood of a greater number of children. Conflicts result in an increase in the average age at marriage, increased education costs, and increased stress, but can also contribute to future poverty alleviation and prosperous economic conditions (*Caldwell* 2007; *Eloundou-Enyegue et al.* 2000; *Khawaja et al.* 2009; *Kraehnert et al.* 2019; *Lindstrom/Berhanu* 1999; *Rodgers et al.* 2005).

In Palestine, another conflict-ridden region, *Khawaja* and *Randall* (2006) find exceptionally high levels of fertility. This was particularly the case for women with nine or fewer years of education. Women under 25 years of age also show higher fertility rates, which can be attributed to the Intifada having stimulated marriage rates and thus overall fertility. *Toft* (2021) attributes higher fertility rates among both Muslims and ultra-Orthodox Jews in Palestine and Israel to the desire to increase the future populations of ethnic and religious groups in order to increase political influence.

However, there is also evidence of a negative relationship between armed conflict and population growth, especially in larger municipalities and ideologically polarized provinces (*Sanso-Navarro et al.* 2019). Terrorism can also negatively impact fertility intentions through poor nutrition and the lack of (or poor) prenatal care and miscarriages (*Silverman et al.* 2007). Psychological stress and stress related to changes in occupation also influence menstrual cycles, affecting fertility (*Bents* 1985; *Fenster et al.* 1999). *Berrebi* and *Ostwald* (2015) employ panel data from 170 countries examining the influence of terrorism on fertility. They show that terrorism decreases fertility while addressing endogeneity concerns by using the instrumental variable of domestic terrorist attacks in neighboring countries.

Households might revise their fertility decisions either through the deferral of marriage or by ceasing to bear children as a result of economic crisis. Economic crises lead to reduced household income, an increased cost of child education, and make the expected future income of children more uncertain due to unemployment (*Eloundou-Enyegue et al.* 2000). However, a counterargument also exists, in that earlier and more frequent childbearing can alleviate poverty (*Cain* 1983; *Nugent* 1985).

This review of the literature demonstrates that there is conflicting evidence for the direction in which terrorism and armed conflict impacts household fertility decisions. This relationship is influenced by the extent, locality, and intensity of the conflict. Furthermore, the issue needs to be tested empirically in many different

contexts to establish generalizability, examine causal mechanisms, and probe potential scope conditions.

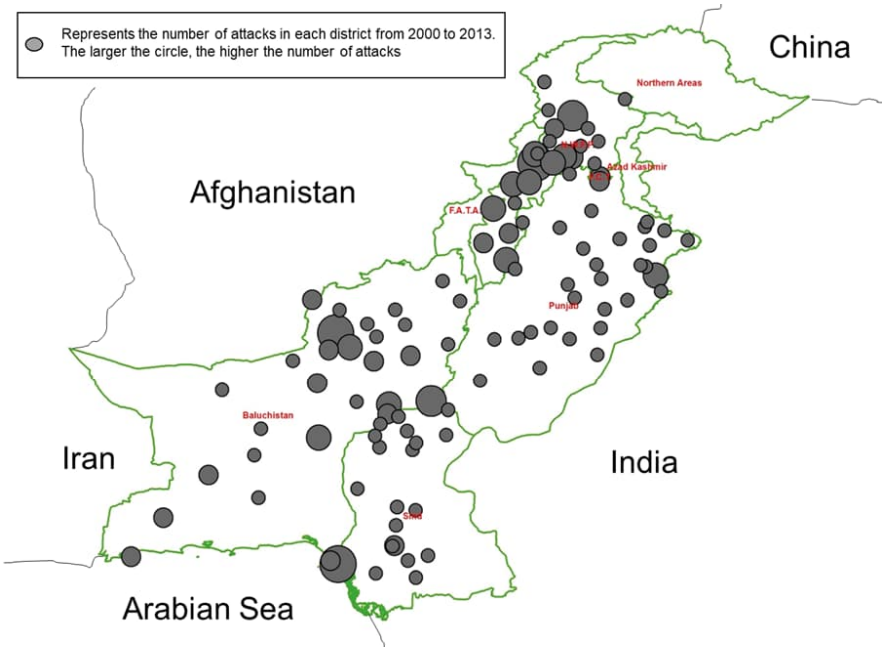
2.1 Terrorism and Pakistan

Pakistan is divided into four provinces: Khyber Pakhtunkhwa (KPK), Sindh, Punjab, and Balochistan, along with a capital territory and two autonomous regions (Azad Kashmir and Gilgit Baltistan). Pakistan has suffered substantial economic and social losses while being a major US ally in the war against terrorism (*Ali* 2010) and shares a long border with Afghanistan. Pakistan's western provinces of KPK and Balochistan, adjacent to Afghanistan, sustained approximately 65 percent of the total terrorist attacks in Pakistan during the period of 2000-15. Pakistan has lost an estimated $35-40 billion since 2000-01 due to the conflicts in the region (*Ali* 2010). During the US war in Afghanistan, many militants took refuge in the tribal areas located on the Pakistan-Afghanistan border (*Gunaratna/Nielsen* 2008). After the collapse of the Soviet Union in 1988–91, the Taliban emerged as a main political force in Afghanistan with very strong connections in the districts situated along the border (*Akhtar* 2008). Pakistan shares its entire eastern border with India across the two provinces of Punjab and Sindh. The Punjab province has witnessed fewer than half the number of terrorist attacks the Sindh province has, but the intensity of the attacks in Punjab was much higher and destructive in nature (on average, five deaths per attack compared to two deaths per attack in Sindh). Terrorists generally choose their targets according to factors such as maximum intimidation and media coverage (*Alexander/Finger* 1979), and the western provinces offer greater opportunities along these dimensions than the eastern provinces do. Figure 1 illustrates terrorists attacks in Pakistan from 2000 to 2013.

3 Data

To explore the relationship between fertility and terrorism, we employ two data sources. First, we extract household-level data from the Pakistan Social and Living Standards Measurements (PSLM) for the period of 2010-11 to 2014-15, collected by the *Pakistan Bureau of Statistics* (2016) every other year. Second, data related to terrorist attacks from 2008-13 is obtained from the Global Terrorism Database (GTD), managed by the *National Consortium for the Study of Terrorism and Responses to Terrorism* (*START*) (2015). We obtain the outcome variable and demographics from three separate cross-sectional data waves of the PSLM (2010-11, 2012-13, and 2014-15), harmonize the coding across these three waves, and then pool them. The survey covers all four provinces of Pakistan (Punjab, Sindh, KPK, and Balochistan), except the Federally Administered Tribal Areas (FATA), which are omitted due to data availability (due to security concerns). There is a total number of 114 districts in the four provinces of Pakistan. The province of Balochistan has 26 districts. The other three provinces contain 85 districts. The PSLM applies a two-stage stratified sampling procedure to the population. Each city or town is classified into blocks, and

Fig. 1: Terrorist Attacks in Pakistan (2000-13)



Source: Global Terrorism Database (GTD)

each block is considered a Primary Sampling Unit (PSU). Each PSU comprises 200-250 households, out of which 16 and 12 are drawn from each block using systematic random sampling from rural and urban blocks, respectively (*Government of Pakistan* 2014). A total of 79,600 households are surveyed, which are contained within 5,563 enumeration blocks.

Table 1 (Panel A) presents the summary statistics. Our outcome variable is fertility, a binary variable. We assign a value of "1" if the woman gave birth during any year from 2010 to 2015, and "0" otherwise. We first identify all children born from 2010 to 2015 and then match the infants with their respective mothers by using the unique identification code for that household. We consider women aged 16 to 45 years, as marrying at a relatively young age is common in Pakistan. These women of child-bearing age could potentially have their fertility affected by terrorism. Only married women are included in our analyses, as cohabitation without a marriage certificate is practically impossible in the social setup of Pakistan. The final sample consists of 11,055 female respondents. While we control for parents' education in our analyses, it is important to note that there are missing values regarding the education of the mother. The dataset shows that 86 percent of women in this age bracket gave birth from 2010 to 2015. Urban women comprise 52 percent of all observations. The average age of women in this study is approximately 30 years.

We also extract the number of older siblings of the infants born from 2010 to 2015 in each family. On average, there are approximately two older siblings in a

household, with the number ranging from 0 to 10. We further control for the number of persons in a family eligible to be in the labor force, which includes respondents aged 15 to 60 years old. On average, a family contains two to three household members that are in the labor force. Given the societal preference for sons over daughters in Pakistan (*Zaidi* 2022), we also control for the number of sons. The number of sons in the sample households ranges from 0 to 8, with an average of one son per household.

The data under analysis, based on the population concentration across provinces, are representative, with 69 percent from Punjab, 21 percent from Sindh, 8 percent from Khyber Pakhtunkhwa (KPK), and 2 percent from Balochistan. The education system in Pakistan consists of various levels starting from kindergarten, primary education (equivalent to five years), elementary or middle school education (equivalent to eight years), secondary school (equivalent to ten years), higher secondary (equivalent to twelve years), a four-year undergraduate degree that includes professional certifications (equivalent to 16 years), and postgraduate studies. We classify formal education into three levels: illiterate and lower-level, medium-level, and higher-level education. Among the female respondents, the distribution of educational levels is 38 percent illiterate and lower-level, 39 percent medium-level, and 23 percent higher-level. The corresponding educational levels of their male spouses are 23 percent illiterate and lower-level, 47 percent medium-level, and 30 percent higher-level. We also control for women's birth cohorts and construct four-decade cohorts, from 1961 to 2000, recognizing that women from different decades may have different attitudes toward fertility due to growing up in distinct eras. We also account for the social status of households based on 24 home appliances used in daily life, categorized as low level (0 to 7 assets), medium level (8 to 15 assets), and high level (16 to 24 assets).

Terrorism involves the use of violence by sub-national groups or concealed individuals against civilians to achieve unlawful objectives and influence a broader audience. Our key exogenous variable is the logarithm of the second lag year's terrorist attacks. In Table 1 (Panel B), our terrorism-related variables are summarized. The data related to terrorist attacks are obtained from the GTD, a dataset widely used in studies involving terrorism (*Tin et al.* 2021). We use the dataset because it classifies attacks into various types. We consider two main characteristics of terrorist attacks: domestic and transnational, and suicide and non-suicide. Suicide attacks are particularly important in the existing literature (*Choi* 2014) due to their high fatality rates and great psychological impact (*Pape* 2003). We use the method developed by *Enders et al.* (2011) to estimate transnational attacks that result in elevated global insecurity (*Piazza* 2008). A transnational terrorist attack occurs when the victim and perpetrator are from different countries of origin (*Sandler* 2011). Table 1 (Panel B) indicates that domestic and non-suicide terrorist attacks are more common, while suicide attacks and transnational attacks are less common. We therefore separately examine the impact of these attack types on fertility outcomes. On average, a district in Pakistan experienced approximately four terrorist attacks two years prior to the year in which births were reported, with the number of attacks

ranging from 0 to 155. We consider terrorist attacks that resulted in at least one fatality and/or injury (*Enders et al.* 2011).

Tab. 1: Descriptive Statistics

Variables	Obs.	Mean	SD	Min	Max
Panel A: Outcome Variable					
Fertility (any child born from 2010-15)	11,055	0.86		0	1
Controls					
Urban	11,055	0.52			
Age (years)	11,055	30.45	5.40	16	45
Older siblings (N)	11,055	2.34	1.72	0	10
Labor force members in the household (N)	11,055	2.54	1.18	1	12
Sons in the household (N)	11,055	1.19	1.16	0	8
Province					
Punjab	11,055	0.69			
Sindh	11,055	0.21			
KPK	11,055	0.08			
Balochistan	11,055	0.02			
Educational level of female					
Illiterate and lower level education	11,055	0.38			
Medium level education	11,055	0.39			
Higher level education	11,055	0.23			
Educational level of spouse					
Illiterate and lower level education	11,055	0.23			
Medium level education	11,055	0.47			
Higher level education	11,055	0.30			
Decade birth cohort for women					
>=1961 & <=1970	11,055	0.01			
>=1971 & <=1980	11,055	0.32			
>=1981 & <=1990	11,055	0.59			
>=1991 & <=2000	11,055	0.08			
Household social status					
Low level	11,055	0.19			
Medium level	11,055	0.75			
High level	11,055	0.06			
Panel B: Independent variables; terrorist attacks in each respondent's district of residence					
Terrorist attacks two years prior to the fertility outcome	11,055	3.55	9.40	0	155
Domestic terrorist attacks two years prior to the fertility outcome	11,055	3.36	9.02	0	153
Transnational terrorist attacks two years prior to the fertility outcome	11,055	0.19	0.53	0	12
Non-suicide terrorist attacks two years prior to the fertility outcome	11,055	2.88	8.72	0	151
Suicide terrorist attacks two years prior to the fertility outcome	11,055	0.67	1.67	0	12

Source: Own calculation based on the Pakistan Social and Living Standards Measurements (PSLM) for the period of 2010-11 to 2014-15

4 Methodology

To explore whether terrorism impacts fertility, we ran binary logistic regressions, given the binary nature of the variable of interest: "1" if childbirth occurred in any year from 2010 to 2015, and "0" if otherwise. The baseline model is expressed as follows:

$$Y_{dit} = \beta_0 + \beta_1 LogTerrorism_{d,t-2} + \beta_2 X_{dit} + \phi_t + \mu_d + \beta_3 H_{dit} + \varepsilon_{dit} \quad (1)$$

In Equation (1), Y_{dit} is the dependent variable for an individual woman i living in a particular district d and surveyed in a particular year t. $LogTerrorism_{d,t-2}$ is the logarithm of the number of terrorist attacks two years ago. It represents the main explanatory variable of interest. Its coefficient can be interpreted as the effect of (the logarithm of) terrorist attacks on whether a woman gave birth two years later. The use of logarithms instead of absolute values is appropriate when dealing with skewed data, as is the case with terrorism data. The gestation period for a baby is approximately nine months. An infant born today is the result of a decision made around 12 months ago. Such decisions can be influenced by terrorist attacks in the preceding year. Due to data limitations, it is challenging to differentiate between intended and unintended pregnancies, as well as the use of contraception. The rationale behind using terrorist attacks from two years prior is based on their potential impact on fertility outcomes in the current year.

X_{dit} includes a set of demographic control variables, such as the woman's education level, residential location, birth decade cohort, and age in years. The covariate ϕ_t accounts for year-specific effects from 2010 to 2015. These yearly fixed effects capture temporal variations consistent across districts. Additionally, district fixed effects μ_d are included to control for time-invariant differences across districts that might confound the relationship between fertility and terrorism. Household variables H_{dit} are also controlled for, including the number of labor force members in the household, the number of older siblings of the infant, the spouse's education level, the household's social status, and the number of sons in the household. In Equation (1), β_1 represents the main coefficient of interest.

5 Results

5.1 Baseline evidence

In Table 2, we present our baseline evidence from the logistic regressions, illustrating the association between terrorist attacks and fertility outcomes two years after those terrorist attacks. The estimates in Columns 1 to 5 encompass comprehensive model specifications that include district fixed effects, year dummies, demographic variables, and household controls. These columns exhibit significant odds ratios greater than 1, except for transnational and suicide attacks in Columns 3 and 5, respectively. Based on the coefficient in Column 1, a one-unit increase in log terrorist

Tab. 2: Baseline Logit Estimations (Coefficients represent the odds ratio)

Variables	1	2	3	4	5
Terrorist attacks occurring two years prior to the fertility outcome	1.79** (0.530)				
Domestic terrorist attacks occurring two years prior to the fertility outcome		1.84** (0.546)			
Transnational terrorist attacks occurring two years prior to the fertility outcome			0.24** (0.172)		
Non-suicide terrorist attacks occurring two years prior to the fertility outcome				2.61*** (0.967)	
Suicide terrorist attacks occurring two years prior to the fertility outcome					0.44** (0.141)
Observations	11,055	11,055	11,055	11,055	11,055
District Fixed Effects	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y
Household Controls	Y	Y	Y	Y	Y

Robust standard errors in parentheses, clustered at the district level
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculation

attacks two years prior to the fertility outcome corresponds to an odds ratio of 1.79, signifying that the odds of giving birth in a particular year are approximately 1.79 times higher per log terrorist attack. In Table 3, we display the probabilities of giving birth, given terrorist attacks. The probability of a woman giving birth two years following a terrorist attack, all else equal, is 64 percent compared to the probability of a woman not giving birth two years following a terrorist attack, which is 36 percent.

We further differentiate the overall terrorist attacks into two classifications: domestic and transnational terrorist attacks, and non-suicide and suicide terrorist attacks. Domestic and non-suicide terrorist attacks are more common, whereas transnational and suicide attacks are rarer. Our observations from Table 3 indicate that the probability of giving birth two years following domestic terrorist attacks is 65 percent, while the probability of giving birth two years following non-suicide terrorist attacks is 72 percent.

Conversely, in the presence of less frequent terrorist attacks, the probability of giving birth in a particular year is 19 percent (transnational) and 31 percent (suicide), respectively. Transnational terrorist attacks (Column 3) and suicide terrorist attacks (Column 5) occur less frequently and therefore may have a lower impact on fertility outcomes. In contrast, domestic and non-suicide terrorist attacks occur on a regular basis. This suggests that fertility outcomes are influenced more by consistent exposure to terrorist attacks than by sporadic occurrences.

Tab. 3: Baseline Logit Estimations (Coefficients represent probabilities)

Variables	1	2	3	4	5
Terrorist attacks occurring two years prior to the fertility outcome	0.64** (0.530)				
Domestic terrorist attacks occurring two years prior to the fertility outcome		0.65** (0.546)			
Transnational terrorist attacks occurring two years prior to the fertility outcome			0.19** (0.172)		
Non-suicide terrorist attacks occurring two years prior to the fertility outcome				0.72*** (0.967)	
Suicide terrorist attacks occurring two years prior to the fertility outcome					0.31** (0.141)
Observations	11,055	11,055	11,055	11,055	11,055
District Fixed Effects	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y
Household Controls	Y	Y	Y	Y	Y

Robust standard errors in parentheses, clustered at the district level
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculation

5.2 The terrorism-fertility nexus by age, education, spousal education, income and residence

In Table 4, we present further results for two sociodemographic segments: age groups and education levels. In the first two columns, age groups are divided into two segments: 16 to 30 years and 31 to 45 years. Older women exhibit a higher probability of giving birth, as evidenced by the significant coefficient in Column 2, in contrast to younger women, whose coefficient in Column 1 is not statistically significant. In Columns 3-5, we categorize education levels into three groups: illiterate and lower, medium, and higher. Women with medium and higher education levels are more likely to give birth during any year within the specified time period compared to women with lower or no formal education. Specifically, the probability of women aged 31 to 45 and with medium and higher education levels giving birth, in the presence of terrorist attacks occurring two years prior, is 68 percent, 70 percent and 67 percent, respectively. The coefficients for the younger age group (16 to 30 years) and for the illiterate and lower education levels are not statistically significant. Notably, older women's fertility appears to be more sensitive to terrorist attacks. This aligns with the intuitive understanding that older women may be more likely to have more children to provide support during their old age.

In Table 5, we segment the sample into three categories based on spousal occupation: employer, employee, and those who work in agriculture. As shown in Columns 1 and 2, households where the spouse is either an employer or an

Tab. 4: Results by Age Group and Education Levels (Coefficients represent probabilities)

Variables	1	2	3	4	5
	Age Groups (years)		Education Levels		
	16 to 30	31 to 45	Illiterate and lower	Medium	Higher
Terrorist attacks occurring two years prior to the fertility outcome	0.60	0.68**	0.58	0.70***	0.67***
	(0.326)	(0.308)	(0.435)	(0.314)	(0.250)
Observations	5,580	5,190	4,566	4,022	2,206
District Fixed Effects	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y

Robust standard errors in parentheses, clustered at the district level
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculation

Tab. 5: Results by Spouse Occupation (Coefficients represent probabilities)

Variables	(1) Employer	(2) Employee	(3) Agriculture
Terrorist attacks occurring two years prior to the fertility outcome	0.76***	0.63**	0.37
	(0.415)	(0.248)	(0.509)
Observations	3,451	5,561	1,369
District Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Demographic Controls	Y	Y	Y

Robust standard errors in parentheses, clustered at the district level
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculation

employee display significant positive coefficients. Consequently, the probability of giving birth in a particular year for households with employers and employees, in the presence of previous terrorist attacks occurring two years prior, is 76 percent and 63 percent respectively. Conversely, for households where the spouse is engaged in agricultural work, terrorism does not seem to exert an impact on fertility, as indicated by the non-significant coefficient.

In Table 6, the sample is divided into two sub-samples: by below- and above-average personal disposable income of the household, and by the location of residence as either urban or rural. The findings indicate that a female residing in a rural area and in a household with above-average income is more likely to give birth in the presence of terrorist attacks. These results are in contrast to *Zhang* (2017), who found that households where the spouse works in a lower-level occupation,

Tab. 6: Results by Personal Disposable Income and Residence Location (Coefficients represent probabilities)

Variables	(1)	(2)	(3)	(4)
	Personal Disposable Income		Residence Location	
	Below Average	Above Average	Urban	Rural
Terrorist attacks occurring two years prior to the fertility outcome	0.62*	0.68**	0.60	0.68**
	(0.294)	(0.376)	(0.281)	(0.335)
Observations	7,006	3,852	6,629	4,205
District Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y

Robust standard errors in parentheses, clustered at the district level
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculation

such as the agricultural sector, and earns a below-average wage are more likely to marry a less educated woman and demand more children, implying that children are considered "inferior" goods (*Zhang* 2017); an inverse relation between family size and income.

6 Conclusions and Policy Recommendations

In this study, we empirically explore the relationship between different types of terrorist attacks and fertility outcomes at the individual level using logistic regression. This micro-level analysis is a less common approach in the literature on the subject. Our estimation delves into the impact of terrorist attacks on the fertility of women in Pakistan. We combine data from three cross-sectional surveys conducted between 2010 and 2015 across 114 districts in four provinces of Pakistan, as provided by the Pakistan Bureau of Statistics. The main finding of our study is that terrorism is associated with an increase in the likelihood of childbirth. Women in Pakistan exposed to a terrorist incident in a given year are 1.79 times more likely to have a child within two years compared to women who haven't been exposed to such incidents. Additionally, our research reveals an intriguing nuance: households tend to choose to have a child when exposed to domestic and non-suicide terrorist incidents, which occur more frequently, while they are less likely to do so when exposed to transnational and suicide terrorist incidents, which are less frequent but larger in magnitude. As per Stress Theory, chronic exposure to stressors are more likely to have long-term effects on physical and mental health, which disturb the normal course of life much more than infrequent events, such as transnational or suicide terrorist incidents This nuanced finding is novel and hasn't been previously observed in the literature.

Furthermore, we segment our analysis by various socioeconomic variables to gain a deeper understanding of how terrorism impacts fertility. Our results shed light on the fertility patterns of women in different population segments. Women with higher education levels, those with higher personal disposable income, older women, and women living in rural regions are more likely to give birth in the face of terrorist attacks. We posit that this trend could be attributed to children being perceived as a form of insurance for these women's futures. More children can contribute to household income, and in the case of untimely family deaths due to a poorer standard of living or terrorist attacks, they can provide support for their mothers in old age (*Cain* 1983; *Nugent* 1985). Our results align with *Drèze* and *Murthi* (2001), who emphasize the significant role of parents' education levels in shaping fertility outcomes.

This study contributes to the existing knowledge in this domain by shedding light on a developing country such as Pakistan. Similar to other populous Asian countries with inadequate basic facilities, our research offers insights for policymakers on where to allocate resources. A primary recommendation is to enhance the country's security by curbing terrorism, allowing households to make family size decisions without the fear of conflict-induced child loss. Policymakers should also concentrate public sector funds on higher-income households and older mothers, who are more likely to have higher birth rates due to the impact of terrorism. Public health efforts could focus on providing prenatal healthcare and family planning education to women to enable informed decisions (*Lichtman-Sadot et al*. 2022). Investing in healthcare services, particularly maternity care, and training healthcare professionals such as obstetricians and midwives can enhance the quality of care. Demographers in the public sector should be mindful that conflict and terrorism can lead to population growth as women opt for more children as a form of insurance.

There are limitations to our study which provide opportunities for further research. We focused on estimating the impact of terrorist attacks on fertility at the individual level. However, our study also has certain data limitations. For instance, we encountered missing data, particularly regarding the education level of the mother. Additionally, our study could not distinguish between intended and unintended pregnancies, and does not capture information about contraceptive usage. These limitations point to potential areas for future research and refinement in understanding the relationship between terrorism and fertility outcomes. Furthermore, some women in the sample may have directly experienced terrorist attacks and decided to have another child due to this experience. The replacement effect of lost children – previously extensively studied in demography – is not the focus of our research.

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