# What Drives Fertility Recovery after Armed Conflict? A Case Study from The Guatemalan Genocide

*Diego Alburez-Gutierrez*

*Max Planck Institute for Demographic Research*

*gatemonte@gmail.com*

## Abstract

Increases in fertility after armed conflicts are common but it is difficult to determine why or how they happen. This paper focuses on the factors underlying the fertility recovery after an iconic series of massacres in Guatemala. It uses a unique genealogical dataset to reconstruct birth histories of survivors. It shows evidence of a collective fertility response to excess mortality, with pronatalist ideals enforced by relatives. The massacres had 'scarring' effects for women – those more exposed to the violence had lower fertility and suffered from social stigma, making it difficult to find a partner and bear children. Male survivors married younger women and women from other communities (who had the highest fertility of all). The killings disrupted the access to modern contraception, but the forced resettlement of the population in a military-run camp increased access to healthcare, education, and employment. There was no evidence of childbirth postponement effects on fertility.

## Introduction

Temporary increases in fertility have been reported repeatedly after conflict-induced fertility drops, but the phenomenon has received little attention in the demographic literature. The best known example is the 'baby boom' that took place in many industrialised countries after World War II (Reher and Requena, 2014; Reher, 2015). However, these fertility recoveries have also been reported after armed conflicts in low- and middle-income countries (Khlat et al., 1997; Agadjanian and Prata, 2002) and after other types of mortality crises (Watkins and Menken, 1985; Nobles et al., 2015).

The exact mechanisms that underlie this behaviour are not fully understood, but exposure to extraordinary mortality is thought to play a central role (Randall, 2005; Heuveline and Poch, 2007). Survivors react to perceptions of mortality – high excess mortality can usher in a pronatalist ideology if survivors believe that their community is under threat. High fertility in the aftermath of a conflict can also result from parents trying to 'replace' their dead children (Nobles et al., 2015). Exposure to the conflict can reduce the fertility of some in the presence of trauma (Elezaj et al., 2015) and social stigma (Ward and Marsh, 2006). Fertility is also influenced by structural factors. Armed conflicts usually reduce the supply of modern contraception, leading to higher childbirth rates (Giacaman et al., 2009). It is common for spouses to be temporarily separated because of the conflict. Their reunification after the crisis can lead to short-term fertility increases (Heuveline and Poch, 2007). In practice, it is difficult to study these processes since fertility data on conflict-affected populations are usually missing or are not entirely reliable (Hill, 2004).

This paper considers the influence of war-time mass killings on fertility behaviour in local populations. Massacres affect local communities in specific ways by subjecting victims to extreme forms of violence. It is therefore important to consider their response to these events in isolation. The study focuses on the fertility behaviour of the survivors of the Río Negro Massacres. Fertility in the population dropped before the 1982 killings and was followed by a quick recovery in the aftermath of the events. This case is studied in depth to address the following research questions: *How did the 1982 Río Negro Massacres affect the fertility behaviour of the massacre survivors? Which factors explained the post-1982 fertility recovery in the population?* The latter question was considered in the light of the main explanations for fertility recoveries given in the literature.

The study contributes to the literature on why populations exhibit high fertility after mass mortality. Mortality crises are a unique setting for studying the interaction between mortality and fertility in local populations. Focusing on the experience of a single massacre-afflicted population allowed a rich discussion about the processes that drove the fertility recovery amongst survivors of the Río Negro Massacres. This is the first study to consider the fertility behaviour of men and women in the same population after an episode of war-time mass killings.

The next section discusses the general patterns of fertility documented after armed conflicts in general since no research to date has looked at fertility in the aftermath of mass killings in particular.

*Fertility recoveries after armed conflicts*

Fertility usually declines before and during armed conflicts and other periods of distress, but these declines in fertility are generally short-lived (Reher and Requena, 2014). They result from a combination of lower fecundity[1] (affected by stress and malnutrition), changes in marital behaviour, and spousal separation (Hill, 2004; Neupert and Prum, 2005; de Walque, 2006; Abu-Musa et al., 2008). Uncertainty about the future can also cause couples to delay childbearing during armed conflicts, contributing to lower fertility in the population.

Conflict-triggered drops in fertility do not usually result in long-term fertility declines (i.e. there is no evidence that they accelerate the onset of the fertility transition). Studies from the genocide in Rwanda found neither a significant long-term fertility decline nor a fertility increase following the conflict at the national level (Schindler and Bruck, 2011; Westoff, 2013). The same may not be true for protracted conflicts, which can bring about a sustained reduction of fertility, as happened in Ethiopia (Lindstrom and Berhanu, 1999), but this pattern has not been widely reported. The study of how mortality shocks interact with ongoing fertility trends is important because most contemporary armed conflicts have occurred in countries where fertility transitions from high to low levels of fertility are underway (Blanc, 2004; Abu-Musa et al., 2007; Woldemicael, 2008, 2010).

[1] Fecundity and fertility should not be confused – the former refers to the potential for reproduction whereas the latter is the actual number of offspring born.

Declines in fertility rates are usually followed by temporary fertility rebounds after the conflict. The 'baby boom' that followed World War II in several industrialised countries has been widely studied (Van Bavel and Reher, 2013), but the phenomenon has been observed after conflicts in Cambodia (Heuveline and Poch, 2007) and Angola (Agadjanian and Prata, 2002), to name only a few. Such fertility recoveries have been reported following tsunamis (Nobles et al., 2015), hurricanes (Cohan and Cole, 2002; Pörtner, 2006), and terrorist attacks (Rodgers et al., 2005). Much of the literature has focused on aggregate (i.e. national-level) conflict mortality, obscuring the particular dynamics of mass killings.

**Table 1. Outcomes of mass killings on local populations and potential effects of these outcomes on fertility behaviour**

| Outcome of mass killings | Factors affecting fertility | Effect on fertility |
|---|---|---|
| High excess mortality in population | Rise of pronatalist ideology | + + |
| Violent death of own child | Replacement effects | + |
| Vulnerability of survivors and reinforcement of traditional roles | Increase of transactional marriages | + |
| Exposure to violence | Scarring effects | - - |
| Forced displacement to urban area | Changing access to contraception, education, and employment | - - |
| Spousal segregation and increased uncertainty | Childbirth postponement/catch-up | + |

Source: Author, based on literature review. Key: + short-term increase; ++ long-term increase; - short-term decrease; - - long-term decrease

The rest of this section discusses potential factors through which mass killings affect fertility. The factors discussed in the literature review are summarised in Table 1.

*Pronatalism and replacement fertility*

This paper defined pronatalism as an ideology that promotes childbirth to achieve high fertility. Pronatalism has often been understood as a set of national policies through which

governments promote high fertility (Demeny, 1986; Van Bavel and Reher, 2013) but pronatalist sentiments can also emerge organically in local populations (Khawaja, 2000; Rahim et al., 2009).[2] Mortality crises may spark pronatalist agendas if there is a perception that the group itself is in danger. The baby boom that followed the 2004 Indian Ocean Tsunami, for example, was driven by a community-level pronatalism, where increases in marriage rates and fertility rates were part of a bottom-up project to rebuild the community after the natural disaster (Nobles et al., 2015).

Pronatalist ideologies are only successful if they manage to bring about higher fertility. Governments can offers incentives to promote childbirth by instituting national-level policies such as parental leave (Duvander et al., 2010). Community-led pronatalist ideologies, on the other hand, operate mainly through social influence in the absence of similar top-down incentives (Kennedy, 1973). Social influence refers to the extent to which members of a community affect the behaviour of others. This research was particularly interested in the coercive dimension of this influence – social pressure (Lois and Arránz Becker, 2014). 'Family pronatalism' was defined as the process by which individuals exercise social pressure on their relatives to promote high fertility within the family. Such an ideology is more effective in traditional societies that rely more heavily on family-oriented (as opposed to friendship-oriented) social networks (Keim et al., 2013; Lois, 2016).

Women are likely to experience much of this pressure, since they carry the symbolic burden of reproduction (Blake, 1972; Hollingworth, 2000). This is important because mortality crises are known to reinforce gender roles and traditional societal norms. This can increase the power differential between genders favouring men, who yield considerably more power in many traditional societies. The war in Guatemala led to both an increase in violence against women (Warner, 2007) and a rebirth of an indigenous pronatalist culture (Kupprat, 2010; Grace and Sweeney, 2016). The relationship between these processes and fertility has not been explored so far.

Fertility replacement effects have also been reported after mortality crises. The replacement effect theory states that individuals react to perceptions of mortality within their own families. Traditional approaches predict that in the context of high infant

[2] 'Organically' is understood as developed locally and in the absence of a centralised pro-birth policy.

mortality parents have more children than they actually want with the expectation that some will die during the mortality crisis (Cain, 1983; Clay and Vander Haar, 1993). Parents may also increase their fertility as a response to the mortality of their own children, resulting in temporary baby booms. This phenomenon has been reported for Bangladesh (Hossain et al., 2007) and after the Indian Ocean Tsunami mentioned above (Nobles et al., 2015). Replacement effects differ from pronatalism in that they are not part of a larger ideology that promotes sustained high fertility in a population. They are individual-level 'adjustments' following the death of relatives.

*Transactional marriages and scarring effects*

Marital fertility is an important contributor to the post-conflict fertility recovery (Khawaja, 2000; Van Bavel and Reher, 2013).[3] Armed conflicts can lead to an increase in transactional marriages, where economic gain is an important (but not the only) consideration. This happens because many survivors of atrocities are left in a vulnerable position that force them to exchange companionship and sex for protection (Staveteig, 2011, p. 101). In particular, research has reported an increase of transactional sex between younger women and older men in the context of armed conflict (Neal et al., 2016). Coincidently, studies of female fertility have shown that young women who enter reproductive age towards the end of a conflict tend to have particularly high fertility in its aftermath (Heuveline and Poch, 2007; Cetorelli, 2014; Nobles et al., 2015). The role of transactional marriages in these processes has not been studied.

Armed conflicts have psychological, social, and physiological 'scarring effects' on survivors. This is particularly true for those affected by mass killings, who are subjected to extreme levels of violence, including torture, and witness the violent death of relatives and friends. War-time sexual violence, which mainly affects women, deserves special attention (Schott, 2011). Rape survivors experience gynaecological complications throughout their lives (Kinyanda et al., 2010) and survivors of sexual violence face social stigma in their own communities that makes it difficult for them to find a spouse or bear children (Ward and Marsh, 2006).

The effects of trauma on fertility have not been studied extensively. The existing research has shown that post-traumatic stress disorder (PTSD) can have negative effects on the

[3] In this paper, 'marriage' encompasses formal partnerships and cohabitation.

fertility of men (usually war veterans) (Elezaj et al., 2015). Little is known about the effects of psychological trauma on female fertility, even though studies have suggested that post-conflict PTSD is more prevalent amongst women (Roberts et al., 2008; Ayazi et al., 2014). No study has looked at the effects of trauma (whether physical or psychological) on fertility after episodes of mass killings. This is partly explained by the fact that individual-level measures of exposure to violence and fertility are usually not available for members of the same population.

*Urbanisation and changing access to contraception*

Armed conflicts undermine a country's health infrastructure, reducing the availability of modern family planning methods (Santiso-Galvez and Bertrand, 2004; Giacaman et al., 2009). This matters because reduced access to these resources can lead to higher fertility. This happened in Guatemala, where the demographic transition was stalled during the civil war given the reduced contraceptive offer, particularly amongst the Mayan population (Grace and Sweeney, 2016).

War-time violence commonly results in rapid urbanisation as populations are forcibly displaced from rural to urban areas (UNHCR, 2018). Accelerated urbanisation can act as a modernising force in itself. Physical proximity to urban areas can expand access to the market economy, wage labour, and public schooling (Khawaja and Randall, 2006). These processes expose survivors to novel expectations of ideal family size and improve access to modern contraception, especially when they affect sub-national and pre-transitional minorities (Devkota and van Teijlingen, 2010). The supply of modern family planning methods (Bongaarts, 1978), employment (Blau and Robins, 1989), and education (Caldwell, 1980) have long been identified as key contributors to the sustained decline of fertility that characterises the fertility transition.

*Childbirth postponement*

Armed conflicts are stressful experiences that produce the temporary separation of spouses. Classical demographic studies have shown that compulsory military service and high male excess mortality can result in a lower supply of marriageable men during and after the conflict (Henry, 1966). The resulting delays in childbearing means that there will be more women who can get pregnant at the end of the crisis, leading to a short-term baby boom (Neupert and Prum, 2005; de Walque, 2006; Heuveline and Poch, 2007). The

magnitude of this baby boom can be expected to vary across contexts (Van Bavel and Reher, 2013; Reher and Requena, 2014). Nonetheless, the phenomenon is short-lived since it results from temporary disturbances in the age-sex structure of a population and the share of women in a position to become pregnant.

**Context**

Guatemala is a Central American country with an estimated population of 17 million. Around 40% of the population is of Mayan heritage (CODISRA, 2010). The Guatemalan civil war, fought between Marxist guerrillas and the Guatemalan Army in the 1960-1996 period, was the most lethal of all the contemporaneous armed conflicts in Latin America. The death toll was highest amongst non-combatants; the vast majority of the estimated 132,000 people killed were Mayan (Ball, 2000). In 1996, a United Nations report concluded that acts of genocide had been committed against the indigenous populations, citing the case of Río Negro as an example of these events (CEH, 1999, pp. 360–377). This study is concerned with the most violent years of the conflict, between 1980 and 1982, when entire villages in the indigenous countryside were destroyed as part of a scorched earth policy.

The Río Negro Massacres were on of the most emblematic case of this war. In 1979, Río Negro was a village of one thousand inhabitants – all indigenous, Maya Achi speakers – in the central highlands of Guatemala. The town relied on subsistence agriculture and yearly seasonal employment migration to the large plantations on the Pacific Coast (Gaitán, 1981). Prior to 1979, it had largely been unaffected by the war. This changed when the community refused to be resettled as construction work began for the state-owned Chixoy Hydroelectric Dam. In 1982, more than a third of the population was killed within a couple of months by paramilitary groups under the aegis of the Guatemalan Army (Johnston, 2005).

The survivors were forcibly displaced to the surrounding mountains for several years but most had been resettled in a military-run camp known as Pacux by 1985. Power, water, and food provisioning in Pacux were regulated by the army until 1996, when war in the country officially came to an end. Most of the population still live in Pacux but around 14% have moved to Guatemala City. The inhabitants of the resettlement Pacux continue to face poverty, overcrowding and poor sanitation. In 2016, young people still found it

difficult to join the labour market given the social stigma derived from the village's history.

## Research design

*Data sources and population of interest*

This study combined quantitative and qualitative data sources on fertility after the massacres in Río Negro. Quantitative data were collected using the Extended Genealogy Method (EGM).[4] Individual genealogies were collected and consolidated in a single dataset that contained data on all members of the population born before 1982. Birth histories were reconstructed from the individual genealogies of the massacre survivors. Qualitative data came from Focus Group Discussions (FGDs). Participants were selected purposefully to represent different combinations of sex, birth cohort, and exposure to conflict. The group discussions produced data on the participants' experiences and perceptions of the demographic processes in the community. These data were recorded, transcribed verbatim, and analysed in the vernacular Maya Achi language.

**Table 2. Number of survivors of the Río Negro Massacres by sex and birth cohorts**

| Cohort definition | | | Number of massacres survivors | | |
|---|---|---|---|---|---|
| Name | Birth years | Age at conflict | Women | Men | Total |
| --- | ≤ 1953 | 30 to 99 | 47 | 40 | 87 |
| High | 1953-1962 | 20 to 29 | 42 | 45 | 87 |
| Middle | 1963-1972 | 10 to 19 | 77 | 82 | 159 |
| Low | 1973-1982 | 0 to 9 | 132 | 139 | 271 |
| All | ≤ 1982 | 0 to 99 | 298 | 306 | 604 |

The survivors of the mass killings and their spouses were the population of interest for this paper. The case was selected for the opportunity it presented to understand how

[4] A paper describing the method is currently being reviewed for publication.

fertility reacts to violent changes in mortality. The analysis focused on members of three birth cohorts (the 'low', 'middle, and 'high' cohort in Table 2). The cohorts were selected under the premise that age at the time of the killings largely defined an individual's experience of the conflict and their subsequent fertility behaviour. Those in the 'low' cohort were children at the time of the killings. Members of the 'middle' cohort were also young, but some had already started their reproductive life or where in a union at the time. Most of the adults in the 'high' cohort were already parents in 1982.

*Data analysis*

Different analyses were carried out to provide a detailed account of fertility behaviour of the massacre survivors. Quantitative data and analysis constituted the backbone of this study. Qualitative evidence helped interpret the numerical results. Combining quantitative and qualitative sources was particularly useful for discussing the role of the factors outlined in the introductory section of the paper.

Two sets of statistical analyses were conducted to study cohort-specific patterns of fertility. Additive OLS linear regression models were fitted to the data to explore post-conflict fertility outcomes. The outcome variable in these models was the total number of children born after 1982, the year of the massacres. Covariates included total family size at the time of the killings, and family size disaggregated by type of relative (e.g. number of siblings, parents, etc.).[5] Other variables captured the parity and marital status of the residents at the time of the killings. The regression analyses included measures of excess mortality within the family (both as the total number of relatives killed and disaggregated by type of relative killed). Birth cohort and place of birth were included as control variables.

The second set of analyses focused on the differences in timing of childbearing across cohorts. The paper used discrete-time Event History Analysis (EHA) models with time-variant covariates to study the factors that affected the timing of the first birth after the massacres. Binary logistic regressions were fitted to the data to study the time that it took for survivors to give birth to a child after the killings. The response variable was a binary measure of whether an individual had a child at any given year after 1982. Episodes were

[5] Family refers to the nuclear family unless stated otherwise.

counted from age 13 and censored at age 55 using an age variable.[6] Ties were handled using the Breslow method (Breslow, 1975). Individuals were observed from birth to death and data were only right-censored for emigrants, although such cases were rare. The exploratory variables in the EHA model were similar to those in the OLS regression.

Qualitative data were analysed using a framework approach to thematic analysis (Ritchie and Lewis, 2003). This involved iteratively summarising the data in matrices until a comprehensive collection of categories emerged. A set of initial analytical themes were derived from the research design and further categories were added as the analysis progressed. The qualitative analysis focused on the factors behind the post-conflict fertility recovery, as well as on the social narratives that members of the population used to make sense of their traumatic experiences, both at an individual level and at the level of their community.

## Quantitative results

The first part of this section presents a summary of the excess mortality from the mass killings. Following this, the section outlines the overall fertility trends in the community by focusing on the period and cohort effects of the mass violence suffered by inhabitants of Río Negro.

*Exposure to violence and excess mortality during the Río Negro Massacres*

The 1982 massacres produced extensive mortality amongst the residents of Río Negro, affecting members of all birth cohorts and both genders. 366 out of 970 individuals alive at the start of 1982 were killed in the conflict – 38% of the population. Residents older than 29 were proportionally more affected by the war and female deaths outnumbered male deaths amongst those under 30. The data are consistent with a scenario where violence was directed against the population as a whole and not only against young men as is common during armed conflicts (Obermeyer et al., 2008).

All the massacre survivors lost at least one member of the nuclear family and multiple relatives in the extended family. Older residents tended to lose more relatives because they had larger families at the time of the killing. Residents in the oldest ('high') cohort

[6] The lower age limit was chosen because it was the minimum marriageable age in pre-war Río Negro, according to the qualitative data.

had the highest levels of own-child mortality (many of the youngest villagers were childless at the time of the mass killings). Table 3 shows that mortality in the family was more pronounced amongst women. On average, women lost more children and family members than men of the same age.

**Table 3. Own mortality and mortality within the family caused by the Río Negro Massacres (by sex and birth cohort)**

| Cohort | Age at conflict | Cohort members killed in massacre (%) | | Lost a child in killings (%) | | Nuclear family killed (survivors only) (%) | |
|---|---|---|---|---|---|---|---|
| | | Women | Men | Women | Men | Women | Men |
| High | 20 to 29 | 48.15 | 37.50 | 50.62 | 43.75 | 32.36 | 28.46 |
| Middle | 10 to 19 | 34.17 | 27.68 | 5.0 | 1.79 | 22.77 | 20.31 |
| Low | 0 to 9 | 29.02 | 32.37 | NA | NA | 18.84 | 18.75 |

Note: 'NA' (not applicable) indicates that all membres of the given group were childless at the time.

*Period fertility in Río Negro after the mass killings*

The previous section summarised how the residents of Río Negro were affected by excess mortality derived from the massacres. The paper now explores how period fertility developed in the village between 1982 and 2015.[7] The first part of the following section focuses on total fertility, a measure of the general levels of fertility in a population. The second part centres on how these fertility levels varied across different age groups.

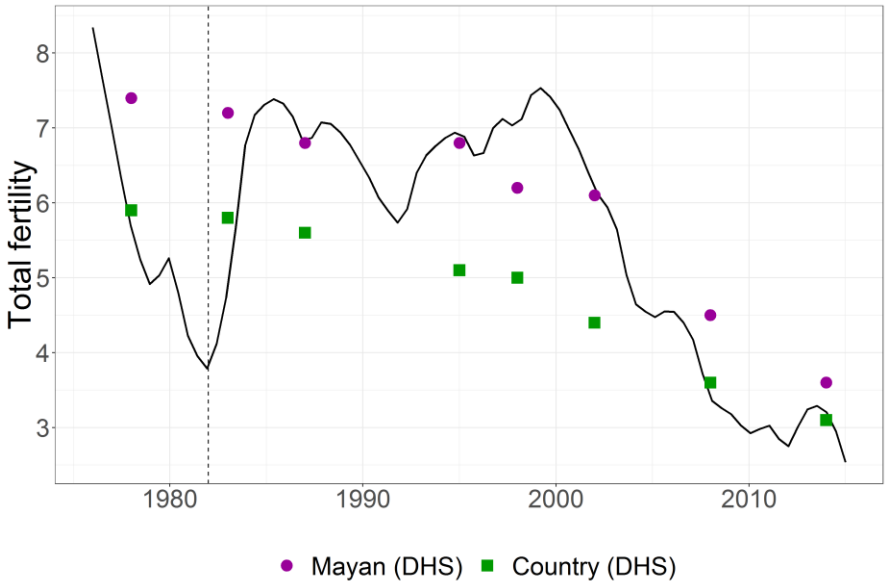
Total fertility

Overall, total fertility in Río Negro (Figure 1) resembled that of the national Mayan population. There was no evidence of a sustained fertility decline before 1979 but fertility did drop rapidly towards the end of the Twentieth Century. The fertility trends in Río Negro differed considerably from those of the national Mayan population only between 1976 and 1983, when the village suffered from a prolonged campaign of intimidation and mass violence.

[7] Period fertility "relates to the number of births in a population during a period of time to some measure of exposure" (Preston et al., 2001, p. 93).

Total fertility dropped sharply before the 1982 killings and reached its lowest level in the year of the massacres (2.9). The years leading to the mass killings were characterised by uncertainty and fear in the area as residents were forcibly relocated to allow for the construction of the Chixoy Dam. In this period, the region became increasingly militarised and entire communities were threatened and intimidated by the Guatemalan Army and local militias.[8] Fertility increased rapidly after 1983 to roughly the same levels reported for the national Mayan population and remained high at around 6.5 until 1999.

**Figure 1. Total Fertility Rates in Río Negro and reference national and Mayan populations (1970-2015)**




Source: Río Negro data come from this study; Mayan and country averages come from Demographic and Health Survey data (DHS).

Fertility in Río Negro started a sustained decline from the year 2000. The rate of decline was more pronounced in the village than amongst the national Mayan population. As a result, by 2015 total fertility in Río Negro was 2.3 – below the average of the Mayan population (3.6) and that of the country as a whole (3.1) (MSPAS, 2015). This pattern is

[8] There were concerns about potential attacks before the killings. A 1979 news report stated boldly that "the residents of Río Negro, Baja Verapaz, are willing to die before giving in a single inch of their lands". (Prensa Libre, June 1 1979, '*Impugnan expropiación de tierras para el INDE*' ['Land expropriations for the INDE are challenged']).

consistent with the evidence that fertility recoveries are often followed by periods of lower fertility; baby booms are followed by 'baby busts' (Reher, 2015).

Total fertility is a useful measure for understanding population-level trends, but it provides no information about the distribution of fertility by age. This is covered in the next section, which presents Age-Specific Fertility Rates (ASFR) for Río Negro in the 1977-2015 period, estimated from the retrospective data produced by the EGM.

Period age-specific fertility

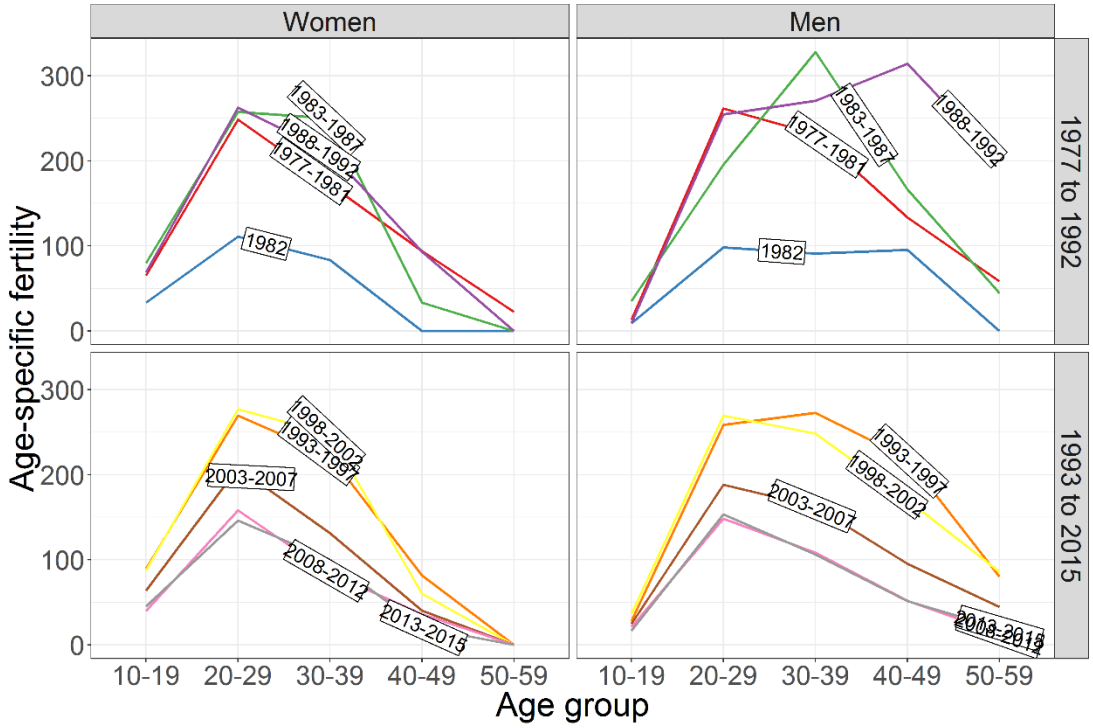
Measures of age-specific fertility in Río Negro reflected the fertility drop and rebound pattern discussed above. The upper panels of Figure 2 show that fertility was lowest at all ages in 1982.[9] After the massacres, it rose over the levels reported before the violent events (i.e. in the 1977-1981 period). Age-specific fertility declined steadily only after 2002 and the lowest fertility at all ages were reported for the most recent period (2013-2015).

Female fertility was generally highest amongst women younger than 30, but after 1982 high fertility until the age of 40 was common. This trend began in the 1983-1987 period (the 'recovery' years after the killings) and continued up until 2002, when female age-specific fertility fell back to levels similar to those of the national averages.

The pattern for men was similar, albeit with higher fertility rates at older ages, which is not surprising since men are able to conceive children at older ages. Between 1983 and 1987, fertility was highest amongst men aged 30 to 39. Fertility amongst men aged 40 to 49 was remarkably high during the next period (1988-1992), suggesting the presence of a cohort effect (i.e. men in a given birth cohort having particularly high fertility over time). Male fertility at older ages continued to be high up until 2002, when it started resembling the national (female) fertility levels.

**Figure 2. Period Age-Specific Fertility Rates of the total population of Río Negro over time (1977-2015)**

[9] In the figure, ASFR are presented as four-year periods, except for the 1982 rates which are presented separately.




Source: Data from this study.

*Cohort fertility in Rio Negro after the mass killings*

The previous section presented patterns of fertility at a population level. This section considers fertility from a cohort perspective, focusing on how fertility outcomes varied between members of the three birth cohorts of interest.[10] As in the preceding section, the analyses focus on the levels of fertility and on the distribution of fertility by age.

Cohort fertility

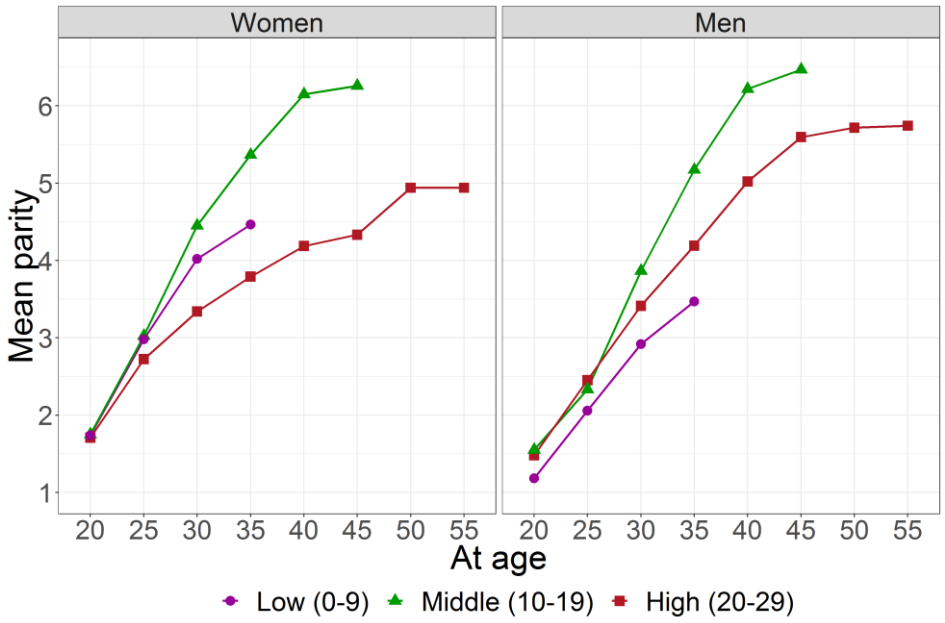
In a society undergoing the demographic transition, and in the absence of a mortality crisis, each subsequent (younger) cohort would be expected to have lower levels of cohort fertility, with births being postponed to later ages. In other words, members of the 'high' cohort should have had the highest cohort fertility of all, followed by members of the 'middle' and 'low cohorts respectively.

This was not the case in Río Negro, where women and men in the 'middle' cohort (aged 10-19 at the time of the killings) had the highest fertility of all (Figure 3). Men in the 'high'

[10] Cohort fertility was defined as the average number of children ever born to members of a given cohort. Cohort fertility at age 30, for example, was calculated as the mean parity of members of a cohort by the time they reached age 30.

cohort (the oldest one) had a higher fertility than men in the 'low' cohort (the youngest one). The pattern of older cohorts having higher fertility than younger cohorts is characteristic of populations undergoing the fertility transition. However, the opposite was true for women: those in the 'high' cohort had the lowest cohort fertility of all (indeed, even lower than women born 20 years later). The violence had a particularly negative effects on the fertility of women who were aged 20 to 29 at the time of the killings.

**Figure 3. Mean parity at different ages for members of the three birth cohorts of interest in Río Negro**




The previous analysis showed cohort-specific patterns of fertility behaviour after the killings. It is now necessary to evaluate the factors responsible for the differential fertility outcomes in the population following the 1982 mass killings. For this, a regression analysis was fitted to the population of survivors of the killings (Table 4).

The regression analyses showed that, all else being equal, women with larger families at the time of the killings were more likely to have higher fertility in the aftermath of the massacres (Models 1-2). The composition of family networks also affected post-killings levels of fertility. For women, the number of children (parity) and siblings at the time of the killings was linked to higher long-term fertility. Marital status was an important predictor of higher fertility for men but not for women.

Exposure to conflict had a consistent negative effect on long-term fertility. Higher mortality within the family was associated with lower fertility for men and women but the effects were stronger for the latter. Model 3 showed how the death of different types of relatives affected the subsequent fertility behaviour of survivors. Losing a child, parent, sibling, or spouse all led to lower post-killings fertility, all else being equal. The association between the death of a spouse and low post-conflict fertility was particularly pronounced for women. Losing a parent or a sibling resulted in lower fertility for men in the long term.

Women born in Río Negro were significantly more likely to have lower fertility after the killings compared to women born elsewhere. The same was not true for men, for whom no significant association was found between place of origin and post-killings fertility. This was related to patterns of marriage that are discussed later in this paper. The analysis also showed that the oldest women at the time of the killings had the lowest fertility after the event. There was no significant association between birth cohort membership and post-killings fertility for men, after controlling for all relevant factors. The same was true for socioeconomic status, which was not a predictor of fertility after the killings.

**Table 4. Output of the OLS linear regression model: total number of births after the massacres (coefficients)**

| Response variable: | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| No. births after killings | Women | Men | Women | Men | Women | Men |
| Family size at year of killings (count) | | | | | | |
| All relatives alive | 0.25*** (0.05) | 0.07 (0.06) | 0.33*** (0.05) | 0.11* (0.07) | | |
| Children alive | | | | | 0.46** (0.19) | -0.07 (0.38) |
| Parents alive | | | | | 0.18 (0.27) | -0.41 (0.31) |
| Siblings alive | | | | | 0.32*** (0.08) | 0.14 (0.09) |
| Spouse alive | | | | | 0.29 (0.56) | 2.77*** (0.77) |
| Excess mortality in the family (count) | | | | | | |
| All relatives killed | -0.64*** (0.08) | -0.33*** (0.09) | -0.57*** (0.08) | -0.42*** (0.10) | | |
| Children killed | | | | | -0.61** (0.25) | -0.57 (0.40) |
| Parents killed | | | | | -0.59** (0.25) | -0.71*** (0.26) |
| Siblings killed | | | | | -0.52*** (0.13) | -0.28** (0.14) |
| Spouses killed | | | | | -1.32** (0.58) | -0.91 (0.77) |
| Birth cohort [Ref.: High] | | | | | | |
| Middle (10-19) | | | 1.69*** (0.45) | 0.23 (0.57) | 1.73*** (0.57) | 0.35 (0.83) |
| Low (0-9) | | | 1.12*** (0.42) | -1.44*** (0.54) | 1.16* (0.62) | -1.04 (0.85) |
| Born in Río Negro [Ref.: Other] | | | -1.91*** (0.41) | -0.11 (0.48) | -1.77*** (0.45) | 0.43 (0.53) |
| Socioeconomic index | | | -0.05 (0.09) | -0.12 (0.10) | -0.03 (0.09) | -0.08 (0.10) |
| Observations | 353 | 326 | 320 | 296 | 320 | 296 |
| $R^2$ | 0.15 | 0.04 | 0.24 | 0.11 | 0.25 | 0.17 |

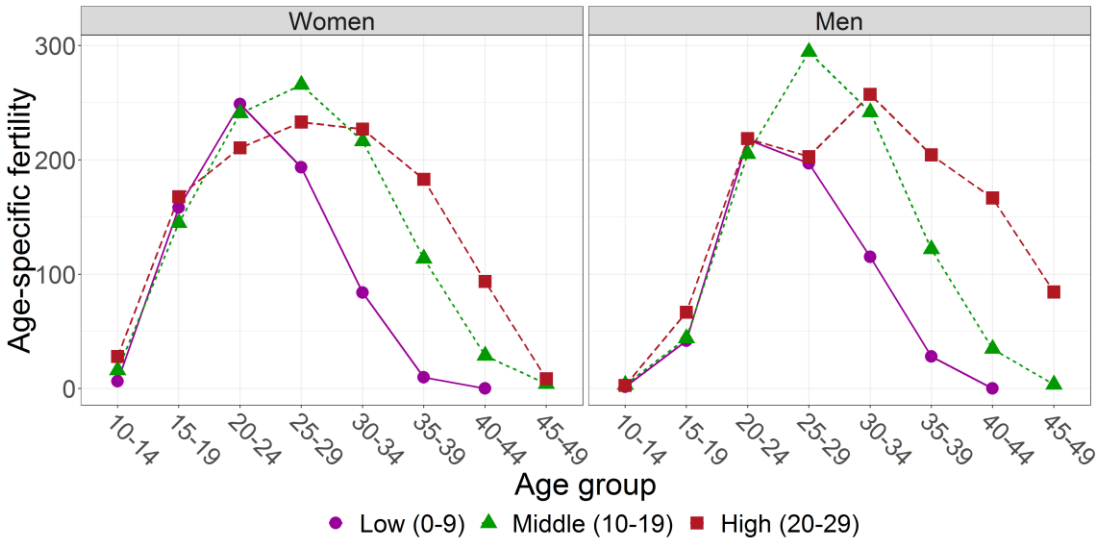
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

Cohort age-specific fertility

This section explores the distribution of fertility by age for members of the three birth cohorts considered in this study. Cohort age-specific fertility makes it possible to establish differences in the timing of childbearing across birth cohorts.

In Río Negro, members of younger cohorts had less extensive childbearing periods than members of older cohorts (i.e. they had lower fertility rates at older ages). This was true for men and women, as Figure 4 shows. For members of the 'high' cohort (the oldest one) births at more advanced ages were mainly of a higher parity, since around 40% of individuals in this cohort had already given birth in 1982. The 'middle' cohort showed a relatively extensive childbearing period with high fertility between ages 20 and 29. Those in the 'low' cohort had considerably shorter reproductive lifespans. Age-specific fertility declined sharply after the age of 25 for members of this cohort and approached zero by the age of 40.

**Figure 4. Cohort Age-Specific Fertility Rates for members of the three birth cohorts of interest (live births per 1000 individuals)**




There were also important differences by gender. Women in the 'low' cohort had consistently higher fertility than coetaneous men, a pattern already noted in Figure 3. Furthermore, fertility at age 15-19 was considerably higher for women than for men of the same cohort. This age group (15-19) is significant because it represented the start of the reproductive life for most survivors of the killings in this cohort. The fact the fertility

was higher for women shows that it was mainly young women (and not young men) who had the highest fertility in the aftermath of the killings.

The high fertility amongst the young survivors of the killings coincided with an increase in the fertility of men who were older at the time. This can be seen in the fertility 'peaks' at age 25-29 for men in the 'middle' cohort and at age 30-34 for those in the 'high' cohort. Older men were tended to have children with younger women after the mass killings. This was confirmed by the fact that female age-specific fertility was lower in older cohorts ('middle' and 'high').

The preceding analysis showed the differences in the timing of childbearing for men and women by birth cohort. Now follows a more nuanced statistical analysis aimed at disentangling the factors that affected the timing of the first post-massacre birth in the population.

The EHA statistical model (Table 5) showed no consistent association between family size and the timing of the first birth after the mass killings. In spite of this, the full model (Model 3) showed that family network composition did make a difference. Having more children was associated with earlier births for women. Men with surviving parents were less likely to have earlier births in the aftermath of the violence but this was not true for women, for whom no significant association was found. Men and women in a marital union (i.e. those with a surviving spouse after the killings) were considerably more likely to have earlier births.

Overall, the total number of relatives killed in the massacres was independent of the timing of the first post-1982 birth after controlling for all relevant covariates. The type of relatives killed in the conflict was more important. Own-child mortality explained the variation in the timing of fertility for women only: those who lost a child tended to have later births after the killings. Men who lost a parent or a sibling tended to have earlier births (the effects are not strong). Losing a spouse was not a significant determinant of the post-killings timing of fertility.

Men born in Río Negro were associated with earlier births, compared with men born elsewhere, all else being equal. Men and women in the younger cohorts had significantly earlier births after the killings than members of the oldest birth cohort. The effects were considerably stronger for women in the 'low' cohort. Finally, socioeconomic status before

the mass killings made no difference for the timing of the first birth after the Río Negro Massacres.

**Table 5. Output of binary logistic regression (coefficients)**

| Response variable: | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| Had birth in given year | Women | Men | Women | Men | Women | Men |
| Time-variant family size (count) | | | | | | |
| All surviving relatives | 0.00 (0.02) | -0.01 (0.02) | 0.02 (0.02) | 0.01 (0.02) | | |
| Children surviving | | | | | 0.34*** (0.10) | 0.12 (0.17) |
| Parents surviving | | | | | -0.13 (0.16) | -0.45*** (0.15) |
| Siblings surviving | | | | | -0.01 (0.04) | 0.09** (0.04) |
| Spouse surviving | | | | | 1.27*** (0.25) | 1.64*** (0.25) |
| Excess mortality in the family (count) | | | | | | |
| All relatives killed | -0.12*** (0.04) | -0.05 (0.03) | -0.03 (0.04) | 0.04 (0.04) | | |
| Children killed | | | | | -0.59*** (0.18) | -0.11 (0.18) |
| Parents killed | | | | | -0.20 (0.16) | 0.34** (0.14) |
| Siblings killed | | | | | 0.06 (0.06) | 0.13** (0.06) |
| Spouse killed | | | | | -0.23 (0.34) | -0.2911 |
| Born in Río Negro [Ref.: Other] | | | -0.35* (0.2) | 0.27 (0.20) | -0.25 (0.23) | 0.49** (0.22) |
| Birth cohort [Ref.: High] | | | | | | |
| Middle (10-19) | | | 1.06*** (0.25) | 1.63*** (0.29) | 1.42*** (0.31) | 1.78*** (0.34) |
| Low (0-9) | | | 1.70*** (0.24) | 1.55*** (0.27) | 2.15*** (0.33) | 1.65*** (0.33) |
| Socioeconomic index | | | 0.02 (0.05) | -0.05 (0.05) | 0.05 (0.06) | -0.04 (0.05) |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

**Discussion: what drove fertility after the massacres?**

This section evaluates how the empirical results presented so far relate to the factors identified in the background section of this paper. The discussion integrates qualitative and quantitative evidence relating to the processes of (1) pronatalism and replacement fertility, (2) transactional marriage and scarring, (3) urbanisation, and (4) childbirth postponement.

*Pronatalism and replacement effects*

The own-child replacement theory predicted a temporary increase in fertility as parents attempted to 'replace' their children killed in the massacres. This study found no evidence that survivors attempted to replace their own children (or any member of their families) by having high fertility after the violent events. On the contrary, for women the death of a child meant a lower fertility in the long term and a delayed first birth after the killings. Male fertility after the event was also not correlated with own-child mortality. These results are similar to the ones reported by Nobles et al. (2015), who found that own-child mortality did not fully explain the fertility recovery after the 2004 Tsunami in Indonesia.

The qualitative data provided ample evidence that a community-led pronatalist ideology developed in Río Negro after the mass killings. Traces of this pro-birth agenda remained at the time of the data collection, in spite of the fact that total fertility had dropped below the national average by 2015. It was common for men to be openly proud of their own high fertility. Older men in the FGDs were generally convinced that increasing fertility had been an appropriate mechanism for 'fixing' (*usuk'umaxik*; literally 'straightening') the dramatic population decline brought about by the mass killings.

The pronatalist attitudes developed in the absence of a national pronatalist policy during or after the Guatemalan Civil War. As a matter of fact, many of the survivors were convinced of the existence of an antinatalist agenda in Pacux (i.e. policies aimed at preventing births in the population). This was epitomised by the persistence of rumours that the local authorities had carried out campaigns of forced sterilisation in the resettlement after the massacres.[11] In the FGDs, members of all birth cohorts emphasised

[11] A human rights expert from the community was convinced that these rumours were false (interview with KI-4). According to a national fertility expert, there is no evidence that APROFAM (the country's leading

that the very existence of the community had been at risk at the time. The memory of the mass killings were a clear reminder of this.

It is now necessary to determine whether this bottom-up pronatalism did in fact influence the fertility behaviour of the survivors. The 'family pronatalism' approach outlined in the background section of this paper stated that family networks can help spread pronatalist behaviour. This is achieved by individuals exercising social pressure on their relatives to bear children. The evidence from Río Negro on this was mixed. Women belonging to more extensive family networks did have higher fertility after the massacres compared to those with smaller surviving families. However, the size of a man's family network did not influence his subsequent fertility behaviour. This gender variation supports the assumptions that the reproductive behaviour of women was affected to a greater degree by pressure exercised by close relatives.

Traditional gender roles were strengthened in the aftermath of the massacres. Men came to be seen increasingly as the breadwinners and providers of safety in the troubled times that followed the killings. The domestic role of women, responsible for the cultural and physical reproduction of the community, was also reinforced. Women in this study attested that domestic violence was common after the mass killings and there were multiple reported cases of rape committed by members of the community themselves (i.e. in addition to the rapes committed by the militias). According to a social worker dealing with survivors of sexual violence in the village, the incidence of domestic and sexual violence in Pacux continues to be high compared to neighbouring populations.[12]

*Transactional marriages and scarring effects*

The previous section mentioned the role of gender dynamics in reproductive behaviour. This section explores how these factors affected dynamics of childbirth amongst the survivors. After the killings, many found themselves in need of support after losing parents, siblings, and spouses. There is evidence of a 'marriage boom' in the months that followed the violent event of 1982. The number of new marriages that took place that year was double the number reported in 1981. However, most of these marriages were

family planning provider) conducted nation-wide sterilisation campaigns during the armed conflict (Alejandra Colom, personal communication, August 28 2017).

[12] Interview with KI-8.

informal and short-lived, which means that their start and end could not be captured accurately by the genealogical interviews.

Transactional marriages between older men and younger women were common after the mass killings.[13] On average, men were older than their spouses in marriages that formed after 1982, with age differentials between partners varying by birth cohort. The 'middle' cohort stands out for having the largest age gap between spouses – in almost 10% of these marriages men were at least 15 years older than their spouses. This is important because women in this cohort had the highest total fertility and were main contributors to the fertility recovery. The following quote exemplifies the view (shared by male and female participants) that many of the marriages after the massacres resulted from 'need' rather than from 'love':

> **Arcadio**: After the violence, there were many widows and widowers. People got together out of pure need. The widows had to find a husband whether they wanted to or not. They looked for a partner because how else would they have found the maize to eat every day and to make their tortillas? We men got the maize, we stole it during the night. But someone had to cook it and serve it. You see, everybody had to find a partner at the time. There was no other way.
>
> FGD 2_2, with men aged 17-27 the year of the massacres

Further evidence of the changing nature of marriages after the mass killings was provided by the prevalence of marriages with members of other communities. These became more common after the 1982 killings and after the survivors were forcibly resettled in Pacux. Men in the 'high' cohort were more likely to marry women from other communities. Women were less likely to marry outside the village before the killings and continued to be so after 1982. This is partially explained by the prevailing system of patrilocal residence, according to which women were expected to move in with their husbands after marriage. It was logistically easier for women from outside to move into the military-run Pacux than for local women to leave the community after marriage. On the other hand, men were more exposed to life outside the community than women, who were generally excluded from labour outside the household.

[13] Age differentials were used to determine whether a marriage was transactional. This is a proxy as marriages can be non-transactional even in the presence of large age differences between partners.

The experience of the massacres explains the sharp increase in the incidence of marriages between locals and individuals from other communities. Participants in the qualitative discussions believed that stigma and social isolation shaped the demographic dynamics after the mass killings. Some women in the 'middle' and 'high' cohorts were unwilling to marry or remarry after the killings. Others were ostracised after suffering from sexual violence. Women suspected of having been raped were often referred to as being 'damaged' (*xb'an k'ax chi ke*) by the survivors in the qualitative discussions. This was consistent with evidence from a range of post-conflict settings, where women who suffered sexual violence (or were suspected of having experienced it) have been rejected by their families and partners (Ward and Marsh, 2006).

The case of women in the 'high' cohort, who were 20 to 29 years old at the time of the massacres, demonstrates this. Women in this cohort were the most affected in terms of conflict mortality and of violent deaths within their families. The qualitative discussions suggested that they also suffered the most from sexual violence, sometimes in the form of repeated rape over long periods of time. Around a quarter of women in this cohort remained single after the mass killings. This was the highest non-marriage ratio of all cohorts and was consistent with a scenario where exposure to violence would have led to lower fertility in later life. Women in this cohort had the lowest cohort fertility of all, even lower than women born decades later. A member of this cohort summarised this point in a FGD, to the approving nods of the other participants:

> **Rebeca**: Some [women] married again after the violence. But others were raped, they were damaged. They separated from their husbands, and some married again in the mountains, others married here [in Pacux]. Others never got together with a man again and didn't have more children. It was easier for younger women to find husbands [after the war] because older women couldn't have any more children.
>
> FGD 2_2, with women aged 17-27 the year of the massacres

The presence of scarring effects was confirmed by the fact that exposure to the killings was associated with lower long-term fertility, particularly for women. Higher exposure to violence might have affected the fecundity of women aged 20-29 at the time of the massacres, in addition to causing psychological trauma and social isolation, but not data were available to evaluate this. This contrasted with the experience of members of the 'low' cohort, all of whom were less than ten years old at the time of the killings. The rate of external marriages in this cohort was equivalent for men and women, all of whom

married for the first time after 1982 (and were less affected by the physical and sexual violence that accompanied these events).

*Urbanisation and changing access to contraception*

It is difficult to disentangle the influence of the mass killings on long-term fertility from the effects of the known determinants of fertility (Bongaarts, 1978). Contraceptive demand was already low in 1982 Río Negro, a time when the village was geographically and culturally isolated from the rest of the country. The prevalence of modern contraception in the village decreased even further between 1982 and 1984, when the population had no access to any healthcare system due to its forced displacement.[14] Studies in other contexts have shown that armed conflicts also reduce the availability of modern contraception (Namasivayam et al., 2017). It is possible that the prevalence of traditional contraception (such as withdrawal or abstinence) was altered in the aftermath of the killings, but no quantitative data were available to evaluate this.

The conditions in Pacux were appalling (Douzant, 2003), but the closeness to the municipal capital improved access to the public healthcare system. This included more availability of modern contraception and exposure to novel ideas of ideal (lower) family size. Older participants constantly referred to the improved supply of family planning methods in Pacux during the qualitative discussions, emphasising how foreign these technologies had seemed initially. The sudden exposure to modern contraception, together with the traumatic experience of the war, might explain the emergence of rumours of forced sterilisation in Pacux. Traces of this scepticism towards modern contraception can be seen in the following exchange between two women from the 'high' birth cohort. This attitude contrasted strongly with the eagerness with which younger women spoke of the benefits of family planning in other FGDs.

> **Remedios**: In the old times, people didn't use any modern contraception [*kunab'al*; literally 'medication'] like they do here in Pacux. You had as many children as God provided. But now girls only have one or two children. Before, I accepted if God wanted to give me ten children. We had to fight for our children.

[14] Secondary sources on Río Negro (Gaitán, 1981) and other Mayan communities (Early, 1982) provide no data on contraceptive use. However, DHS data showed that contraceptive demand was very low amongst the Mayan population in 1987 (only 5.5% of Mayan women reported using modern contraception). It is unclear how the war affected the supply and demand of modern contraception in indigenous areas (Grace and Sweeney, 2016).

> **Sofía**: Now everything has changed, there are new ideas, there many things that we didn't know before. We never heard about those things; what are young people doing now? They don't want children, I don't know why. They don't want any more kids.
>
> FGD 1_1, with women aged 28-42 the year of the massacres

Fertility declined in the village after the year 2000, coinciding with the reduction of fertility amongst the national Mayan population. Improved contraceptive offer certainly played a major role in this, but better access to education and employment (especially for women) also mattered. The socioeconomic variables in the statistical models were non-significant. This can explained by the fact that income inequality was low in the village before the mass killings, since most villagers relied almost exclusively on subsistence agriculture. Whilst Pacux remained under military control, all services and most of the employment were provided by the military. This dependency on the army maintained most residents of Pacux in a protracted and generalised state of deprivation.

The last section of this paper focuses on the influence of population structure on the fertility recovery that followed the mass killings.

*Childbirth postponement*

The theory of childbearing postponement stated that a higher share of women would be in a position to become pregnant at the end of a conflict because childbirth tends to be delayed during crises (Heuveline and Poch, 2007, p. 409). In this case, we would expect higher fertility amongst the women who already were of reproductive age at the time of the killings (since it was only them who could delay their fertility).

This was not the case in the aftermath of the mass killings in Río Negro. Women in the 'high' cohort (who were aged 20-29 in 1982) contributed only a small percentage of the births that made up the fertility recovery. It was women aged 10-19 in 1982 who had the earliest births after the killings. These younger women also had the highest cohort fertility and the highest number of births after the killings. Most did not postpone their fertility as a result of the massacres because their reproductive life started after 1982.

The potential influence of delayed childbearing were offset by the extremely high excess mortality and exposure to violence experienced by older women. Women who were in reproductive age at the time of the mass killings were particularly likely to be targeted by

perpetrators and, as a result, experienced particularly high levels of sexual violence. This means that, even if there were more women at risk of pregnancy after the killings, they were not always able or willing to give birth.

It is possible that the effects of childbirth postponement are diminished by these factors in other contexts of mass killings. Mass killings tend to produce relatively high mortality for men and women of different ages. They also affect the mental, physical, and social wellbeing of those who suffer them to a greater extent than other types of conflict events. The particularly negative effects of mass violence on women have been documented for Rwanda (de Walque and Verwimp, 2010) and Cambodia (de Walque, 2006). However, more research is needed to generalise the findings of this study to other contexts.

**Conclusions**

This paper focused on a single sub-national population that experienced a series of mass killings in 1982. The Río Negro Massacres in Guatemala produced high mortality across the different demographic groups of the population, including extreme levels of psychological, physical and sexual violence. Fertility in the village declined dramatically before the massacres but the rates recovered quickly, following a known pattern of fertility drop and rebound (Agadjanian and Prata, 2002; Van Bavel and Reher, 2013).

This study explored the factor that influenced fertility behaviour in this period. Bottom-up pronatalist attitudes developed as a response to the perception that the future of the community was compromised, but survivors did not necessarily act to replace their own children. Rather, there was evidence that survivors exercised social pressure on their relatives to achieve high fertility. Traditional gender roles were reinforced after the killings, leading to an increase in the gender power differentials between men and women. This, together with the fact that many found themselves in very precarious circumstances after the killings, resulted in a greater prevalence of marriages between older men and younger women. These marriages, in turn, tended to have very high fertility.

Women who were more affected by the violent events had the lowest subsequent fertility as a result of 'scarring' processes, partly derived from their exposure to high levels of sexual violence. The social stigma derived from this experience led men to seek younger spouses (who had been less exposed during the mass killings) and to marry women from outside the village. Older men in this cohort had very high fertility until old ages but the

same was not true for women of the same age, whose fertility never recovered after the events.

The prevalence of modern contraception was extremely low in Río Negro before the killings. The forced resettlement of the population in an urban area improved access to modern contraception, education, and employment. This may have influenced the rapid fertility decline in the village after the year 2000. The same can be true for other marginalised communities relocated from less accessible to more accessible areas during armed conflicts, but more research is needed to establish this.

The fertility recovery in Río Negro occurred in the absence of childbirth postponement. Women aged 10-19 had the highest post-killings fertility but most were single or too young to have children at the time of the crisis. The effects of postponement are likely to be more important in the presence of sex segregation (e.g. military conscription). Women who were already in reproductive age at the time of the massacres had lower fertility in their aftermath given the scarring processes mentioned above.

The in-depth description of the Río Negro case helped identify the processes underlying the post-conflict fertility recovery, but the results cannot be generalised to other populations without further research. This paper emphasised that massacres are a particular type of conflict event that deserve separate attention. Collecting more evidence on mass killings will help improve our understanding of fertility behaviour after these events.

A better understanding of fertility behaviour after armed conflicts can help humanitarian organisations provide more effective assistance. The United Nations High Commissioner for Refugees (UNHCR) is in the process of introducing demographic models to project the future size and composition of displaced populations. This will allow resources to be allocated more efficiently to field operations (Alburez-Gutierrez and Segura, 2018). At the moment, these demographic projection models rely on simplified assumptions about how mortality and fertility react to armed conflict. This study can help improve these assumptions, ultimately leading to more accurate population projections. Further research on this subject is needed given that armed conflicts will continue to affect millions in the foreseeable future.

**References**

Abu-Musa, A., L. Kobeissi, A. B. Hannoun, and M. C. Inhorn. 2008. Effect of war on fertility: a review of the literature, *Reproductive BioMedicine Online* 17(1): 43–53.

Abu-Musa, A., A. Nassar, A. Hannoun, and I. Usta. 2007. Effect of the Lebanese civil war on sperm parameters, *Fertility and Sterility* 88(6): 1579–1582.

Agadjanian, V., and N. Prata. 2002. War, peace, and fertility in Angola, *Demography* 39(2): 215–231.

Alburez-Gutierrez, D., and C. Segura. 2018. The UNHCR Demographic Projection Tool: estimating the future size and composition of forcibly displaced populations, *UNHCR Statistics Technical Series* (1): 1–22.

Ayazi, T., L. Lien, A. Eide, L. Swartz, and E. Hauff. 2014. Association between exposure to traumatic events and anxiety disorders in a post-conflict setting: a cross-sectional community study in South Sudan, *BMC Psychiatry* 14(1): 6.

Ball, P. 2000. The Guatemalan Commission for Historical Clarification: Generating Analytic Reports. Inter-Sample Analysis, In P. Ball, H. F. Spirer, and L. Spirer (Eds.), *Making the Case: Investigating Large Scale Human Rights Violations Using Information Systems and Data Analysis*. Washington, DC: American Association for the Advancement of Science.

Blake, J. 1972. Coercive Pronatalism and American Population Policy, In R. Parke and C. . Westoff (Eds.), *Commission on Population and the American Future. Vol. 6: Research Reports*. Washington, DC: U.S. Government Printing Office.

Blanc, A. K. 2004. The Role of Conflict in the Rapid Fertility Decline in Eritrea and Prospects for the Future, *Studies in Family Planning* 35(4): 236–245.

Blau, D. M., and P. K. Robins. 1989. Fertility, Employment, and Child-Care Costs, *Demography* 26(2): 287–299.

Bongaarts, J. 1978. A Framework for Analyzing the Proximate Determinants of Fertility, *Population and Development Review* 4(1): 105.

Breslow, N. E. 1975. Analysis of Survival Data under the Proportional Hazards Model,

*International Statistics Review* 45(1): 45–58.

Cain, M. 1983. Fertility as an Adjustment to Risk, *Population and Development Review* 9(4): 688–702.

Caldwell, J. C. 1980. Mass Education as a Determinant of the Timing of Fertility Decline, *Population and Development Review* 66(2): 225–255.

CEH. 1999. Capítulo segundo: Las violaciones de los derechos humanos y los hechos de violencia (Tomo I) [Chapter II: Human Rights violations and the acts of violence (Volume I)], In *Guatemala: Memoria del Silencio [Guatemala: Memory of Silence]*. Guatemala City: UNOPS - Comisión para el Esclarecimiento Histórico.

Cetorelli, V. 2014. The Effect on Fertility of the 2003 – 2011 War in Iraq, *Population and Development Review* 40(December): 581–604.

Clay, D. C., and J. E. Vander Haar. 1993. Patterns of Intergenerational Support and Childbearing in the Third World, *Population Studies* 47: 67–83.

CODISRA. 2010. *Indicadores y Estadísticas por Pueblos y Comunidades Lingüísticas de Guatemala [Indicators and Statistics by Linguistic Communities in Guatemala]*. Guatemala City: Serviprensa, S.A.

Cohan, C. L., and S. W. Cole. 2002. Life course transitions and natural disaster: marriage, birth, and divorce following Hurricane Hugo, *Journal of Family Psychology* 16(1): 14–25.

de Walque, D. 2006. The socio-demographic legacy of the Khmer Rouge period in Cambodia, *Population Studies* 60(2): 223–31.

de Walque, D., and P. Verwimp. 2010. The Demographic and Socio-economic Distribution of Excess Mortality during the 1994 Genocide in Rwanda, *Journal of African Economies* 19(2): 141–162.

Demeny, P. 1986. Pronatalist Policies in Low-Fertility Countries: Patterns, Performance, and Prospect, *Population and Development Review* 12: 335–358.

Devkota, B., and E. R. van Teijlingen. 2010. Understanding the effects of armed conflict on health outcomes: the case of Nepal, *Conflict and Health* 4(1): 20.

Douzant, D. 2003. Requiem pour les Mayas de Río Negro [Requiem for the Mayans of Rio Negro], In M.-C. Arnauld, A. Breton, M.-F. Fauvet-Berthelot, and J. A. Valdes (Eds.), *Misceláneas... en honor a Alain Ichon [Miscellaneous ... in honour of Alain Ichon]*. Mexico City: Centro Francés de Estudios Mexicanos y Centroamericanos.

Duvander, A. Z., T. Lappegård, and G. Andersson. 2010. Family policy and fertility: Fathers' and mothers' use of parental leave and continued childbearing in Norway and Sweden, *Journal of European Social Policy* 20(1): 45–57.

Early, J. D. 1982. *The demographic structure and evolution of a peasant system: the Guatemalan population*. Boca Raton: University Press of Florida.

Elezaj, S., Z. Gashi, A. Zeqiraj, D. Grabanica, A. Shllaku, B. Gruda, and V. Musaj. 2015. Treatment of Infertility in Men with Post-traumatic Stress Disorder (PTSD) with the Method of Intrauterine Insemination, *Medical Archives* 69(5): 327.

Gaitán, G. A. 1981. *Los asentamientos humanos en la cuenca del Rio Negro o Chixoy (su estructura y dinamica socioeconomica) [The human settlements in the Basin of the Rio Negro or Chixoy River (their structure and socioeconomic dynamic)]*. Guatemala City: INDE (Manuscript).

Giacaman, R., R. Khatib, L. Shabaneh, A. Ramlawi, et al. 2009. Health status and health services in the occupied Palestinian territory, *The Lancet* 373(9666): 837–849.

Grace, K., and S. Sweeney. 2016. Ethnic Dimensions of Guatemala's Stalled Transition: A Parity-Specific Analysis of Ladino and Indigenous Fertility Regimes, *Demography* 53(1): 117–137.

Henry, L. 1966. Perturbations de la nuptialité résultant de la guerre 1914-1918 [Disruption of marriage resulting from the 1914-1918 war], *Population* 21(2): 273–332.

Heuveline, P., and B. Poch. 2007. The Phoenix population: demographic crisis and rebound in Cambodia., *Demography* 44(2): 405–26.

Hill, K. 2004. *War, humanitarian crises, population displacement, and fertility: a review of evidence*. Washington, DC: National Academies Press.

Hollingworth, L. 2000. Leta S. Hollingworth on Coercive Pronatalism, *Population and Development Review* 26(2): 353–363.

Hossain, M. B., J. F. Phillips, and T. K. Legrand. 2007. The impact of childhood mortality on fertility in six rural thanas of Bangladesh, *Demography* 44(4): 771–84.

Johnston, B. R. 2005. *Chixoy Dam Legacy Issues Study. Volume 1: Executive summary*. Santa Cruz, California: Center for Political Ecology.

Keim, S., A. Klärner, and L. Bernardi. 2013. Tie strength and family formation: Which personal relationships are influential?, *Personal Relationships* 20(3): 462–478.

Kennedy, R. 1973. Minority Group Status and Fertility: The Irish, *American Sociological Review* 38(1): 85–96.

Khawaja, M. 2000. The recent rise in Palestinian fertility: permanent or transient?, *Population Studies* 54(3): 331–346.

Khawaja, M., and S. Randall. 2006. Intifada, Palestinian fertility and women's education, *Genus* 62(1): 21–51.

Khlat, M., M. Deeb, and Y. Courbage. 1997. Fertility Levels and Differentials in Beirut During Wartime: An Indirect Estimation Based on Maternity Registers, *Population Studies* 51(1): 85–92.

Kinyanda, E., S. Musisi, C. Biryabarema, I. Ezati, et al. 2010. War related sexual violence and its medical and psychological consequences as seen in Kitgum, Northern Uganda: A cross-sectional study, *BMC International Health and Human Rights* 10(2008): 28.

Kupprat, F. 2010. *Gewalterinnerungen und ihre Tradition – Das kollektive Gedächtnis in Río Negro, Rabinal, Baja Verapaz, Guatemala [Memories of violence and tradition – Collective Memory in Río Negro, Rabinal, Baja Verapaz, Guatemala]*. Universität Bonn (unpublished thesis).

Lindstrom, D. P., and B. Berhanu. 1999. The impact of war, famine, and economic decline on marital fertility in Ethiopia, *Demography* 36(2): 247–61.

Lois, D. 2016. Types of social networks and the transition to parenthood, *Demographic Research* 34: 657–688.

Lois, D., and O. Arránz Becker. 2014. Is fertility contagious? Using panel data to disentangle mechanisms of social network influences on fertility decisions, *Advances*

*in Life Course Research* 21: 123–134.

MSPAS. 2015. *Encuesta Nacional de Salud Materno Infantil ENSMI 2014-2015 [2014-2015 DHS]*. Guatemala City: MSPAS, INE, Segeplán.

Namasivayam, A., P. A. González, R. C. Delgado, and P. C. Chi. 2017. The Effect of Armed Conflict on the Utilization of Maternal Health Services in Uganda: A Population-based Study, *PLOS Currents Disasters* Oct 3: 1–12.

Neal, S., N. Stone, and R. Ingham. 2016. The impact of armed conflict on adolescent transitions: a systematic review of quantitative research on age of sexual debut, first marriage and first birth in young women under the age of 20 years, *BMC Public Health* 16(1): 225.

Neupert, R. F., and V. Prum. 2005. Cambodia: Reconstructing the Demographic Stab of the Past and Forecasting the Demographic Scar of the Future, *European Journal of Population* 21: 217–246.

Nobles, J., E. Frankenberg, and D. Thomas. 2015. The Effects of Mortality on Fertility: Population Dynamics After a Natural Disaster, *Demography* 52(1): 15–38.

Obermeyer, Z., C. J. L. Murray, and E. Gakidou. 2008. Fifty Years of Violent War Deaths from Vietnam to Bosnia: Analysis of Data from World Health Survey Programme, *British Medical Journal* 336(7659): 1482–1486.

Pörtner, C. C. 2006. *Gone with the Wind? Hurricane Risk, Fertility and Education*. University of Washington (unpublished).

Preston, S., P. Heuveline, and M. Guillot. 2001. *Demography: measuring and modeling population processes*. Malden, MA: Blackwell Publishers.

Rahim, H. F. A., L. Wick, S. Halileh, S. Hassan-Bitar, H. Chekir, G. Watt, and M. Khawaja. 2009. Maternal and child health in the occupied Palestinian territory, *The Lancet* 373(9667): 967–977.

Randall, S. 2005. The Demographic Consequences of Conflict, Exile and Repatriation: A Case Study of Malian Tuareg, *European Journal of Population* 21(2–3): 291–320.

Reher, D. 2015. Baby booms, busts, and population ageing in the developed world,

*Population Studies* 69(Sup1): S57–S68.

Reher, D., and M. Requena. 2014. Was There a Mid-20th Century Fertility Boom in Latin America?, *Revista de Historia Económica / Journal of Iberian & Latin American Economic History* 32(3): 319–350.

Ritchie, J., and J. Lewis (Eds.). 2003. *Qualitative research practice: a guide for social science students and researchers*. London: Sage Publications.

Roberts, B., K. F. Ocaka, J. Browne, T. Oyok, and E. Sondorp. 2008. Factors associated with post-traumatic stress disorder and depression amongst internally displaced persons in northern Uganda, *BMC Psychiatry* 8(1): 38.

Rodgers, J., C. John, and R. Coleman. 2005. Did fertility go up after the Oklahoma City bombing? An analysis of births in metropolitan counties in Oklahoma, 1990–1999, *Demography* 42(4): 675–692.

Santiso-Galvez, R., and J. T. Bertrand. 2004. The Delayed Contraceptive Revolution in Guatemala., *Human Organization* 63(1): 57–67.

Schindler, K., and T. Bruck. 2011. The Effects of Conflict on Fertility in Rwanda, *Policy Research Working Paper* (June): 47.

Schott, R. M. 2011. War rape, natality and genocide, *Journal of Genocide Research* 13(1–2): 5–21.

Staveteig, S. E. 2011. *Genocide, nuptiality, and fertility in Rwanda and Bosnia-Herzegovina*. Berkeley: University of California.

UNHCR. 2018. *Global Trends: Forced Displacement in 2017*. Geneva: United Nations High Commissioner for Refugees.

Van Bavel, J., and D. S. Reher. 2013. The baby boom and its causes: What we know and what we need to know, *Population and Development Review* 39(2): 257–288.

Ward, J., and M. Marsh. 2006. Sexual Violence Against Women and Girls in War and its Aftermath: Realities, Responses, and Required Resources, *Symposium on Sexual Violence in Conflict and Beyond* 21(June): 23.

Warner, F. R. 2007. Social Support and Distress among Q'eqchi' Refugee Women in Maya Tecun, Mexico, *Medical Anthropology Quarterly* 21(2): 193–217.

Watkins, S. C., and J. Menken. 1985. Famines in Historical Perspective, *Population and Development Review* 11(4): 647–675.

Westoff, C. F. 2013. The Recent Fertility Transition in Rwanda, *Population and Development Review* 38: 169–178.

Woldemicael, G. 2008. Recent fertility decline in Eritrea: Is it a conflict-led transition?, *Demographic Research* 18: 27–58.

Woldemicael, G. 2010. Declining Fertility in Eritrea Since the Mid-1990s: A Demographic Response to Military Conflict, *International Journal of Conflict and Violence* 4(1): 149–168.