# *Disparities in Gender Preference and Fertility: Southeast Asia and South America in a Comparative Perspective*

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## Abstract

Preference for sons and sex selection against females is commonly widespread in a number of Asian and East European countries. However, while robust son-bias has been widely studied in several countries of these regions, much less attention has been given to research on contraception and fertility in Latin America. The aim of this paper is to compare the intensity of gender preference in selected countries of Southeast Asia (Cambodia, Indonesia, Laos, Malaysia, Vietnam, Thailand and Vietnam) and South America (Argentina, Brazil, Colombia, Ecuador, Mexico and Uruguay) at the beginning of the 21st century by calculating to what extent parents adapt their fertility behavior to ensure the birth of preferred sex. Using census data from Integrated Public Use Microdata Series-International (IPUMS-I) derived from the 2010 round, we calculate parity progression ratios (PPRs) according to the sex composition of siblings, including variations on educational levels.

## Introduction

Preference for children of a certain sex, –usually, preference for sons which fosters sex selection against females– is commonly widespread in several Asian and East European countries[1]. At the population level, sex-selection behaviors lead to skewed sex ratios at birth, which has adverse consequences in the long run, as seen in the Chinese, Indian and Korean cases –few potential partners for men and an increased likelihood of coerced marriages or other kinds of violence against women (Attané 2006, Guilmoto 2012; Bongaarts 2013). Thus, the masculinization of sex ratios at birth has been seen as a general concern in countries where son preference predominates, especially where it is more dramatically combined with poorer health, less schooling and higher mortality for girls.

In fact, when Sen (1990) famously estimated that there were more than 100 million "missing women", the focus was precisely on female neglect –gender discrimination in access to nutrition and health care–, resulting in higher female mortality. Now, prenatal sex selection might be replacing postnatal discrimination against women, even when both occur in several countries such as India or China. In any case, there are 1.7 million missing female births in 2015 alone, mostly in Asian countries (Bongaarts and Guilmoto 2015).

While sex selection has been widely studied in these regions, much less attention has been given to other regions, such as Latin America and the Caribbean. The aim of this paper is to compare the intensity of gender preference in selected countries of Southeast Asia (Cambodia, Indonesia, Laos, Malaysia, Vietnam, Thailand and Vietnam) with South America (Argentina, Brazil,

[1] Sex preference for children has been measured in some African countries as well, but prenatal sex selection has not emerged yet.

Colombia, Ecuador, Mexico and Uruguay) at the beginning of the 21st century by calculating to what extent parents adapt their fertility behavior to ensure the birth of preferred sex.

Prenatal sex selection not only includes sex selective abortions, but also differential stopping behavior, one of the main mechanisms that people or couples use to select the sex composition of their offspring. The masculinization of sex-ratios at birth has been partially explained as a general concern in family planning choices where son preference predominates. Some explanations offered have focused on the gap between improvements in women's socioeconomic status and persistent gender inequality. Economic development and the linked fertility decline observed on those two continents are likely to affect average family sizes and, accordingly, the level of sex selection ("fertility squeeze effect").

In our paper, we will look at sex differentials that can be explained by gender preferences, due to traditions, values and social norms. These gender inequalities have consequences on the way children are raised and on their parents' expectations. In comparing selected regions of the world, this research provides an up-to-date picture of Southeast Asian and Latin American women's fertility intentions and fertility behavior differences. The relationships among family size, sex ratio at birth, birth order and the proportion of couples choosing to "employ sex selection" in the selected countries offers an important opportunity to test the hypothesis of preference for sons between countries. This study will speak to concerns around gender inequality and enable us to contribute to debates around fertility in the Global South and the links between these two regions.

## Background

### Son preference around the world

Evidence on sex preferences around the world is extensive but focused mainly on regions and countries where son preference tends to be prominent, and can be measured in reproductive behaviors. Those are mostly countries from a band stretching from North Africa (Morocco, Tunisia, and Egypt), through the Near East, Central Europe and Caucasus (Albania, Azerbaijan, Armenia, Georgia), to South Asia (India, Bangladesh, Nepal) and East Asia (China, South Korea, Vietnam) (Arnold, 1997; Rai et al 2014; Hatlebakk 2012; Brunson 2010; Gupta et al 2017; Haughton and Haughton 1995; Guilmoto 2012; Calhoun et al. 2013; Das Gupta et al. 2003; Murphy et al. 2011; Chung et Das Gupta 2007; Duthé et al. 2012; Maksymovych et al. 2018). Rossi & Rouanet (2015) have shown that in North Africa, a strong son preference not only persisted but increased over time. Some of the clearest cases of son preferences in the world are India, Bangladesh, Egypt, and Nepal. (Rai et al 2014: Hatlebakk 2012; Brunson 2010).

Instead, there is a very slight preference for women in some Latin American countries like Colombia or the Dominican Republic (Arnold, 1997) and also in some Caribbean countries. Since the 1990s, many countries where son preference used to prevail, changed to more indifferent sex preferences, as Lin (2009) shows for Taiwan. In other cases, as in India, "historical son-preference has continued unabated into the modern era" (Bhalla, Kaur, & Agrawal, 2013:3). In Europe, when there is any preference at the country level, it is for a mixed-sex composition of children. Hank & Kohler (2000) also found girl preference in the Czech Republic, Lithuania, and Portugal. All these trends can change quite rapidly. For instance, in parts of Germany, preference for sons and preference for girls have been detected in different decades (Brockmann, 1999).

Sex preference tends to be derived from the actual composition of births[2], but attitudinal sex preference is also part of the research agenda. Fuse (2010) studied it in 40 countries, concluding that while the most popular type of preference in most countries is a mixed-sex composition, the prevalence of son and daughter preferences can vary heavily across countries and regions. Her results confirm that daughter preference can be found in some Latin American countries and Southeast Asian countries, while son preference is prevalent in Southern Asia, Western Asia, and

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[2] Some authors also link gender preferences to differential birth spacing (Rossi & Rouanet, 2015).

Northern Africa. In sub-Saharan Africa, son preference prevails in about two-thirds of the countries. Within countries, socioeconomic variables explain variation in gender preferences.

In any case, attitudinal sex preference might entirely translate into reproductive behavior –when couples have the means to stop subsequent births or practice sex-selective abortion–, or not. When it does, it is relevant to observe which behavior is used to implement selection. Altindag (2016) points out that son-biased differential stopping behavior tends to be more common in Central Asia (Filmer et al 2009) and North Africa (Basu & De Jong, 2004), while in other countries (China, India, South Korea) this behavior coexists with sex-selective abortions.

Sex preferences are embedded in cultural traditions and norms. Although they do not emerge from a single set of historical and cultural experiences (Arnold, 1997), son preference tends to be the norm in traditional family systems. Having a son is an investment, considering patrilineal and patrilocal rules and inheritance patterns, reproduction of the lineage, and how they may act as old age insurance for parents in a sort of primitive social security system, given that they are supposed to remain in the house. Sons also tend to be more valuable on the farm or in any family business, and provide adittional household help from the daughter in law or from dowry payments (Bhalla, Kaur, & Agrawal, 2013; Rai et al 2014).

Modernization and socioeconomic development is expected to change most of these structures, as in modern societies, children are not a source of resources, but are instead valued for social and psychological reasons. In that context, subtler reasons emerge, and sex preferences might change. For instance, each partner might prefer to have at least one child of his or her sex for the purpose of companionship (Jacobsen, 1999). Specific historical contexts matter as well. Hank & Kohler (2000) mention studies in the USA –during the Vietnam war– and in Israel, suggesting that in times of military crisis, a slight preference towards daughters emerges, since parents want to avoid losing a son in combat.

What should be expected? Anderson et al (2006) argue that countries with higher gender equality might show no sex preferences. In Europe, when there is any preference at the country level, it is usually for a mixed-sex composition of children. However, data for Nordic countries do not support the sex indifference hypothesis and show new sex preferences instead. A mixed composition is preferred in two-children couples, but for third births, there is a slight preference for girls in Denmark (also in Jacobsen et al 1999), Sweden and Norway and a slight preference for boys in Finland. Hank & Kohler (2000) also found girl preference in the Czech Republic, Lithuania, and Portugal. All these trends can change quite rapidly. For instance, in parts of Germany, preference for sons and preference for girls have been detected in different decades (Brockmann, 1999).

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[3] Some authors also link gender preferences to differential birth spacing (Rossi & Rouanet, 2015).

while in other countries such as China, India, South Korea or Vietnam (Pham et al. 2012), this behavior coexists with sex-selective abortions.

### Demographic and social consequences of sex preferences

These preferences have consequences at the population level. For instance, preference for a mixed-sex composition tends to increase fertility. Kippen et al (2007) estimate that it added 3% to the fertility of Australian cohorts. Parents looking for one or more children of a given sex may have more offspring than previously intended ("the desire for a son is the father of many daughters" (Seidl 1995). In fact, in any population with some sex preferences, reproductive decision-making might be affected, impacting on the reproductive behaviors of women and couples. In countries with strong son preference, there is a higher prevalence of contraception after the birth of a son than after the birth of a daughter (Arnold, 1997).[4]

Counter-intuitive as it may sound, in a population with a differential stopping mechanism, no matter how strong its use might be, the sex ratio of all births can be normal and not vary by birth order –considering that there is no sex selective abortions or other mechanisms of sex selection. This behavior should be measured by other indicators, such as Sex Ratio of Last Birth (SRLB) : the proportion of last births that are boys can be quite much higher than 0.51. Differential stopping behavior has other consequences, mostly at the household level, as daughters may grow up with more siblings than sons and are born earlier than their male siblings. Basu & De Jong (2004) notice both this *sibling effect* and *birth-order effect* in many countries in South Asia, Southeast Asia, and North Africa. The former can make girls face more competition for family resources (Rossi & Rouanet, 2015), while the latter can be also detrimental to girls, as parents might delegate the care of younger children to the older children in the household (Basu & De Jong, 2004).

Son preference can also alter the Sex Ratio at Birth (SRB), but this happens when sex-selective abortion is one of the gender preference mechanisms, not when preference is implemented exclusively by male-biased differential-stopping behavior (Altindag, 2016). Sex selection can produce impressive male-skewed SRB, as in the case of South Korea in the 1990s: 196 in third-births and 229 in fourth births. Nowadays, the world's sex ratio at birth is 107 boys for 100 girls, and the highest sex ratio at birth can be found in Vietnam (112.3 in 2015-2020), Azerbaijan (112.5 in 2015-2020) and China (113 in 2015-2020) (World Population Prospects 2019, UNDP). As Bongaarts (2013) recalls, for most of human history, the SRB was never above the natural level –around 105 boys per 100 girls. This continued to be the case even during much of the fertility transition in countries with strong son preference. Quite recently, sex ratios at birth have increased, mostly in Asia –due to access to ultrasonography, allowing couples to know the sex of the fetus, and fertility decline, decreasing the probability to have a son.

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### Sex preference and fertility decline. The "fertility squeeze"

Economic development and female education might reduce son preference, but counterintuitively, it might also worsen sex ratio at birth at the same time, given that it reduces desired and actual family size. With a decreasing family size, the influence of the sex composition of previous children on fertility behavior should increase (Wood & Bean 1977; Jayachandran, 2014), through the so-called *fertility squeeze effect* (Guilmoto 2009). Let us imagine a couple that desires to have at least one son. Their probability of remaining sonless –if it is left to chance– decrease

[4] Mortality also plays a role, as son preference means having one (or more) *surviving* sons.

exponentially with fewer children, so they might feel a big incentive to revert to sex selection at low birth orders. If a couple wants to have at least one son, it is very unlike to fail if they have 4 or 5 children. But there is a 24% chance if they have two children. Data support this hypothesis, i.e., fertility decline can explain roughly half of the increase in the sex ratio at birth in India (Jayachandran, 2014).

Then, considering that son preference might be reduced while a worse sex ratio at birth might arise at the same time, sex ratio at birth bias becomes increasingly hyper-sensitive to fertility changes. In fact, this is the case for India, in 1991-2006 (Bongaarts, 2013), visible through its geographic heterogeneity in sex selection at second- and third-order births (Aksan 2019). This is also visible though the link between fertility squeeze and sex preference in the context of China's *one-child policy* (Yang 2012). Certainly, the pace of this change depends on a rapid diffusion of prenatal sex determination technology combined with small but growing propensities to abort at low birth parities (Dubuc & Sivia, 2017)

In the context of low fertility, a small proportion of sex-selecting parents is enough to distort the SRB. The lower the average family size, the less number of interventions is needed to distort the SRB at the population level, in a "disproportionality" effect that applies synergistically with the *fertility squeeze* effect (Dubuc & Sivia, 2017). Through a simulation approach, Kashyap & Villavicencio (2016) show that sex ratio at birth distortions can emerge even with low levels of son preference (just 20%-30% wanting at least one son), given that many mechanisms of sex selection intervene (fertility decline, sex preference and diffusion of technology for sex selective abortions).

### Trends in the sex ratio at birth

In the decades to come, two opposite forces will play a role in defining the sex composition of children, as more gender equity will influence a decline in son preference but an intensification of its effect on the population structure (the "intensification effect" of selecting at earlier parities, described by Gupta and Bhat (1997)) can emerge with the co-incident decline in fertility (Bhalla, Kaur, & Agrawal, 2013). This may be the reason why women's education and job opportunities have played a smaller role in the fertility decline in India than in other Asian countries (Aksan 2019 ; Dharmalingam, Rajan and Morgan 2014)[5].

Up to now, SRB has returned to normal values in South Korea, since its peak of 115 in the 1990s, and it is decreasing in countries of the South Caucasus, since their peak values at the end of the century –117 in Azerbaijan in 2002, 119 in Georgia in 1998, and 116 in Armenia in 2001– (Guilmoto, 2009). However it is stabilizing at a high value in China and in Vietnam (Becquet & Guilmoto, 2018) and it is worsening in other countries, such as India (Aksan, 2019). The stylized model that may be behind these trends is a "sex ratio transition", whereby son preference declines through the fertility transition, and both SRB and SRLB first increases and then gets back to natural levels, as population dynamics become post-transitional (Bongaarts, 2013). This model may be used as a hypothesis. The pace of this transition depends on the counterbalance between son preference and average family size.

Fertility decline comes along a much stronger fertility control. Parents become more effective in achieving their reproductive goals, which might include having at least one son, having children of both sexes or any other preference regarding the sex composition of their children. More specifically, wider availability of technology for implementing sex selective abortions, strong son preference and fertility decline might raise the SRB, while factors as laws banning prenatal sex selection or limiting access to abortion can decrease it (Bongaarts, 2013). Rising gender equality might as well be a factor, although an ambivalent one, as it should decrease son preference but also increase SRB through "fertility squeeze", as it typically decreases the total amount of children per woman. Bhalla, Kaur, & Agrawal (2013) make a more nuanced point with data from India, stating that there is no monotonic relationship between sex ratio at birth and fertility decline, but

[5] Also in India, fertility decline may explain one third to one half of India's recent sex ratio at birth increase (Jayachandran, 2017).

a sort of zig-zag pattern. When parity reaches odd figures the sex ratio at birth worsens (5, 3, 1) and it improves when reaching even fertility levels (4, 2).

### Fertility decline in Latin America

In the last 50 years, fertility has declined very rapidly in Latin America and the Caribbean. In 1970, TFR was around 5 children per woman. In the latest available data, fertility is near replacement level, and few countries in the region have fertility below replacement. Although TFR levels are still considerably heterogeneous, the rest of the countries are rapidly converging, mostly through better access to contraception and parity-specific stopping behavior. After a very steep decline in Central American countries since the 1990s, almost every country in the region has TFR below 3 children per woman. Latin America and the Caribbean is now one of the low fertility regions in the world.

However, fertility decline in Latin America and the Caribbean does not follow the same pattern as in the countries that led this process. The emergent Latin American low fertility regimen is characterized by the decoupling of the rate of decline of adolescent fertility in relation to total fertility decline. Adolescent and early fertility rates remain high, in a low fertility setting (Cabella & Pardo, 2014 ; Rodríguez & Cavenaghi, 2014). Latin American fertility is also characterized by a high number of unplanned pregnancies and a high proportion of children born to consensual unions, an expected result of the Latin American "cohabitation boom" (Esteve, Lesthaeghe, & López-Gay, 2012). Considering that adolescent fertility and poverty (absolute and relative) are strongly associated in all Latin American countries, social inequalities explain most of its unusual trends in reproductive behavior.

The persistence of a pattern of early reproduction coexists with the onset of postponement, which is concentrated among women in the higher educational levels (Rosero-Bixby, Castro-Martín, & Martín-García, 2009). This highly heterogeneous reproductive behavior is reflected in polarization in age at first child, giving place to a peculiar "bimodal pattern" (Pardo & Cabella, 2018; Lima, Zeman, Castro, Nathan, & Sobotka, 2017), at least in the Southern Cone of the region. It also perpetuates a gap between desired and effective fertility, as people from low socioeconomic levels have higher and earlier fertility than the rest and a higher proportion of unwanted pregnancies, while women from other status tend to have fewer children than desired. In the most recent data, adolescent fertility (15-19) and early fertility (20-24) started to fall at faster rates, as also expected by United Nations projections (Cabella & Nathan, 2018). If this trend continues, reproductive behavior will be less unequal, mean age at first birth will be later, and low fertility levels will be consolidated. In any case, the Latin American pattern would continue to be a peculiar case of low fertility regimen, making for an unusual demographic context in which behaviors such as sex preference might take place.

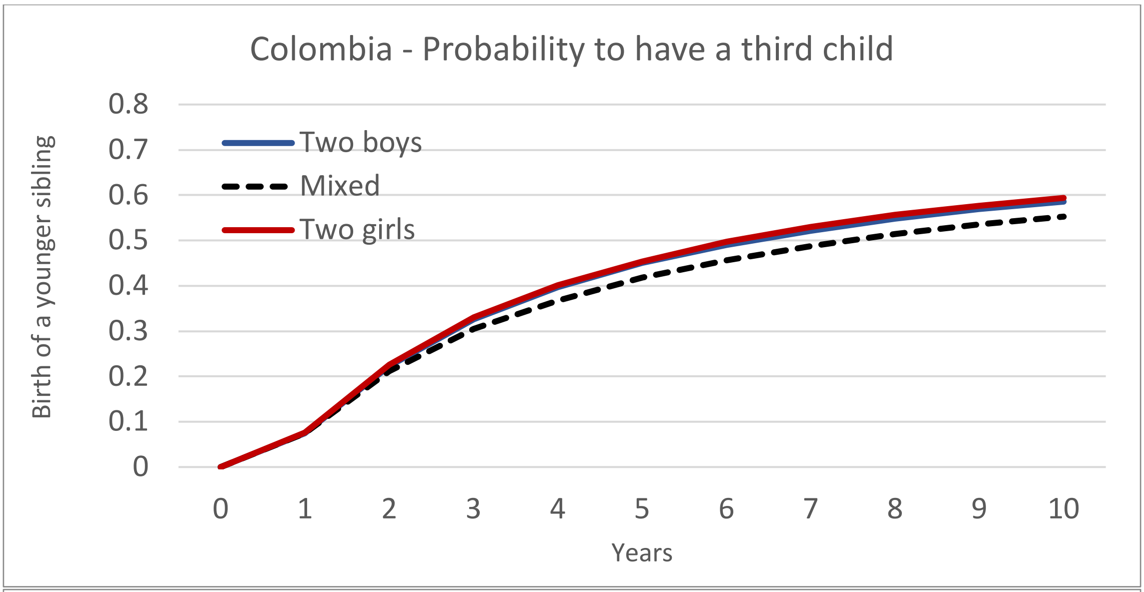
## Data and Methods

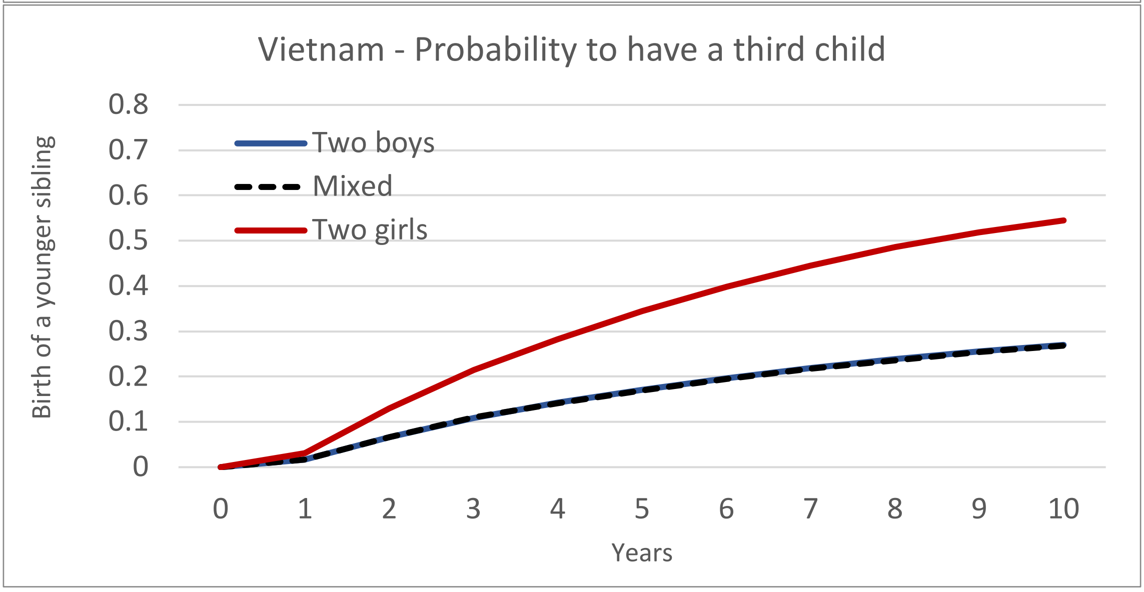
PPRs were calculated according to the sex of the previous children, based on the hypothesis that parents that have a preference for sons have a greater probability of having an additional child if they do not have a son or enough sons yet. This method models fertility behaviors and allows the measure of what Rahman and DaVanzo (1993) call "manifested son preference," following the idea that the desire to have additional children is likely to decrease when the sex composition of children already born is consistent with the preferences of the parents (Hank and Kohler 2003: 142). The method has been used earlier by Haughton and Haughton (1995) and Guilmoto (2012) to explore regional disparities of the absence of a male child in Vietnam, but this research did not examine the sex composition of siblings in detail, nor individual variations.

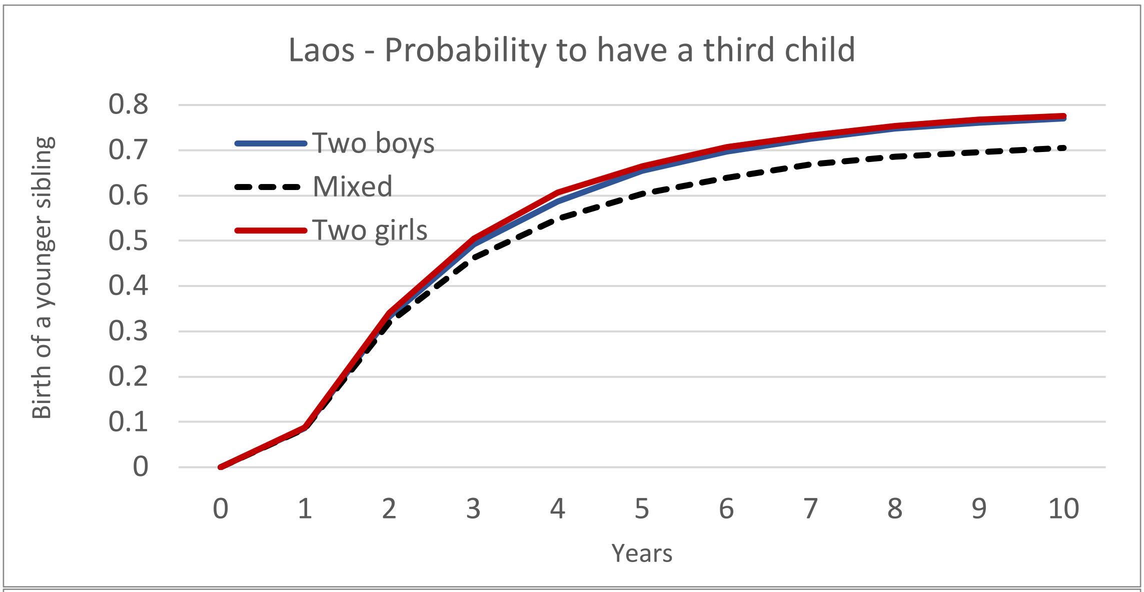
PPRs were calculated based on cohorts of children. To that end, applying the technique described by Guilmoto (2017) and based on the own-children method, we reconstructed a population of siblings using their relation to the household head to classify them. Following the model of synthetic parity progression ratios, these cohorts were classified by parity instead of cohort (Wunsch 2006). We used the Kaplan-Meier estimator to measure the cumulative proportion of children who had a younger sibling before 2010, since our sample is right-censored by the census date. We also used Cox regressions to compare distinct effects of several characteristics.

**Provisional Results**

Probability to have a third child




Laos - Probability to have a third child
Birth of a younger sibling
0.8
0.7
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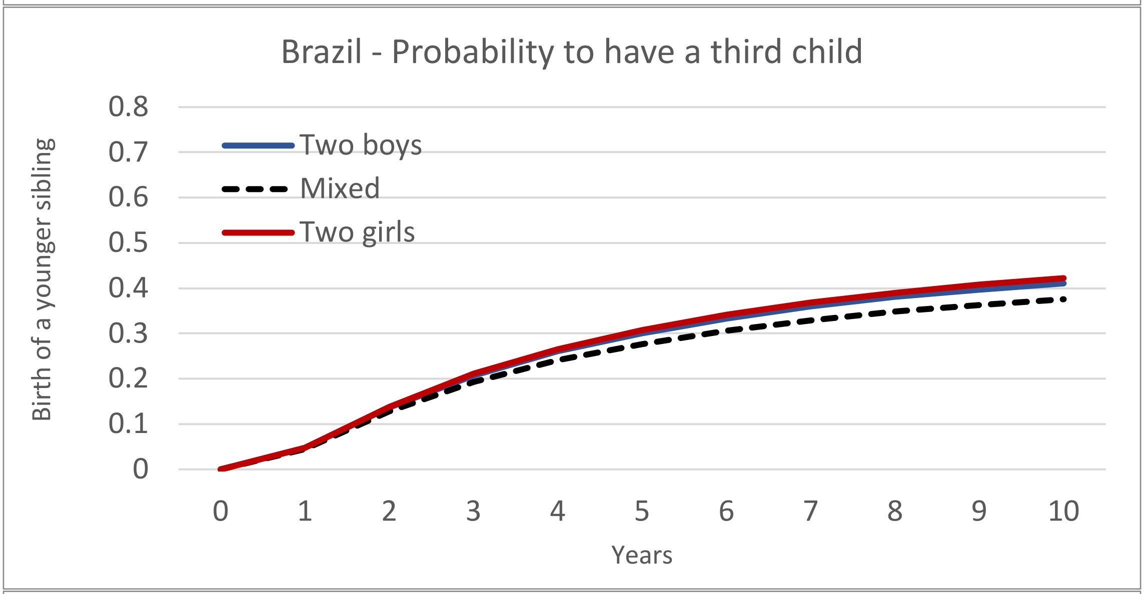
Years
Two boys
Mixed
Two girls


Brazil - Probability to have a third child
Birth of a younger sibling
0.8
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Years
Two boys
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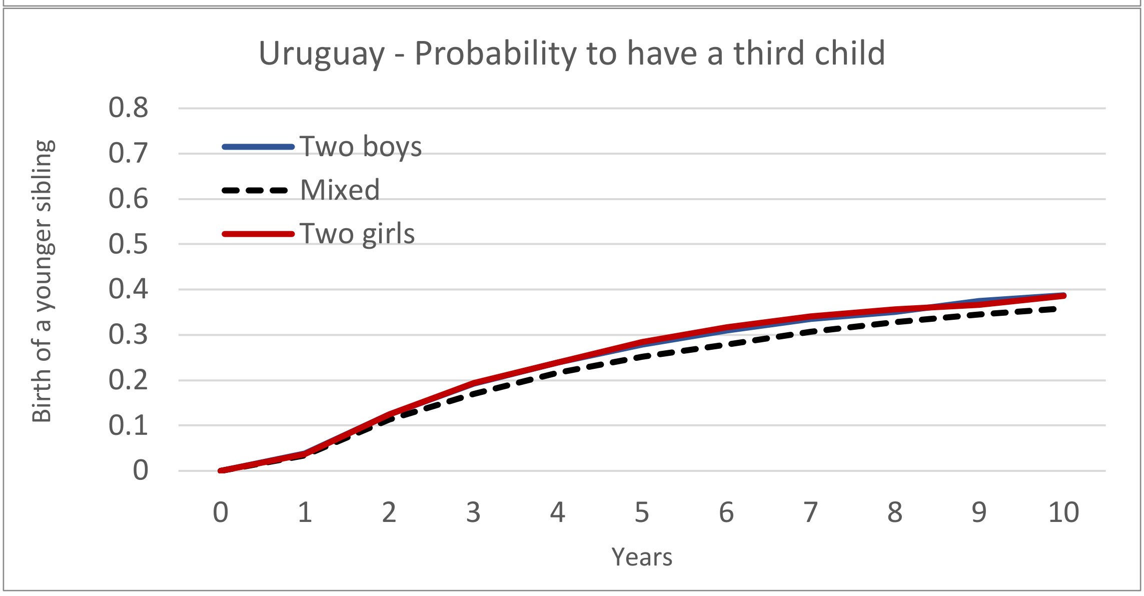
Two girls


Uruguay - Probability to have a third child
Birth of a younger sibling
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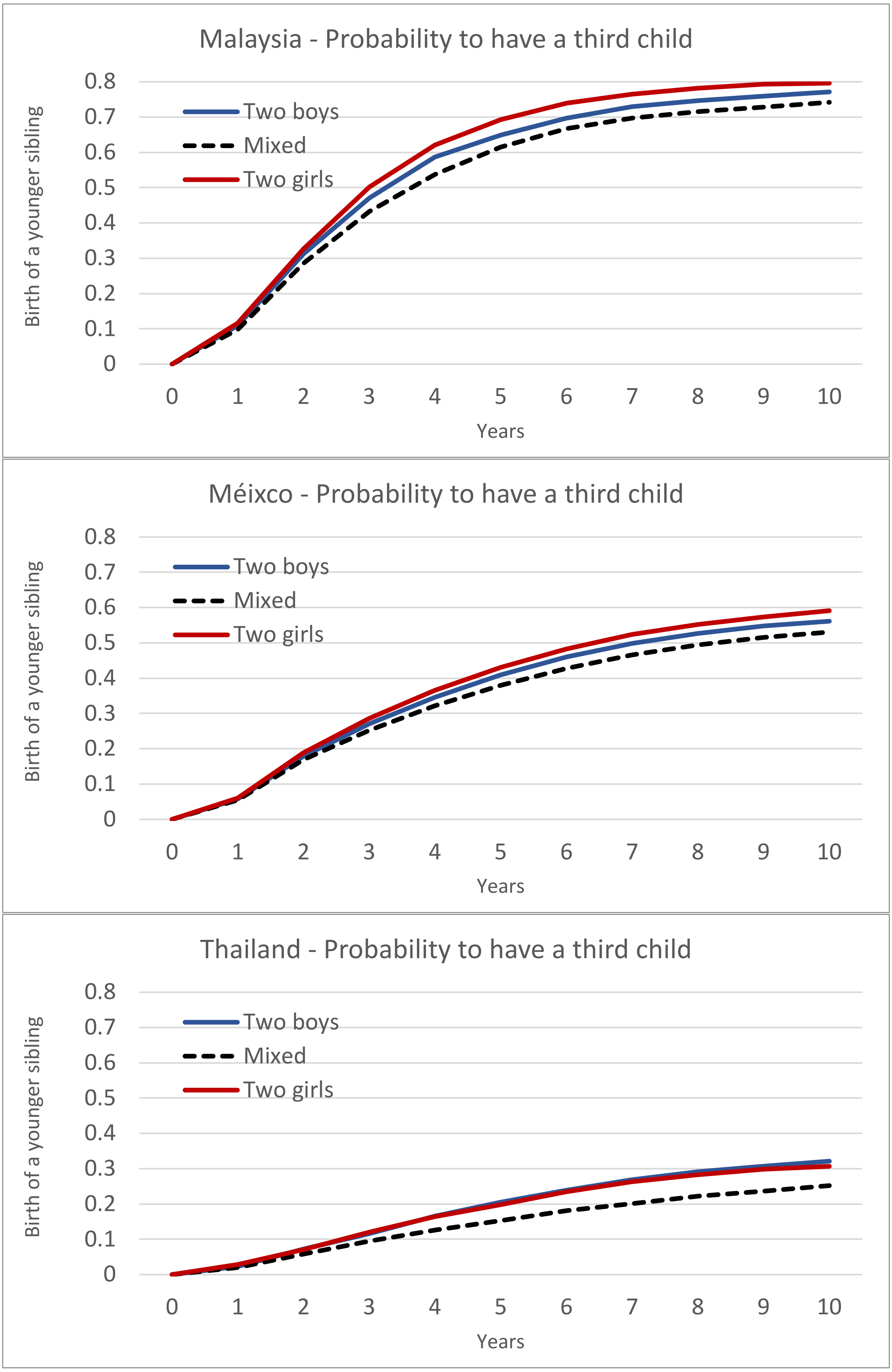
Years
Two boys
Mixed
Two girls



Malaysia - Probability to have a third child
Birth of a younger sibling
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Two boys
Mixed
Two girls
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Years
Méixco - Probability to have a third child
Birth of a younger sibling
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Two boys
Mixed
Two girls
0 1 2 3 4 5 6 7 8 9 10
Years
Thailand - Probability to have a third child
Birth of a younger sibling
0.8
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Two boys
Mixed
Two girls
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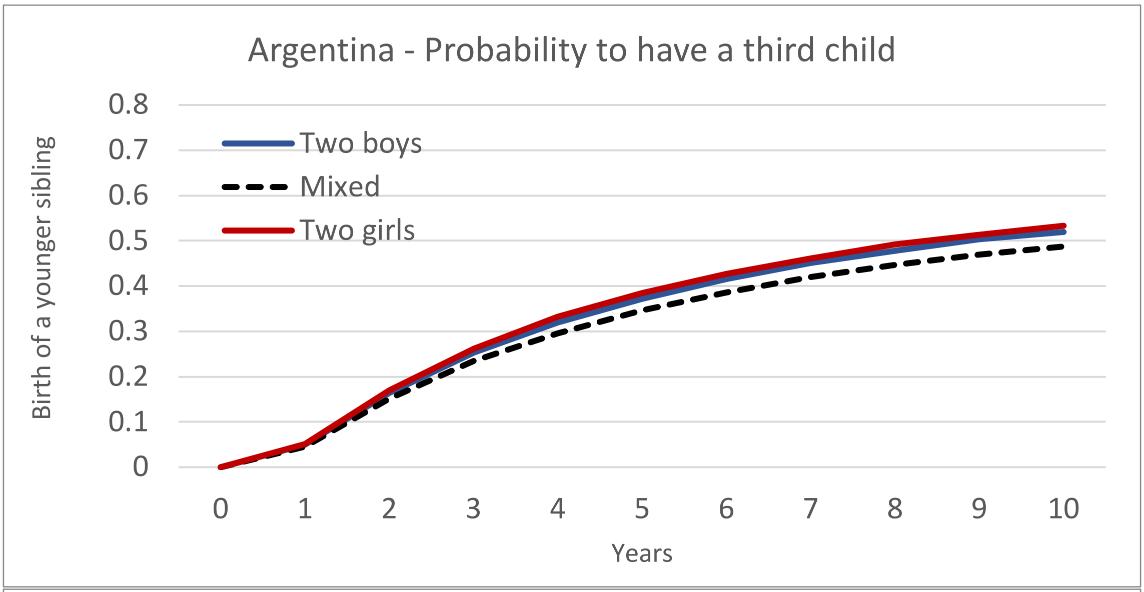
Years


Argentina - Probability to have a third child
Birth of a younger sibling
Years
Two boys
Mixed
Two girls
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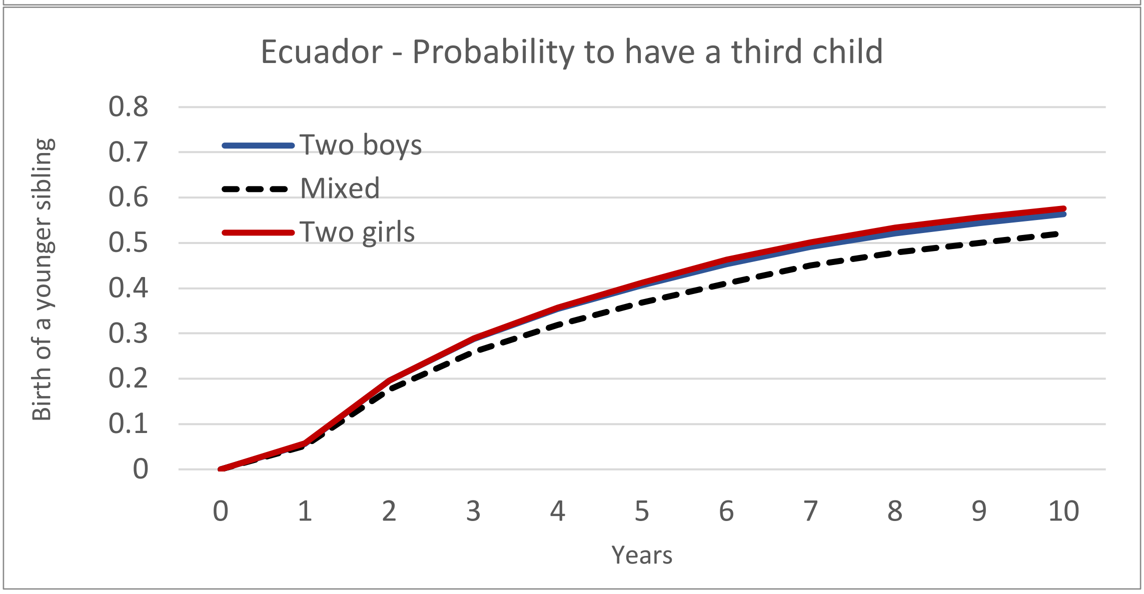
Ecuador - Probability to have a third child
Birth of a younger sibling
Years
Two boys
Mixed
Two girls
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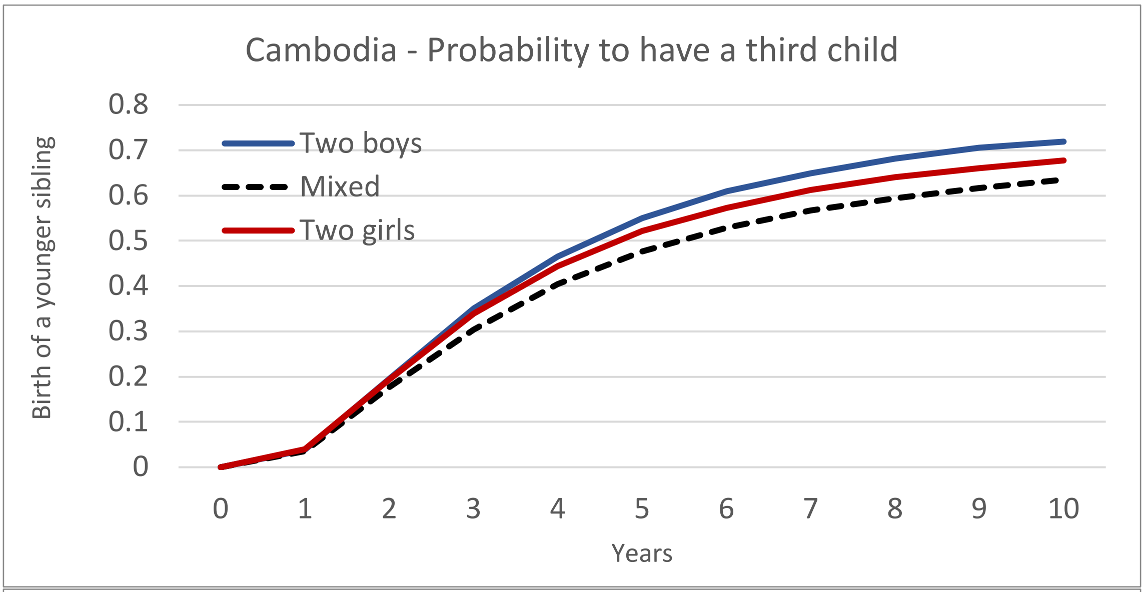
Cambodia - Probability to have a third child
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Birth of a younger sibling
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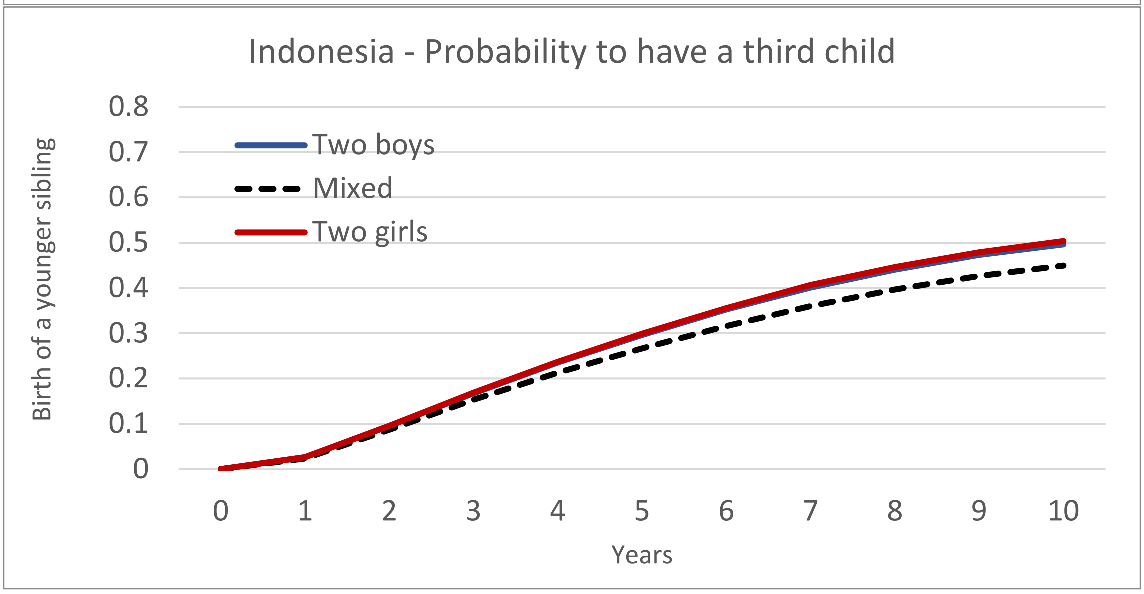
Indonesia - Probability to have a third child
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Two boys
Mixed
Two girls
Birth of a younger sibling
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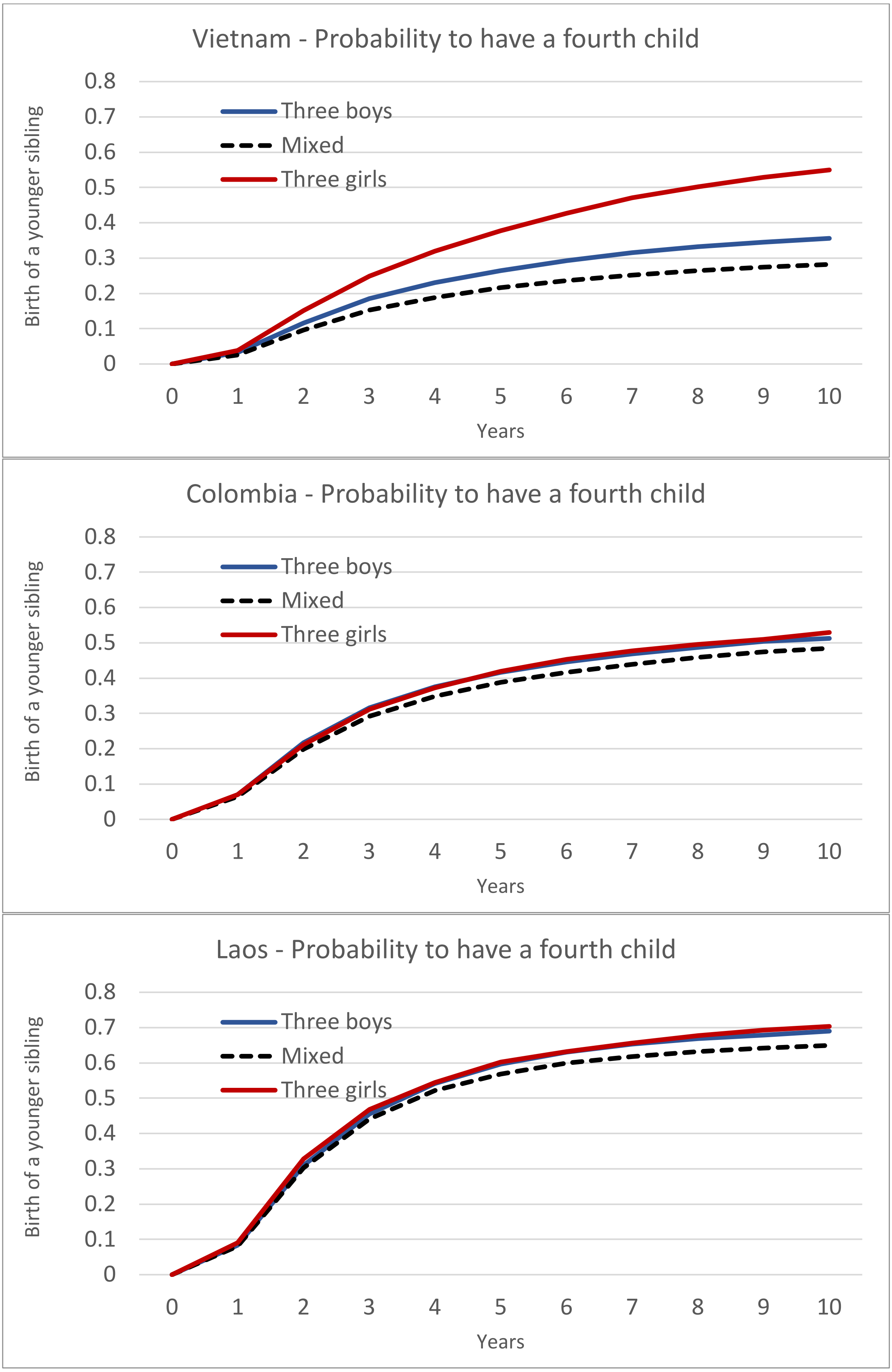
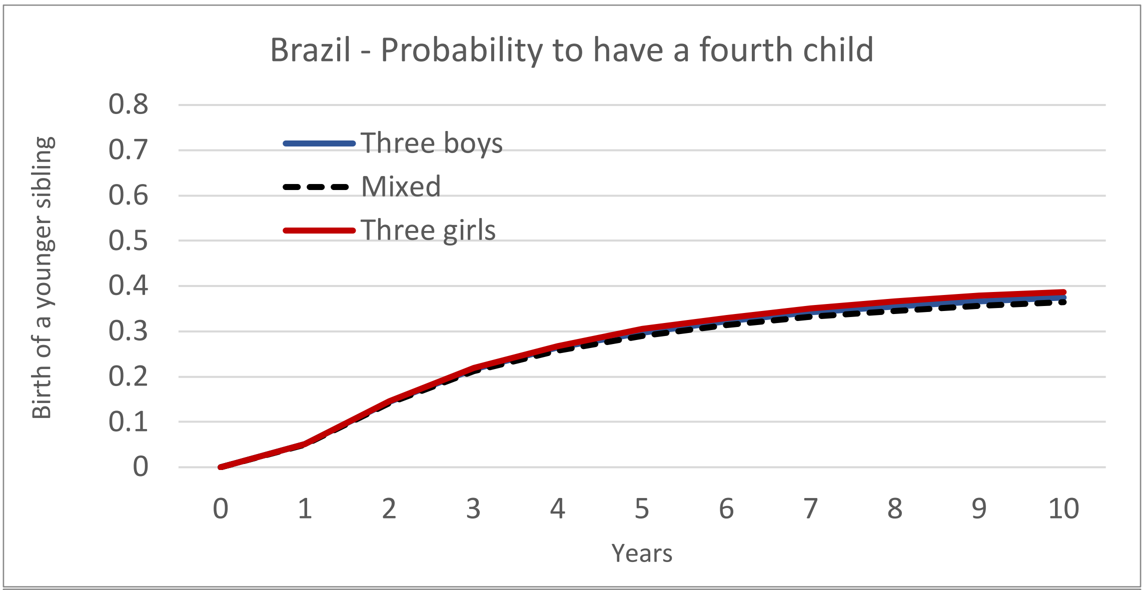
Years

Probability to have a fourth child




Brazil - Probability to have a fourth child
Birth of a younger sibling
Years
Three boys
Mixed
Three girls
0.8
0.7
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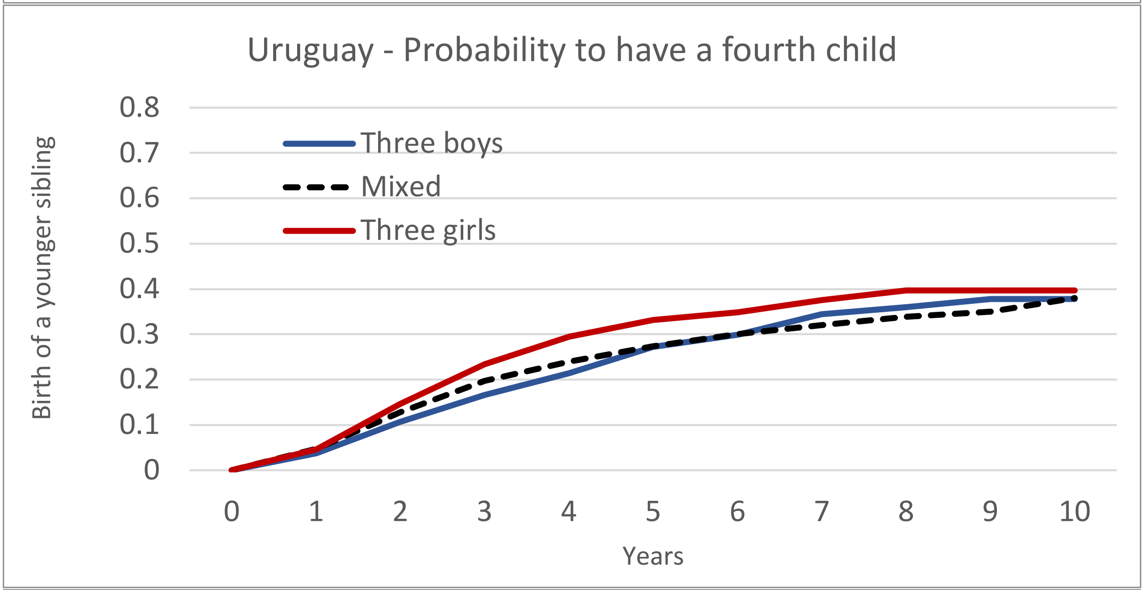
Uruguay - Probability to have a fourth child
Birth of a younger sibling
Years
Three boys
Mixed
Three girls
0.8
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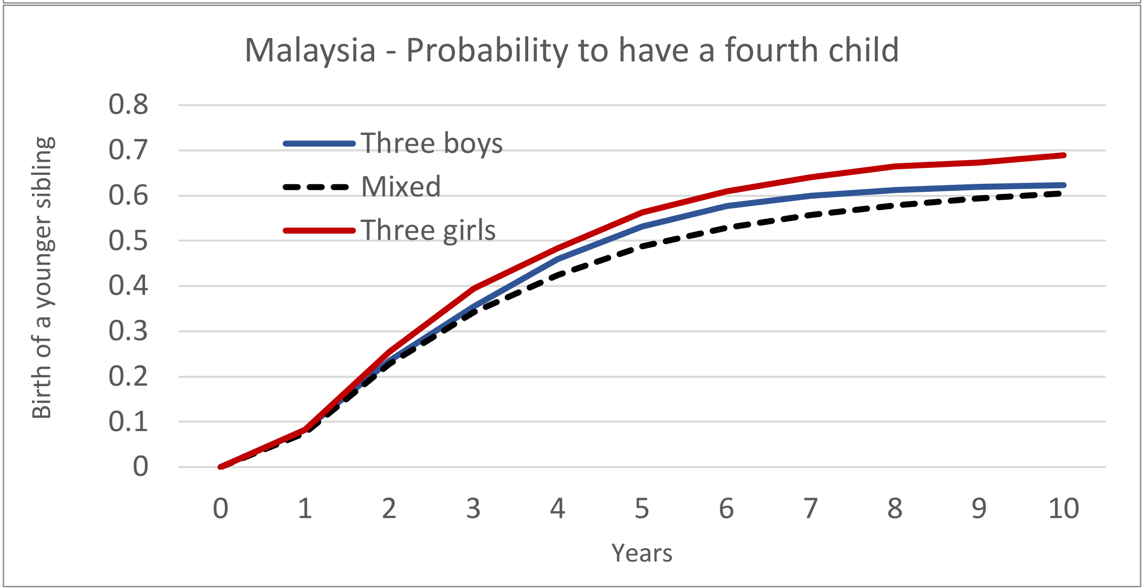
Malaysia - Probability to have a fourth child
Birth of a younger sibling
Years
Three boys
Mixed
Three girls
0.8
0.7
0.6
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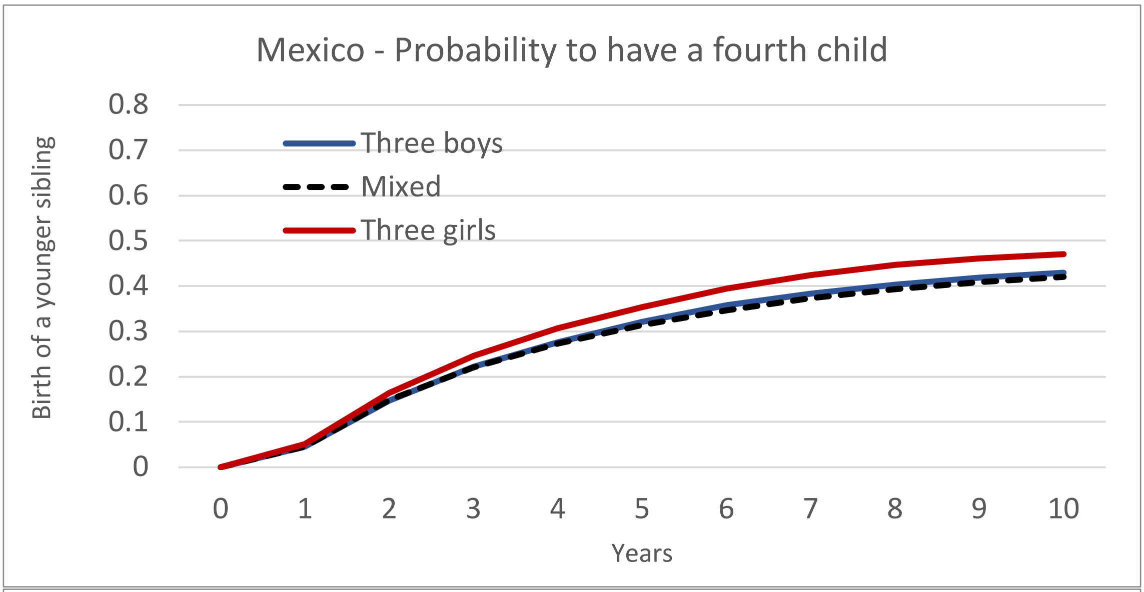
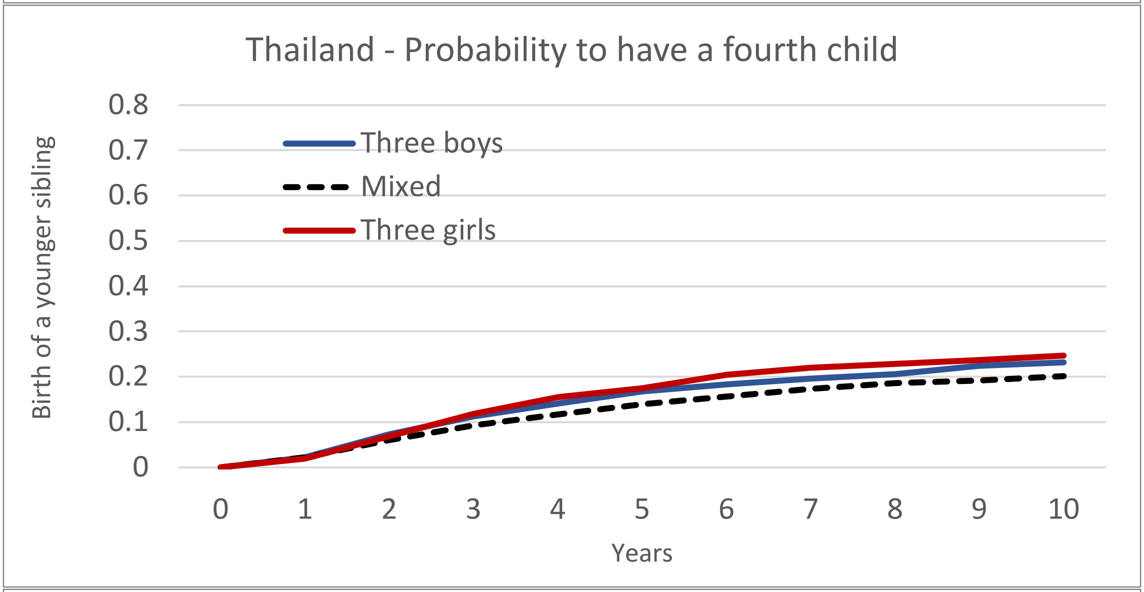
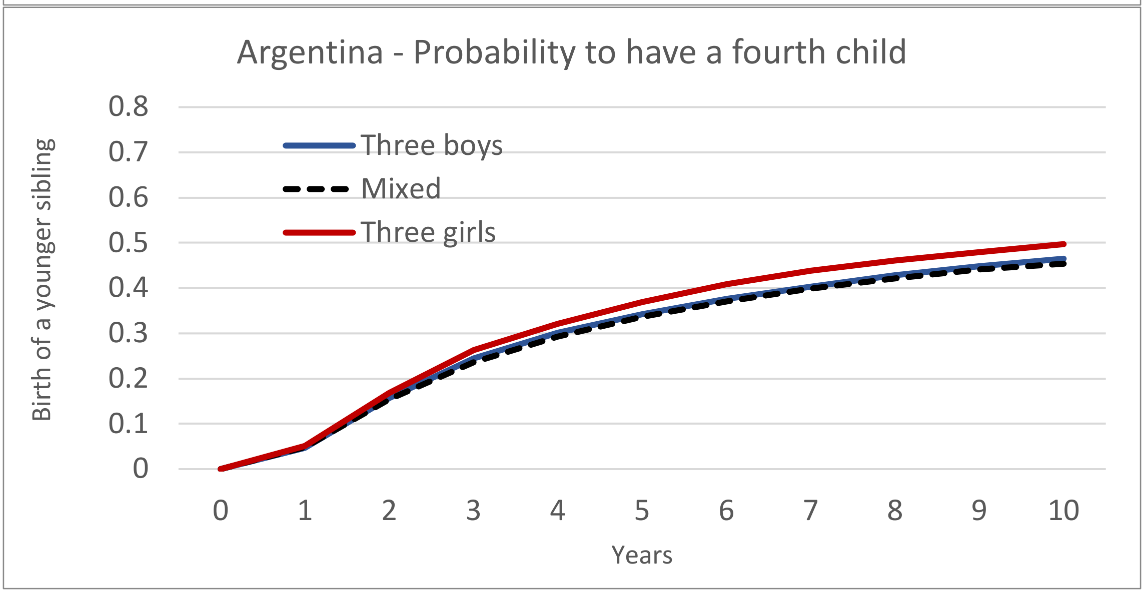
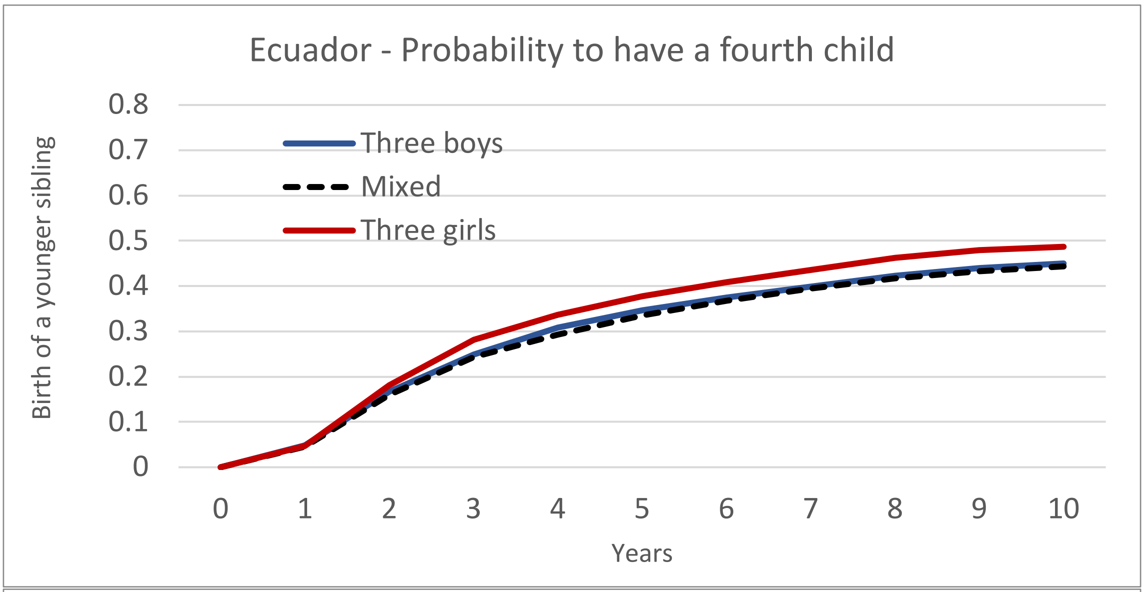
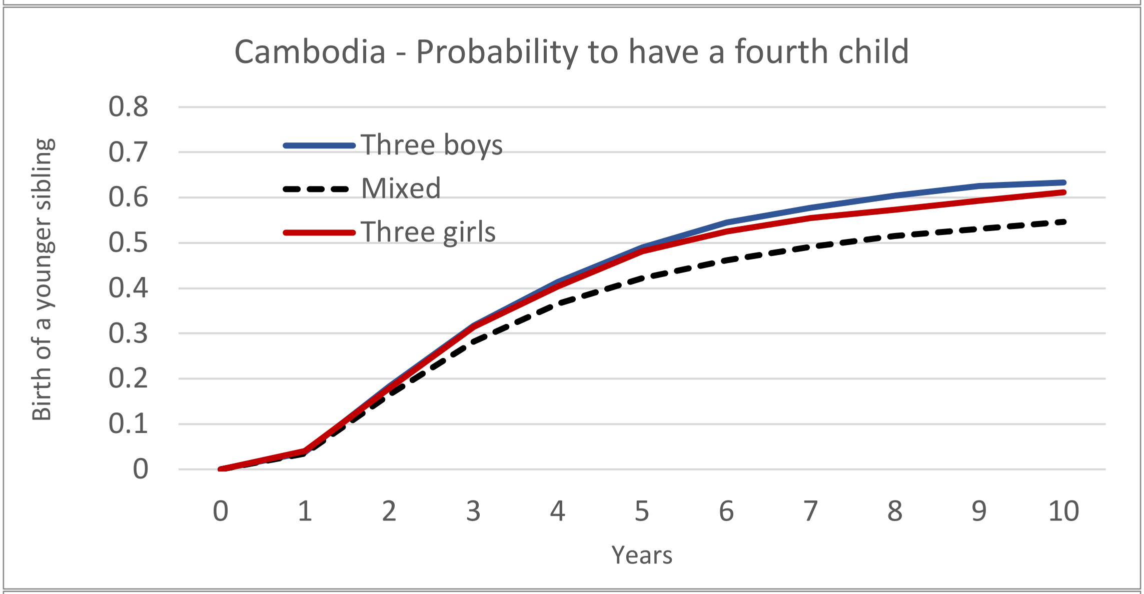
0
0 1 2 3 4 5 6 7 8 9 10

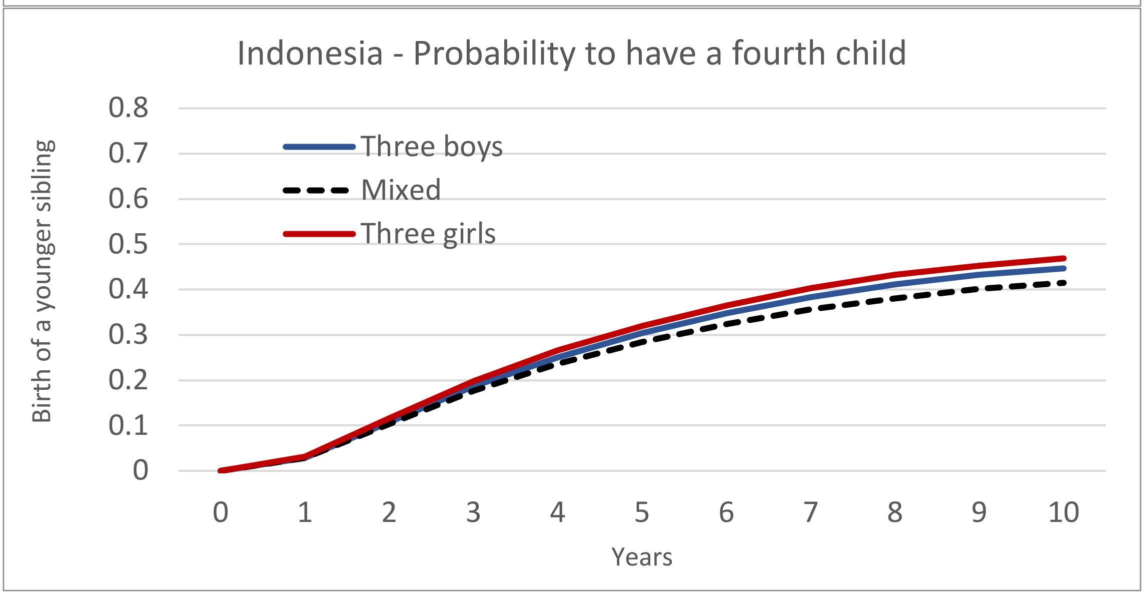

Mexico - Probability to have a fourth child
Birth of a younger sibling
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Three boys
Mixed
Three girls
0 1 2 3 4 5 6 7 8 9 10
Years


Thailand - Probability to have a fourth child
Birth of a younger sibling
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Three boys
Mixed
Three girls
0 1 2 3 4 5 6 7 8 9 10
Years


Argentina - Probability to have a fourth child
Birth of a younger sibling
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Three boys
Mixed
Three girls
0 1 2 3 4 5 6 7 8 9 10
Years


Ecuador - Probability to have a fourth child
Birth of a younger sibling
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Three boys
Mixed
Three girls
0 1 2 3 4 5 6 7 8 9 10
Years


Cambodia - Probability to have a fourth child
Birth of a younger sibling
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Three boys
Mixed
Three girls
0 1 2 3 4 5 6 7 8 9 10
Years


Indonesia - Probability to have a fourth child
Birth of a younger sibling
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Three boys
Mixed
Three girls
0 1 2 3 4 5 6 7 8 9 10
Years

Probability of having a third child (Cox model, Hazard Ratios) by sex composition of prevoius children and control variables .

| | | Latin America | | | | | | Southeast Asia | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Argentina | Brazil | Colombia | Ecuador | México | Uruguay | Cambodia | Indonesia | Laos | Malaysia | Thailand | Vietnam |
| | **Sex composition of previous children** | | | | | | | | | | | | |
| | Mixed (*Ref.*) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | **Two boys** | **1.09*** | **1.12*** | **1.10*** | **1.13*** | **1.09*** | **1.11*** | **1.22*** | **1.14*** | **1.11*** | **1.06*** | **1.36*** | **1.01** |
| | **Two girls** | **1.13*** | **1.15*** | **1.12*** | **1.16*** | **1.18*** | **1.08** | **1.13*** | **1.15*** | **1.15*** | **1.16*** | **1.30*** | **2.33*** |
| | | | | | | | | | | | | | |
| CONTROL VARIABLES | **Residence area** | | | | | | | | | | | | |
| | Rural (*Ref.*) | / | 1.00 | 1.00 | 1.00 | 1.00 | / | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | Urban | / | 0.81*** | 0.84*** | 0.87*** | 0.84*** | / | 0.81*** | 0.89*** | 0.72*** | 0.88*** | 0.96 | 0.72*** |
| | **Parent's characteristics** | | | | | | | | | | | | |
| | Educational attainment mother (*Cont.*) | / | 0.77*** | 0.78*** | 0.81*** | 0.84*** | 0.79*** | 0.82*** | 1.02*** | 0.76*** | 1.06*** | 1.04 | 0.59*** |
| | Educational attainment father (*Cont.*) | / | 0.86*** | 0.89*** | 0.88*** | 0.91*** | 0.82*** | 0.91*** | 1.04*** | 0.89*** | 0.99 | 0.99 | 0.74*** |
| | Indigenous mother | / | 1.59*** | 1.30*** | 1.24*** | 1.10*** | / | / | / | / | / | / | / |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Indigenous father | / | 1.47*** | 1.04 | 1.15** | 1.08*** | / | / | / | / | / | / | / |
| | Observations | 168,207 | 709,801 | 160,047 | 60,724 | 511,128 | 9,899 | 59,894 | 1,277,593 | 26,895 | 21,489 | 25,760 | 742,509 |
| | Log likelihood | -670030.78 | -2539262.80 | -773945.69 | -245924.53 | -2545422.70 | -21596.50 | -291987.60 | -5000651.40 | -150330.39 | -119116.42 | -44581.52 | -1983134.30 |

Note: Children aged 0 to 10.

Results are expressed in hazard ratios.

*** significant at the 0.0005 level ** significant at the 0.005 level * significant at the 0.05 level

Ref. = reference category.

Probability of having a fourth child (Cox model, Hazard Ratios) by sex composition of prevoius children and control variables

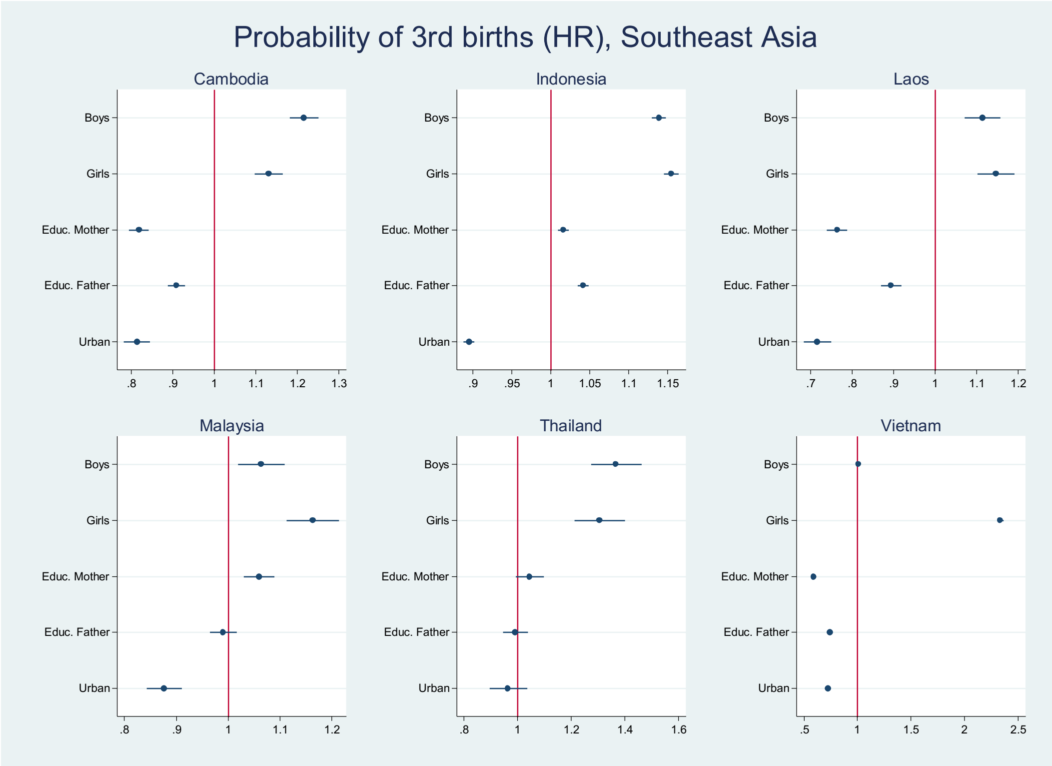
| | | Latin America | | | | | | Southeast Asia | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Argentina | Brazil | Colombia | Ecuador | México | Uruguay | Cambodia | Indonesia | Laos | Malaysia | Thailand | Vietnam |
| | **Sex composition of previous children** | | | | | | | | | | | | |
| | Mixed (*Ref.*) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | **Three boys** | **1.02** | **1.05***** | **1.10***** | **1.06*** | **1.03**** | **0.99** | **1.22***** | **1.08***** | **1.07*** | **1.07*** | **1.17** | **1.23***** |
| | **Three girls** | **1.12***** | **1.09***** | **1.14***** | **1.16***** | **1.18***** | **1.17** | **1.16***** | **1.16***** | **1.13***** | **1.19***** | **1.31**** | **2.20***** |
| | | | | | | | | | | | | | |
| CONTROL VARIABLES | **Residence area** | | | | | | | | | | | | |
| | Rural (*Ref.*) | / | 1.00 | 1.00 | 1.00 | 1.00 | / | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | Urban | / | 0.80*** | 0.77*** | 0.77*** | 0.73*** | | 0.78*** | 0.78*** | 0.62*** | 0.71*** | 0.85* | 0.72*** |
| | **Parent's characteristics** | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Educational attainment mother (*Cont.*) | / | 0.73*** | 0.74*** | 0.75*** | 0.73*** | 0.66*** | 0.78*** | 0.94*** | 0.76*** | 1.06** | 0.99 | 0.58*** |
| | Educational attainment father (*Cont.*) | / | 0.83*** | 0.84*** | 0.84*** | 0.83*** | 0.77*** | 0.86*** | 0.96*** | 0.88*** | 1.00 | 0.97 | 0.68*** |
| | Indigenous mother | / | 1.64*** | 1.33*** | 1.32*** | 1.19*** | / | / | / | / | / | / | / |
| | Indigenous father | / | 1.39*** | 1.11* | 1.19* | 1.16*** | / | / | / | / | / | / | / |
| | Observations | 95932.0 | 316126.0 | 101376.0 | 36469.0 | 323896.0 | 4151.0 | 45219.0 | 640286.0 | 23593.0 | 17806.0 | 8334.0 | 269727.0 |
| | Log likelihood | -343903.5 | -1054955.3 | -408123.9 | -116797.7 | -1205351.3 | -8501.2 | -192201.4 | -2280502.6 | -120648.5 | -76986.0 | -9945.5 | -757039.9 |

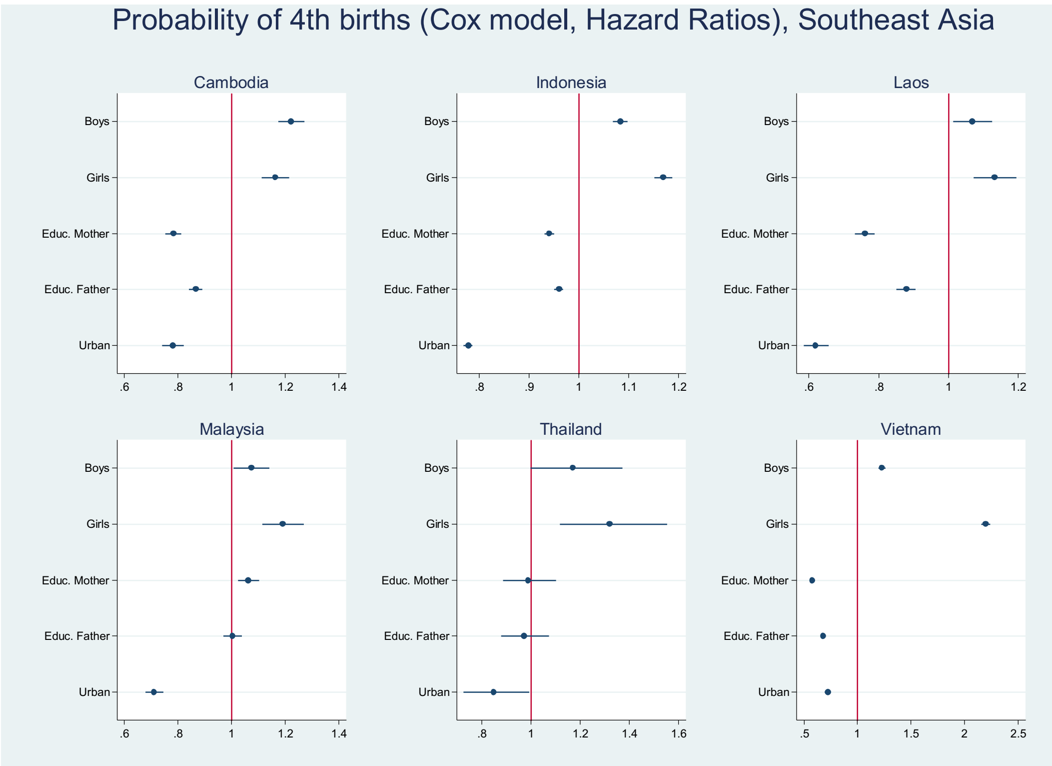
Note: Children aged 0 to 10. / Ref. = reference category.

Results are expressed in hazard ratios.

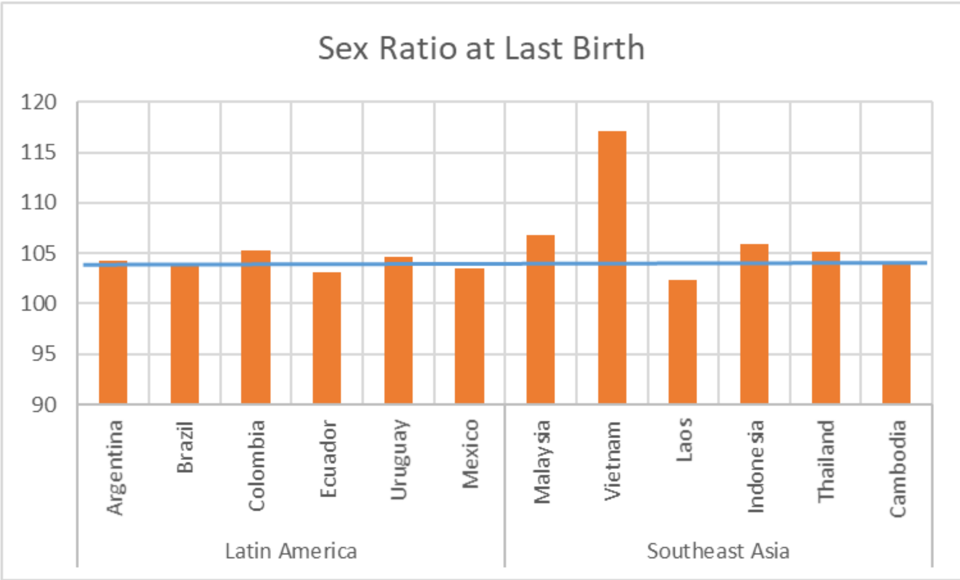
*** significant at the 0.0005 level ** significant at the 0.005 level * significant at the 0.05 level



Probability of 3rd births (HR), Southeast Asia
Cambodia
Indonesia
Laos
Malaysia
Thailand
Vietnam
Boys
Girls
Educ. Mother
Educ. Father
Urban

Probability of 4th births (Cox model, Hazard Ratios), Southeast Asia
Cambodia
Indonesia
Laos
Malaysia
Thailand
Vietnam
Boys
Girls
Educ. Mother
Educ. Father
Urban



Sex Ratio at Last Birth
120
115
110
105
100
95
90
Argentina
Brazil
Colombia
Ecuador
Uruguay
Mexico
Malaysia
Vietnam
Laos
Indonesia
Thailand
Cambodia
Latin America
Southeast Asia

# Probability of progression to next parity by gender composition - hazard ratios (Cox model, Hazard Ratios, no control variables)

*** significant at the 0.0005 level ** significant at the 0.005 level * significant at the 0.05 level

## Argentina

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M | | | | | | | | F | | | | |
| Progression to second birth | | | | 1 | | | | | | | | 1.174192 | *** | | | |
| | | MM | | | | MF | | | | FM | | | | FF | | |
| Progression to third birth | | 1.008049 | | | | | | MIXED = 1 | | | | | | 2.256128 | *** | |
| | MMM | | MMF | | MFM | | MFF | | FMM | | FMF | | FFM | | FFF | |
| Progression to fourth birth | 1.272832 | *** | | | | | | MIXED = 1 | | | | | | | 1.966169 | *** |

## Brazil

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M | | | | | | | | F | | | | |
| Progression to second birth | | | | 1 | | | | | | | | 0.991 | ** | | | |
| | | MM | | | | MF | | | | FM | | | | FF | | |
| Progression to third birth | | 1.1013 | *** | | | | | MIXED = 1 | | | | | | 1.131 | *** | |
| | MMM | | MMF | | MFM | | MFF | | FMM | | FMF | | FFM | | FFF | |
| Progression to fourth birth | 1.032 | *** | | | | | | MIXED = 1 | | | | | | | 1.060 | *** |

## Colombia

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M | | | | | | | | F | | | | |
| Progression to second birth | | | | 1 | | | | | | | | 0.997 | | | | |
| | | MM | | | | MF | | | | FM | | | | FF | | |
| Progression to third birth | | 1.085 | *** | | | | | MIXED = 1 | | | | | | 1.104 | *** | |
| | MMM | | MMF | | MFM | | MFF | | FMM | | FMF | | FFM | | FFF | |
| Progression to fourth birth | 1.089 | *** | | | | | | MIXED = 1 | | | | | | | 1.096 | *** |

## Ecuador

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M | | | | | | | | F | | | | |
| Progression to second birth | | | | 1 | | | | | | | | 1.010 | | | | |
| | | MM | | | | MF | | | | FM | | | | FF | | |
| Progression to third birth | | 1.124 | *** | | | | | MIXED = 1 | | | | | | 1.149 | *** | |
| | MMM | | MMF | | MFM | | MFF | | FMM | | FMF | | FFM | | FFF | |
| Progression to fourth birth | 1.032 | *** | | | | | | MIXED = 1 | | | | | | | 1.145 | *** |

## México

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M | | | | | | | | F | | | | |
| Progression to second birth | | | | 1 | | | | | | | | 1.007982 | * | | | |
| | | MM | | | | MF | | | | FM | | | | FF | | |
| Progression to third birth | | 1.090445 | *** | | | | | MIXED = 1 | | | | | | 1.164159 | *** | |
| | MMM | | MMF | | MFM | | MFF | | FMM | | FMF | | FFM | | FFF | |
| Progression to fourth birth | 1.02297 | ** | | | | | | MIXED = 1 | | | | | | | 1.15307 | *** |

## Uruguay

| | | | |
|---|---|---|---|
| Progression to second birth | M: 1 | | F: 0.950 * |
| Progression to third birth | MM: 1.112 * | MF, FM: MIXED = 1 | FF: 1.119 * |
| Progression to fourth birth | MMM: 0.987 | MMF, MFM, MFF, FMM, FMF, FFM: MIXED = 1 | FFF: 1.186 * |

## Cambodia

| | | | |
|---|---|---|---|
| Progression to second birth | M: 1 | | F: 0.994 |
| Progression to third birth | MM: 1.202 *** | MF, FM: MIXED = 1 | FF: 1.121 *** |
| Progression to fourth birth | MMM: 1.207 *** | MMF, MFM, MFF, FMM, FMF, FFM: MIXED = 1 | FFF: 1.158 *** |

## Indonesia

| | | | |
|---|---|---|---|
| Progression to second birth | M: 1 | | F: 0.997 |
| Progression to third birth | MM: 1.134 *** | MF, FM: MIXED = 1 | FF: 1.148 *** |
| Progression to fourth birth | MMM: 1.083 *** | MMF, MFM, MFF, FMM, FMF, FFM: MIXED = 1 | FFF: 1.154 *** |

## Laos

| | | | |
|---|---|---|---|
| Progression to second birth | M: 1 | | F: 1.016 |
| Progression to third birth | MM: 1.112 *** | MF, FM: MIXED = 1 | FF: 1.142 *** |
| Progression to fourth birth | MMM: 1.065 ** | MMF, MFM, MFF, FMM, FMF, FFM: MIXED = 1 | FFF: 1.095 ** |

## Malaysia

| | | | |
|---|---|---|---|
| Progression to second birth | M: 1 | | F: 1.005 |
| Progression to third birth | MM: 1.099 *** | MF, FM: MIXED = 1 | FF: 1.192 *** |
| Progression to fourth birth | MMM: 1.084 ** | MMF, MFM, MFF, FMM, FMF, FFM: MIXED = 1 | FFF: 1.197 *** |

## Thailand

| | | | |
|---|---|---|---|
| Progression to second birth | M: 1 | | F: 0.991 |
| Progression to third birth | MM: 1.339 *** | MF, FM: MIXED = 1 | FF: 1.311 *** |
| Progression to fourth birth | MMM: 1.178 * | MMF, MFM, MFF, FMM, FMF, FFM: MIXED = 1 | FFF: 1.270 ** |

## Vietnam

| | | | |
|---|---|---|---|
| Progression to second birth | M: 1 | | F: 1.174192 *** |
| Progression to third birth | MM: 1.008049 | MF, FM: MIXED = 1 | FF: 2.256128 *** |
| Progression to fourth birth | MMM: 1.272832 *** | MMF, MFM, MFF, FMM, FMF, FFM: MIXED = 1 | FFF: 1.966169 *** |

## Conclusion
## Discussion
## Bibliography