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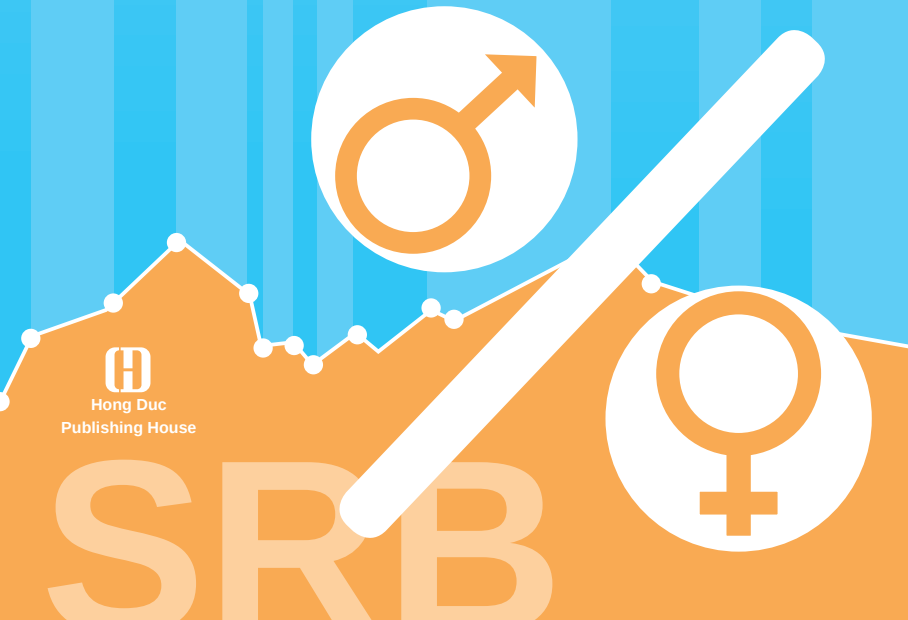
SEX RATIO AT BIRTH IN VIET NAM

New evidence from the Intercensal Population and Housing Survey in 2014



Hong Duc
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BABY POOH

Tables & Figures

1. Introduction

Sex imbalances at birth, observable today in a handful of countries around the world, are manifested in sex ratio at birth (SRB) that rise well above the natural biological level of 105 male births per 100 female newborns. The primary cause of high SRB levels is the practice of prenatal sex selection through sex-selective abortions. Such imbalances not only testify to significant discrimination against women but also herald the emergence of a surplus of adult males in future decades.

No data shows that Viet Nam has experienced with any form of postnatal sex selection. Mortality estimates have long confirmed that survival rates among girls and boys follow international patterns and demonstrate no apparent excess in female mortality, including rural areas where son preference is more pronounced (Le Pham, 2013; GSO, 2011b). The impact of prenatal sex selection found in rising SRBs since the last decade is evident in most parts of Viet Nam, although recording significant regional variation. The 2009 census documented the extent and differentials of prenatal discrimination across Viet Nam (GSO, 2011a). Notably, the ensuing policy response to this phenomenon demonstrated the priority placed by the Vietnamese government on this issue as soon as it became evident.

A major challenge to successful policy implementation is the issue of regular monitoring of progress in reducing prenatal sex selection. In the absence of reliable vital statistics, surveys and census are the major sources for estimating levels and differentials in sex imbalances at birth. In this context, the General Statistics Office (GSO) conducts a population change and family planning survey every year to update population figures. In April 2014 the GSO launched the Intercensal Population and Housing Survey (IPS 2014) – exactly at the midpoint between the 2009 and 2019 Census rounds. In addition to providing updated demographic estimates at national and subnational levels on Viet Nam's population trends, the IPS 2014 provides data that can be used to assess recent SRB trends in the country. The information in this booklet is based on analysis conducted by Dr. Christophe Z. Guilmoto, a demographer with substantive experience in SRB, to share key preliminary findings based on the 2014 IPS data.

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2. SRB in Viet Nam

The sex ratio at birth (SRB) represents the method of determining the distribution of birth by sex. In most parts of the world the SRB fluctuates between 104-106 male births per 100 female births. Birth masculinity may, however, be affected by sex selection when parents decide to avoid births depending on the sex of the fetus. Through the use of ultrasound testing parents may, for instance, resort to abortion if they desire a child of a particular sex – usually a boy. As a consequence, sex-selective abortions may alter the sex ratio at birth and raise it above the standard biological level. The preference for sons is strong in many countries, especially in Asia and Eastern Europe, and this explains why birth masculinity has increased to levels such as 110-120 in some areas over the last thirty years, as shown below in Figure 1. (UNFPA, 2012).

Since the last decade, statistical and field studies have identified a trend towards high SRB imbalance in Viet Nam using various demographic surveys.[1] Several sources are used for estimating the sex ratio at birth, but the 2009 census provides the most reliable figures based on births prior to the census. The SRB in Viet Nam in 2009 was 110.6 male per 100 female according to this source (GSO, 2011a). The IPS 2014 now provides a new set of estimates that allow for

1 Previous studies include in particular Bang et al. (2008), Christophe Z. Guilmoto et al. (2009), UNFPA (2009, 2011) and GSO (2011a).

a detailed review of SRB trends and differentials in the five years after the 2009 census.

2.1 SRB estimates in 2014

SRB estimates from the IPS 2014 are shown in Table 1. These figures stem from different estimation procedures (see Appendix I for a description of the IPS data and of the estimation procedures). The smaller IPS sample is based on the long-form questionnaire which identifies births occurring during the 12 months preceding the survey in April 2014. The complete IPS sample is based on the small-form questionnaire and provides the sex ratio of the population aged less than one year, which – after a minor correction for survival rates by sex – can be also converted into the sex ratio at birth during the last 12 months.

Table 1 shows the official estimate as 112.2 male births per 100 female births according to the recent births recorded by the IPS 2014. Using a larger sample the estimate, based on the population aged less than one year old, is slightly higher at 112.7. The agreement between these two estimates places the SRB in 2014 close to 111.5.

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Table 1: Estimates of the sex ratio at birth based on the IPS 2014, Viet Nam.

	SRB	Sample size
Births during the last 12 months	112.2	22,599
Confidence interval	*[109.3-115.2]*	
Population below one (corrected for mortality)	112.7	67,011
Confidence interval	*[110.0-114.4]*	

- SRB: number of male births per 100 female births.
- 95% confidence interval computed on the sample size.

The qualitative value of these estimates is further confirmed by another unofficial figure. The General Office for Population and Family Planning (GOPFP) keeps a record of all births monitored by its population collaborators across the country. Based on the provisional GOPFP figures for 2013-14,[2] the estimate of the SRB for the one-year period prior to the IPS 2014 is 112.5 male births per 100 female births. Interestingly, this figure is based on an entirely different source, but it lies exactly in-between the two SRB estimates from the IPS 2014. Our figures also emphasize that fluctuations may be due to sample estimation, with a 95% confidence of 109-115 and 110-114 respectively, for the two estimates derived from the IPS 2014.

The number of births in Viet Nam is estimated at 1.56 million in 2014. We can now compare the number of female births according to the IPS with the number of expected female births if the SRB in Viet Nam falls at the natural level of 105. The latter figure is deduced by dividing the number of male births in 2014

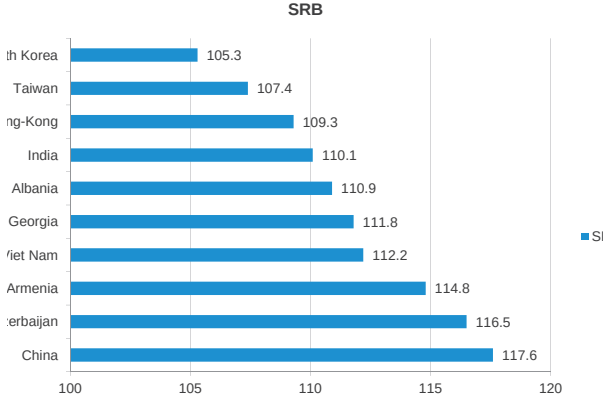
2 We use preliminary data for the period from January 2013 to August 2014 communicated by the GOPFP.

by 1.05. The number of expected female births proves to be larger than the observed number of female births by 50,400 births. This figure corresponds to the number of female births that went missing in Viet Nam in one year. It represents 6.9% of all female births in 2014. This number also corresponds to the number of cases of prenatal sex selection in 2014, mostly sex-selective abortions. A similar computation yields a surplus of male births estimated at 52,900 in 2014.

2.2 International comparison

Viet Nam's SRB level is obviously abnormal and much higher than in neighboring countries of Southeast Asia such as Thailand, Cambodia, and Laos where birth masculinity is close to 105 (UNFPA, 2012). But it is comparable to the SRB observed in several countries shown in Figure 1 such as India. Viet Nam's level is, however, well below the highest SRB levels observed recently in Azerbaijan and China.

Figure 1: SRB in various countries, 2008 - 2014



Sources: UNFPA, 2012: National estimates for China, South Korea and Hong-Kong (2013), Taiwan (2012), India (2010-2012), and Eastern Europe (2008-2012)

2.3 Trends in birth masculinity

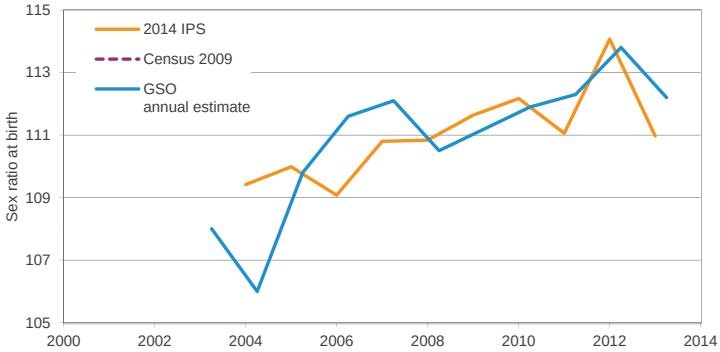
The direct comparison between 2009 and 2014 SRB estimates points to a relative increase in birth masculinity from 110.6 to 112.2. The increase is not significant if we take into consideration the size of the birth sample and the corresponding confidence interval (see Table 1). Yet, we can use different series of estimates to probe the presence of an upward SRB trend over the last ten years in Viet Nam. We use three different series of estimates for this purpose:

- The first series (GSO annual estimates) is provided by the GSO and based on SRB estimates computed from annual population and family planning change surveys. We have added to this series the 2014 estimate from the IPS and the 2009 estimate from the previous census.
- A second series is a back projection coming from the sex ratio by year of birth computed from the IPS 2014. It is corrected for sex differentials in mortality, since a larger proportion of girls than boys survive in the first years of life.
- A third series also represents a back projection computed from the sex ratios by year of birth during the 2009 census. It is also corrected for sex differentials in mortality.

The SRB trends based on these sources are shown in Figure 2. The three series do not perfectly coincide because of the oscillations caused by small sample size on SRB estimates. Yet, in spite of these fluctuations, a relatively clear picture of the SRB scenario in Viet Nam emerges from the comparison of these different sources. We distinguish three distinct phases in the evolution of the SRB in Viet Nam: before 2004, 2004-2010, and after 2010.

During the first phase prior to 2004, the SRB is lower and closer to the normal level. While prenatal sex selection may have already been present in some parts of the country, its prevalence was modest and it left almost no tangible trace on the national SRB average. It is presumed that few Vietnamese women used prenatal diagnosis during this period. This phase ends in 2004 and SRB estimates tend to rise rapidly thereafter.

Figure 2: Estimated trends of the sex ratio at birth according to various sources, Viet Nam, 2000 - 2014.



The second phase extends from 2004 to 2010 and is characterized by a sustained increase in birth masculinity. During that period, the SRB increased by about 6 percent point according to various series. As observed earlier (Guilmoto et al., 2009), this corresponds to an extremely rapid augmentation. The annual rate of increase is close to 1 per 100, significantly faster than the increase observed elsewhere. This phase corresponds to a period of rapid diffusion of sex selection practices across the country and within social groups: what was known and practiced only by a minority spread across the society as the possibility of

using sex selection to avoid female births gradually became a reality for a larger proportion of the population.

In contrast, the third phase, which may have started around 2010, is characterized by an obvious deceleration in SRB increase. The overall increase till 2014 is modest and almost statistically negligible. This may correspond to a slowing down of the SRB increase or even to a stabilization of the SRB level. Due to the limitations of the samples used here, it is in fact difficult to decide whether SRB has still been on the increase during the last three years. Annual GOPFP estimates of the SRB point to stabilization since 2009. However, interpreting the trend became ambiguous by the sudden jump from 112 to 114 observed during 2012. This isolated spike may have been caused by the year of the Dragon according to the traditional calendar (Do and Phung, 2010). That year, 2012, was especially auspicious in Viet Nam (*Nhâm Thìn*) and considered highly favorable to boys born during that time. It was also associated with a rise in the total number of births, demonstrating the real desire to have children during that particular time. This spike was followed by a significant plunge in the SRB level by 2-3.

In conclusion, the SRB started rising only in 2004, with this increase seeming to decelerate after the 2009 census. The SRB fell significantly after 2012 and reached 112 in 2014 – a level almost similar to that observed in 2010-11. If we set aside the unusual year of the Dragon, there has been almost no tangible increase in the trend towards birth masculinity for several years in Viet Nam. This recent observation somewhat contradicts the more rapid SRB increase in 2014 predicted earlier on the basis of 2009 census data.

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3. Regional and social variations

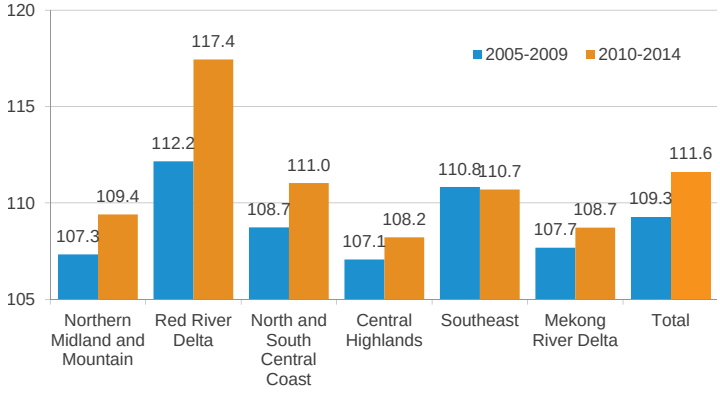
The level of birth masculinity reflected in the national averages often conceals significant geographical and socio-economic variations (UNFPA, 2012). Thus, the extent of sex imbalances at birth is far from uniform both across China and India. While the SRB is almost indistinguishable from a natural SRB in West China or South India, extreme SRB estimates above 125 are common in Eastern China or Northwest India. The same degree of regional variation in SRB levels is also evident in Viet Nam.

We should first consider the six socio-economic regions of Viet Nam in which the SRB varies from 106 to 118 in 2014. These regional estimates are, however, not reliable because of the size of available birth samples (less than 4000 births in most regions). Instead, we use the population aged less than 5 years for this estimate, after correction for the effect of mortality on the observed sex ratio. The sample size per region ranges from 23,000 (Central Highlands) to 81,000 (Red River Delta) and provides more reliable SRB estimates.

As shown in Figure 3, the mean SRB is 111.6 for the period 2010-2014 in Viet Nam. The regional variations in SRB range from 108.2 to 117.4. The geographical divide is rather pronounced (Guilmoto 2012). On one hand, we have three regions in Viet Nam where the sex ratio at birth falls very

close to the normal level of 105. These include the Northern Midlands and Mountains, the Central Highlands and the Mekong River Delta. In other words, half of the country displays SRB levels that are barely distinguishable from normal SRB levels observed in the rest of Southeast Asia. It may be added that the first two regions are characterized by a comparatively lower level of social development, lower urbanization, higher fertility and a significant proportion of minority populations. These conditions prove often unfavorable to prenatal sex selection. For its part, the third region with moderate SRB – the Mekong River Delta – is a more developed agricultural region with several cities. It is also one of the regions in Viet Nam more influenced by Southeast Asian traditions than by Chinese culture and sharing some cultural and religious features with its western neighbors.

Figure 3: Estimates of the sex ratio at birth in 2005 - 2009 and 2010 - 2014, Viet Nam regions.

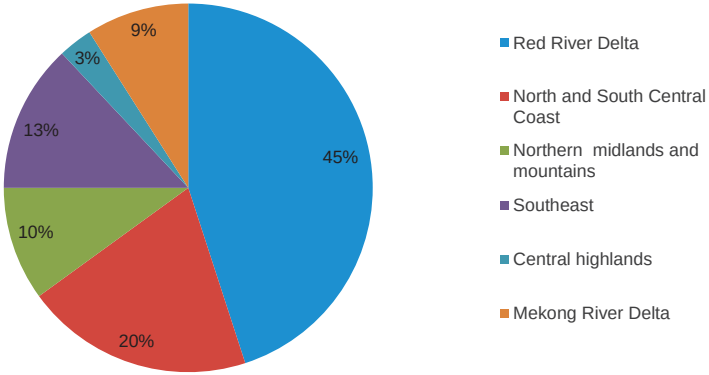


In contrast, the Red River Delta has a distinctly higher SRB level at above 117 in 2010-2014. Comparison with previous international figures shows that this is close to some of the highest levels observed in the world. Because of its shared history and proximity to China, the Red River Delta is also considered the part of Viet Nam where Confucian traditions are the strongest. As we will see below, this translates into particularly strong forms of son preference. The other two regions – Southeast and the North and South Central Coast – have SRB values closer to the national average as characterized by a moderate level of prenatal sex selection.

Figure 3 also includes figures for the five years preceding the 2009 census. We can therefore compare the progression of the regional variations in SRB with an increase from 109.3 to 111.6 over this five-year interval. The geography of SRB in Viet Nam has not changed significantly during this period: the region around Ha Noi already recorded the highest estimated level before 2009 while mountainous regions and the Mekong River Delta, the lowest.

Regional variation notwithstanding, the increase in birth masculinity has been observed everywhere. That said, we note that the rise has been more pronounced in the Red River Delta. The average SRB level has expanded in this region by five percentage points during the five-year period. This is undoubtedly a considerable increase and significantly greater than the increases observed in other regions of Viet Nam. In comparison, changes in SRB levels have been less marked in the rest of the country, especially in the South. We even note an apparent SRB stabilization in the Southeast region and only a moderate rise in the Mekong River Delta and in the Central Highlands.

Figure 4: Contribution of regions to excess boys in Viet Nam, 2010 - 2014



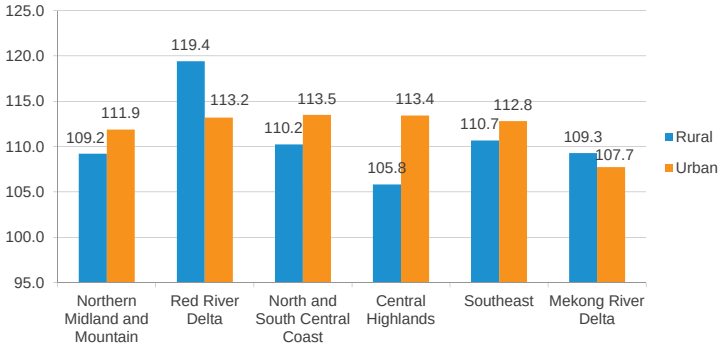
Differentials of SRB across regions may also be converted into the distribution of surplus of male births by region. To do this, we compute the number of excess boys over the last five years by comparing the sex distribution of children aged less than five to the normal sex ratio (after correcting for the effect of mortality). Surplus boys correspond to the difference between the observed number of boys and the number of boys expected if the sex ratio at birth had been normal. The regional distribution of these excess boys is shown in Figure 4.

Unsurprisingly, the Red River Delta region takes the lion's share since this region represents 45% of the total number of surplus boys in the country. The northern and central regions account for another 30% of the aggregated number of excess boys. In contrast, the three southern regions account for no more than a quarter of the national total – whereas they constitute more than 42 % of Viet Nam's population.

It is more complex to estimate the SRB variations on the scale of Viet Nam's 63 provinces. The 2014 IPS sample is insufficient, with less than a few hundred births reported per province during the twelve months preceding the survey. If we calculate all children born since 2010 per province, we have bigger province-level samples of several thousand children, but within this total can be found random variations. The SRB variations prevailing in 2010-2014 at provincial level (data not shown here) appear more pronounced than at the regional level. On the one hand, we have nine provinces with an estimated SRB level below 106. They are located in South Viet Nam or in ethnic minority areas. With such low levels of birth masculinity, these provinces can be considered as free of prenatal selection. On the contrary, seven provinces of North Viet Nam display SRB values above 115, including three provinces above 125 (namely Bac Ninh, Hai Duong, and Hung Yen). While the quality of these estimates requires caution, they reflect the extreme level of diversity in the country with regard to sex imbalances at birth. Viet Nam is composed both of regions with no sex selection and regions where SRB are among the highest in the world.

Another important dimension of SRB variation relates to rural-urban differentials. These have, however, never been pronounced in Viet Nam and birth masculinity is often similar in urban and rural areas. It was lower in urban areas than in rural areas in 2014 (110.1 vs. 113.1), but slightly higher when assessed during 2010-2014 (112.2 vs. 111.2). The difference between rural and urban parts of the country was also less significant in 2009. The reason for this situation relates to the complex interplay between regional and urban-rural zones characteristic of the country as shown in Figure 5.

Figure 5: SRB by region and rural/urban areas in Viet Nam, 2010 - 2014



Data in Figure 5 demonstrate that SRB in most regions is actually higher in towns and cities by several points. Higher birth masculinity in urban areas can be explained by the role of lower fertility, better living standards and easier access to modern reproductive technology more typical of urban circumstances. Besides, the ethnic composition of urban areas is different, with Kinh populations comprising the majority in towns and cities rather than in the countryside. However, this feature of higher urban SRB is not true everywhere in Viet Nam. To the contrary, we observed that in the two richest agricultural regions – the delta of the Red River and of the Mekong –, SRB is higher in the rural sectors. Thus, in the Red River Delta, the SRB climbs from 113 in urban areas to 119 in rural areas. In this case, son preference is probably at the origin of these variations. Male preference is likely stronger in rural communes and among peasant families in view of the specific social and economic role of sons. For instance, a majority of the elderly in the rural areas has no pension benefits and relies primarily on their sons for

support. Moreover, while the Mekong and Red River regions are mainly rural, they are characterized by a high population density and a tight network of towns and cities in contrast to other regions where rural populations tend to be more isolated. In densely populated regions access to healthcare facilities is rarely an issue and fertility rates are comparatively low thus representing two dimensions other than son preference known to be associated with sex selection. In conclusion, the different ways in which the rural and urban characters influence birth masculinity in Viet Nam explains why the difference is blurred at the national level, but pronounced when the examination is conducted at the regional level.

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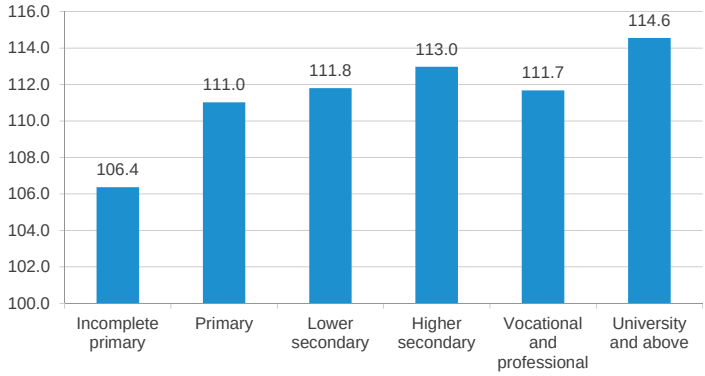
4. Socio-economic variations

Regional differences commonly reflect significant variations in SRB within a given country that in turn often correspond to cultural differences – such as the strength of old family traditions or ethnic composition. We may for instance observe that the SRB is at times lower among some minority groups – such as the Tay and Hmong with SRB below 105 – as well as among Vietnamese declaring their practice of a religion. Ultimately, these characteristics can be linked to variations across Viet Nam in kinship systems and son preference (Guilmoto, 2012).

Besides these “horizontal” variations there are also “vertical” disparities across socio-economic groups. A major source of variation relates to the socio-economic status of individuals and families. Thus, it is expected that son preference may be stronger among peasant groups, while more prosperous groups may have both lower fertility and easier access to sex selection technology, features likely to increase the proportion of boys. The IPS 2014 does not have information on occupation or sector of employment, and thus we cannot for instance distinguish the agricultural sector from other occupations. However, we do have both direct and indirect indications on individual educational attainment and household-level living standards.

Using birth records, we can for instance relate the SRB during 2010-2014 to the education levels of the mothers. Here, we have simplified the original education variables by regrouping vocational training and professional education into a single category. Data plotted in Figure 6 illustrate the strong relationship between education and sex selection. SRB figures start with the lowest education level – including the illiterate population – which displays the lowest SRB at 106. Typically, this corresponds to poverty-stricken populations living in isolated rural areas with little access to schooling or modern infrastructure. Not only is fertility higher among these communities, but also their access to modern healthcare and reproductive technologies is restricted by poor living standards and the long travel distances to towns.

Figure 6: SRB by educational level of the mothers in Viet Nam, 2010 - 2014



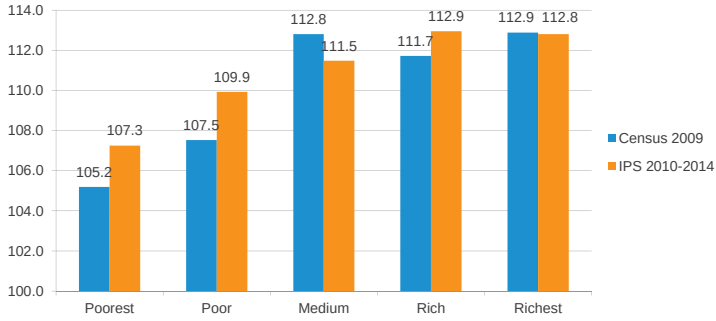
The educational attainment of women corresponds with SRB levels. It climbs from 106 to 111 for primary level, to 113 for upper secondary and finally to 115 for university and higher

education. A similar analysis by number of years of school (data not shown here) leads to a comparable gradient, with SRB growing from 105 for women who had almost no education at all to 113 for those who studied 12 years or longer.

Apart from individual educational information, we can also use a synthetic indicator for socio-economic status or living standards. This indicator defines five socio-economic quintile groups, from the poorest to the richest category (see Appendix II for details). These quintiles are computed based on housing quality and available household equipment data and reflect income groups and socio-economic status. They also closely relate to the educational achievements of adult household members.

Figure 7 illustrates a relationship between socio-economic status and SRB. It is somewhat reminiscent of the differentials previously observed across educational levels. The poorest quintile displays a SRB level of 107, which is close to the biological level. The less prosperous classes in the country have remained partly immune to the recent spread of sex selection. The SRB rises significantly as we move up the social ladder, from 107 to 110 and 111.5 and a peak of 113 for the fourth quintile. In fact, the fourth and fifth quintiles, encompassing the more prosperous sections of Viet Nam's population, are associated with the highest levels of birth masculinity. As with education, we can distinguish once again an increase in SRB corresponding to an increase in living standards. But there is a plateau at 113 for the two more prosperous quintiles. This feature is not entirely new, since the same relationship was observed at the time of the 2009 census (GSO, 2011a).

Figure 7: SRB by socio-economic quintile in Viet Nam, 2009 and 2010 - 2014



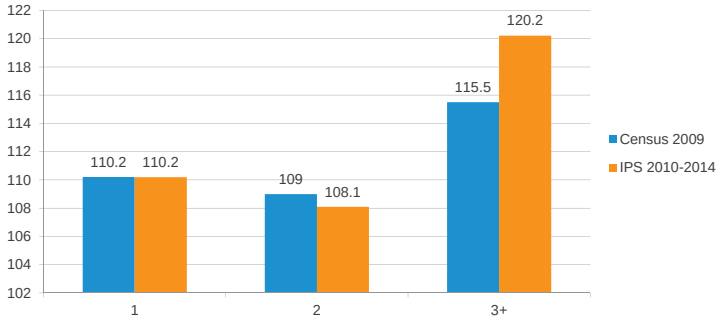
When we compare these results with data from the 2009 census the overall picture is similar. The main difference between 2009 and today is probably that the SRB has now increased by more than two points among the two poorest socio-economic quintiles. Among the other categories, the SRB has remained more or less stable during this period, as if leveled off. This suggests that economic mobility or social diffusion has had some impact on the first two socio-economic quintiles that have benefited from economic growth, reflecting demographic behavior more contemporary with the rest of the population. Yet, the diffusion of sex selection practices in Viet Nam is still incomplete and the SRB may still increase in the future among the poorest categories of the population.

5. Masculinity, birth order and gender composition

One distinctive feature of the SRB is the variation observed across parities (birth order). In countries with elevated SRB, birth masculinity is higher among later births. For instance, the SRB in China was 130 for second births and 158 for third and later births according to the 2010 census. This phenomenon is also visible in Viet Nam, but to a lesser extent for reasons that will be discussed.

We use data on 93,000 births during 2010 - 2014 to compute variations in SRB according to birth order. Figure 8 presents the results of our analysis. The SRB among higher-order births is indeed significantly high in Viet Nam. It crosses the 120 threshold, a level well above the average SRB or even values observed in the Red River Delta region. Nevertheless, the SRB of high-order births is below figures observed elsewhere, which are often close to or above 150 among third births. The data also show that the SRB for first births is 110 in Viet Nam, a level distinctly above the biological 105 standard. Notably, the SRB does not increase for birth order 2 and rises only for higher-order births.

Figure 8: SRB by birth order in Viet Nam, 2009 and 2010 - 2014



The high SRB level for first births is an important finding, as first-order births represent the largest share of all births - 47% in this sample. In fact, we can also compute the contributions of each birth order to the overall number of excess male births in 2010 - 2014. It emerges from this analysis that the SRB of first births accounts for 42% of all excess boys. In contrast, the much higher SRB for birth order 3+ explains a slightly smaller proportion of the surplus of boys, at 38%.

Results from the 2009 census are also plotted in Figure 8 and display similar features (see also UNFPA, 2009). Yet, a distinct increase in the SRB at higher parities from 2009 to today is noticeable: the SRB for birth order 3+ appears to have risen by five points in a few years, while other parity-specific SRBs are stable. However, even when the SRB of higher-order births has increased in Viet Nam, its role in the overall sex imbalances at birth observed in the country remains smaller than that of first and second births.

In addition to birth order, birth history data from the IPS 2014 also provide information on the family composition by sex at the time of each birth. We can for instance distinguish between births that followed male births from those that followed female births in 2009 - 2014. This analysis illustrates the role of the absence of boys in the reproductive strategy of Vietnamese couples. Let's consider first the situation of second births. Second births after the birth of a boy have a perfectly normal SRB of 105. In contrast, the SRB of second births following the previous birth of a girl rises to 111 male births per 100 female births. We can further highlight this selective behavior by looking at higher-order births. If we restrict our analysis to births at birth order 3 or higher, we can clearly distinguish two situations. Among parents with already one boy or more, the SRB remains almost normal at 107. Sex selection in favor of boys appears very limited, if not negligible. However, for the parents who do not have at least one male offspring among their first births, the SRB of the next births shoots up to 148. This is the highest SRB ever identified in our analysis of SRB in Viet Nam.

This analysis illustrates clearly the sex selection pattern in Viet Nam. A small percentage of couples - about 5% - opt for prenatal sex selection right from the first pregnancy. Their strategy is to ensure immediately the birth of a son and some of them may in fact not have any more children. Other parents are less concerned about the gender composition of their first children. It is only after the birth of one girl or, even more so, after two girls that they realize they may fail to have a boy. In this scenario, the SRB climbs to 148. The proportion of sex-selective abortions becomes very high and we can even estimate about four abortions of female fetuses for every 10 female live births.

6. Son preference according to the 2014 IPS

Son preference lies at the core of these selective reproductive behaviors. The phenomenon has already been the subject of several studies in Viet Nam. These studies describe the so-called patriarchal family system imbued with Confucian values, particularly prevalent in most of the north of the country (Bélanger, 2002; UNFPA, 2012; ICRW, 2012). The main features of this system are familiar: patrilineal descent, patrilocal residential system, cohabitation with or residence close to the husband's family after marriage, old age support expected primarily from married sons, ancestor worship through the male line, land transmission through sons, etc. Yet, the qualitative approach is limited in that it yields only qualitative indicators and does not allow for systematic comparison of the actual intensity of gender bias across regions or social groups.

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Table 2: Sex preference during the last pregnancy over the last two years according to birth order and sex composition, Viet Nam, PCFPS, 2013.

Previous sex composition	Sex preference				Births
	Boy	Girl	None	Total	
First birth					
Total	24.1%	3.9%	71.9%	100%	28,316
Second birth					
One girl	63.7%	1.8%	34.6%	100%	13,160
One boy	8.0%	35.1%	56.9%	100%	13,654
Total	35.3%	18.7%	46.0%	100%	26,814
Third birth					
Two girls	82.0%	1.3%	16.7%	100%	2,607
One boy and one girl	19.3%	5.5%	75.3%	100%	2,556
Two boys	5%	60.1%	34.7%	100%	1,194
Total	42.4%	14.0%	43.6%	100%	6,357

The Population Change and Family Planning Survey (PCFPS) conducted in 2013 provides a recent evaluation of stated preferences. It includes a question to women about the preferred sex of their child during the last pregnancy (over the last two years). The above summarizes their statements. For the first birth, the preference for a boy is already 20% higher than for a girl, although most mothers say that they are indifferent to the sex of their child. At higher parities, the preference goes for the missing sex. Following a female birth, 64% want to have a boy while the comparison with 35% for a girl after a male birth. As can be seen, there is always a

stronger preference for boys than for girls. This is even more visible in the case of a third birth, since 43% of women desire a boy against 14% in favor of a girl. The proportion in favor of a son rises to 82% expecting a boy among mothers who had only daughters.

Opinions expressed during such a survey may be influenced by introduced norms, especially since recent campaigns in Viet Nam have tried to promote the value of a girl child. Moreover, preferences may not translate into concrete reproductive decisions. We can use the IPS 2014 data to compute a more concrete indicator of the way sex preferences affect reproductive choices. We will restrict our observation to women at birth order 2 and examine whether the sex of their children makes a difference.[3] To do this, we contrast parents who had two daughters with parents who had at least one boy.[4] We then measure their respective probability of having a third child (i.e. the parity progression ratios, PPR) following the birth of their second child. The procedure is described in more detail in Appendix II.

Table 3 highlights some of the differences observed across the country. We see for instance in the last row that only 18% of parents of two boys will have a third child in Viet Nam, but that

3 The difference is also visible in Viet Nam at parity one – between parents with one son or with one daughter – but far less pronounced than at parity 2.

4 We focus on the case of parents with two girls and ignore *the case* of parents without any girl. Having no daughter – families with two sons in a row – does not increase the probability of having a third child, except in provinces located in the South of the country where it does increase subsequent fertility.

this proportion rises to 41% for parents without a male child. If we compare these two probabilities of having a third child, we see that 23% of parents appear to opt for a third child simply because the first two were girls. This proportion corresponds to parents who would not have a third child if they already had a boy. In other words, 23% of parents change their mind after the successive birth of two girls and opt for a third birth in their quest for a son. This number may also be interpreted as the share of Viet Nam's population with a strong need for a male offspring and is directly linked with the extreme SRB of 148 already observed among these births (see previous section).

Table 3: Progression from 2nd to 3rd child according to previous sex composition, Viet Nam regions, 2004 - 2014.

Region	Sex composition			Births of parity 2
	1 or 2 boys	No boy	Difference	
Northern Midlands and Mountains	17.2%	45.1%	28.0%	16,978
Red River Delta	15.0%	54.5%	39.4%	16,382
North and South Central Coast	23.4%	47.4%	24.1%	16,432
Central Highlands	32.6%	50.2%	17.5%	6,224
Southeast	14.3%	26.8%	12.5%	9,181
Mekong River Delta	11.7%	23.1%	11.3%	15,547
Viet Nam	**17.9%**	**41.1%**	**23.2%**	**80,744**

The intensity of son preference is not the same across the country. The regional analysis provided in Table 3 shows in fact that son preference appears much weaker in the southern regions. In both the Mekong River Delta and in the Southeast, the absence of a male child appears to affect less the probability of a third birth than elsewhere in Viet Nam. The proportion of parents ready for another child after two female children in the family is only 11-12%. In contrast, we find the largest proportion of parents (39%) responding to the absence of male offspring by additional fertility in the Red River Delta. These tables combine measurements of opinions and behavior and they prove that the need for a son has a direct influence on reproductive behavior through selective fertility. This analysis of son preference can now be related to variations in birth masculinity illustrated by birth data that recognizes clearly how son preference and sex imbalances at birth coincide, especially if we compare outcomes across regions or according to the gender composition of the family.

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7. Conclusion

The new IPS survey provides a new estimate of the national sex ratio at birth of 112.2 male births per 100 female births at the beginning of 2014. The survey data have also confirmed the presence of significant regional differentials across the country, with the Red River Delta emerging as a region with one of the highest SRB levels in the world. Where the SRB is especially skewed, unborn girls may account for almost 20% of all births. By contrast, the sex ratio at birth appears to have remained nearly normal in the south of the country. These regional disparities call for a better understanding of the variety of family systems existing across the country and for a focus on the most affected regions.

While sex selection remains very common among couples who had two succeeding female births, analysis of the data confirms the presence of prenatal discrimination among first births. Gender bias and discrimination among first births in Vietnamese families is significant, because it now accounts for 40% of the entire sex imbalances estimated throughout the country. Further data analysis indicates that social and economic differentials are also affecting birth masculinity, with lower SRB levels among the poorest quintiles and other underprivileged groups such as ethnic minorities and the less educated. This may begin to change as there are now signs pointing to a recent increase of the SRB within these categories. This suggests that the diffusion of discriminatory practices is taking place across the country and may generate a further increase in the sex imbalances at birth in the future.

Prenatal sex selection across the world proceeds from the combination of three distinct factors (Guilmoto, 2009). Son preference is the leading factor and is a very common attitude in Vietnamese families. Our analysis has laid bare the intensity of son preference by highlighting selective fertility behavior and birth masculinity by gender composition of children in a family. The second factor behind sex selection is low fertility that exerts a pressure on parents by discouraging them from having repeated births as used to be the case in their quest for a son. Viet Nam's successful family planning programme and so-called "2-child policy" contributed to a rapid reduction of fertility rate between 1970 and 2000. As a result, the fertility rate in Viet Nam has been at replacement level over the past 10 years: 2.1 children per woman in 2014. The third factor relates to the rapid change in healthcare infrastructures and the emergence of modern prenatal diagnosis methods in the country. Gammeltoft (2014) has provided a detailed analysis of the spread of prenatal technology in North Viet Nam. The 2013 Population and Family Planning Survey indicated that 96% of women went for an antenatal check during their last pregnancy. Ultrasonography is very common, in spite of the legislation banning the disclosure of the sex of the fetus. According to the same source, 83% of mothers in the country knew the sex of their child before delivery thanks to the ultrasound tests.[5]

5 The proportion of women who knew in advance the sex of the child was lower among less educated women, especially among women who had received no education at all.

Viet Nam's birth masculinity has not diminished over the last five years. There has been indeed a continuous increase in the sex ratio at birth from 110.6 in 2009 to 112.2 as recorded by the IPS 2014. Yet, in spite of the temporary spike observed in 2012, the increase appears to have slowed down over the last five years. It has not reached 115 as forecasted earlier according to the "no-intervention scenario" based on SRB trends till 2009 (GSO, 2011a). This may be a sign that political mobilization has borne fruit, but further research may help identify social groups where the progress of sex selection has indeed slowed down and where son preference may be on the decline. Moreover, it is probably too early to say whether this deceleration will persist and turn into a real stabilization of the SRB in the country or whether there may be a need to anticipate a further increase in sex imbalances at birth.

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Appendix I: The IPS 2014 and measurement issues

The Intercensal Population Survey of 2014 (IPS 2014) was conducted in 1.1 million households (4.2 million persons) in April 2014. The survey follows the format of the previous population surveys conducted every year by the GSO. It includes both social and demographic information on individuals as well as information on household amenities and housing quality.

The IPS 2014 includes individual and household questionnaires. These questionnaires come, however, in two formats. The short-form questionnaire includes standard demographic and household questions and is used across the entire sample. The long-form questionnaire includes several additional variables such as social, demographic and educational details of individuals, the detailed birth history of women aged 15-49 years and detailed information about housing quality and household equipment. But this long-form questionnaire is used only for a subsample representing about a third of the entire IPS 2014 sample.

This variation in sample size has important implications on the quality of our estimates. This is particularly true for sex ratio estimates that are very sensitive to sample size – the confidence interval of estimation increases significantly with a smaller sample. For instance, the confidence interval of the SRB of 112 male births per 100 female births reduces from [106-118] for 5,000 births to [108-116] for 10,000 births and [110.6-113.4] for 100,000 births. This statistical constraint

leads us to rely on different types of measurements of the sex ratio in this analysis and to use a larger sample whenever required for statistical significance. Three different sex ratio measurements are used here with sample size ranging from 22,600 to 289,000:

- Births during the last 12 months: **22,599 births** in 2014 (long-form)
- Population below one year-old: **66,628 individuals** (small-form).
- Births since 2010: **150,958 births** (long-form)
- Population born since 2010: **289,475 children** (short-form)

When SRB levels are computed from the population distribution by sex, they are corrected for sex differentials in mortality till 2014 by applying the WHO life tables for Viet Nam in 2010. This procedure aims at correcting the slight mortality excess among boys that tends to decrease the sex ratio of older children.

We refer to births born during the last 12 months as 2014 births and 2014 SRB in keeping with GSO usage. SRB and other IPS estimates for 2014 refer in fact to the period from April 2013 to March 2014. All computations used here are based on weighted births and populations.

Appendix II: socio-economic quintile and son preference

We developed different new indicators based on IPS 2014 data for this analysis.

Socio-economic quintile:

The analysis of socio-economic differentials would ideally require data on individual income or occupations that are not available from the IPS 2014. It is, however, possible to develop a household-level socio-economic indicator based on available information on housing quality, household amenities and equipment canvassed in the long-form sample. A subset of household-level IPS variables has been submitted to a factor analysis (multiple correspondence analysis) for computing a synthetic index of living standards.

After eliminating variables poorly correlated to the first axis, the factor analysis yields a first axis accounting for 78% of the overall variance. This dimension is then used as a synthetic indicator of socio-economic standard at household level. Households were then divided into five quintiles, from the poorest to the richest households. The 17 variables retained for the final factor analysis include ten appliances owned by the household (from television to car), four types of amenities (lighting, cooking fuel, source of drinking water, toilets) and three types of construction materials of the building.

Son preference and parity progression:

We use here fertility behavior as an indicator of sex preference. To do this, we examine the behavior of parents according to birth order and the gender composition of their offspring. The probability of having another child at various parity levels is called a parity progression ratio (PPR). PPR_n is computed here as the proportion of women with *n* children who had an additional ($n+1^{th}$) child during the next ten years. PPRs are given as percentages of parents with an additional child, ranging from 0% to 100%. They are estimated by using a Kaplan-Meier procedure.

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