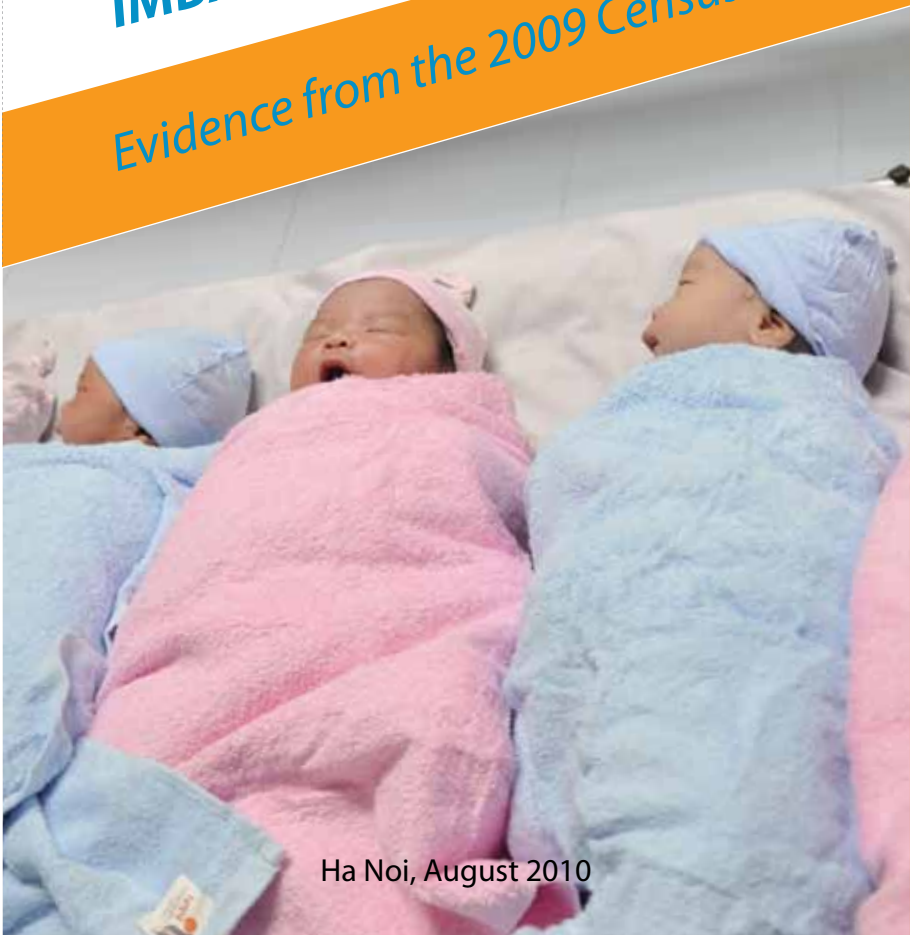
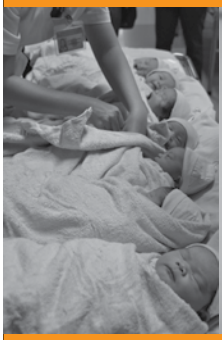
SEX RATIO AT BIRTH
IMBALANCES IN VIET NAM:
Evidence from the 2009 Census



Ha Noi, August 2010



CONTENTS

1. Introduction

Sex ratio at birth (SRB) is the means of determining the number of boys being born per one hundred girls. In Viet Nam, since the year 2000, statistical data and research studies have identified a trend towards SRB imbalance, notably the expression of a disproportionate number of live male compared to live female births.

In 2006, the General Statistics Office (GSO), with technical support from the United Nations Population Fund (UNFPA), collected, analyzed and published essential data on SRB that was found to be at the significantly high level of 110/100. The information in this booklet is based on analysis conducted by Dr Christophe Z. Guilmoto, a demographer with substantive experience in SRB related research in China, India and Viet Nam, on 15% of the sample data extracted from the 2009 Population and Housing Census. The booklet represents the sixth in a series published by UNFPA in recent years. Dr Guilmoto's more comprehensive analysis of this data will be released in the coming months in the form of a census data monograph. However, in publishing this booklet, UNFPA hopes to update and inform readers on current demographic SRB trends in Viet Nam and to encourage better informed opinion on this crucial population issue.

2. Birth masculinity in Viet Nam and the 2009 census

In spite of an increasing array of quantitative and qualitative survey information, the decennial population census in Viet Nam remains the main tool for monitoring demographic trends not just in the country as a whole but also at the regional levels that exhibit wide variation in social and geographical constituents. One domain in which census statistics are eagerly awaited relates to the sex distribution of the population in a country that has long been numerically dominated by women, but where the proportion of male births is now known to have risen significantly since 1999.

In April 2009, initial data released from the census confirmed that women continue to represent the majority of Viet Nam's population, numbering 43.3 million against 42.5 million men. Yet, against this statistic, the sex ratio shows a steady rise in the

male proportion of the total population over the last 30 years, moving from 94 in 1979 to 96.7 in 1999, and finally 98.1 in 2009.

This gradual shift is a complex phenomenon, influenced by lower female mortality, changing age structures and international migration. However, of significance is the direct link to this shift found in the gradual increase in live male births recorded since the 1999 census. This increase relates to the prevalent practice of prenatal sex selection, particularly the widespread preference for boys over girls. As a manifestation of such gender bias, the elevated SRB is therefore of major concern for both social and demographic reasons.

In most populations across the world, the SRB oscillates around 105/100 with observed variations across different populations that range from 104 to 106. However, it should be noted that since the 1980s several countries in Asia have experienced an unusual proportional rise in live male births likely attributable to the practice of prenatal selection (Miller, 2001; Attané and Guilmoto, 2007). With the introduction of prenatal diagnostic tools such as ultrasonography, a modest but significant share of parents across Asia has opted for termination of pregnancy on discovering they were expecting a female child. This situation led to an increase in SRB levels that have exceeded 110 in several countries and even above 120 in specific regions.

In Viet Nam, returns from the 1999 census failed to identify any significant SRB imbalance (Bélanger et al., 2003). Subsequently, however, a slight excess in the number of live male births over female has gradually been detected in sample surveys conducted annually by the General Statistics Office.[1] This rising masculinity trend is now viewed as one of the most important demographic issues elucidated through the census data.

1 *The annual Population Change Surveys are conducted in all provinces based on a census subsample. A detailed analysis of their results in relation to birth masculinity can be found in UNFPA (2009).*

3. Sex Ratio at Birth in Viet Nam: levels, comparisons, and trends

Since the census enumeration in April 2009, the GSO has gradually released data as they complete processing and analysis. A complete set of age and sex disaggregated data, covering 100% of the population, is expected to be released in the coming months providing an exhaustive picture of the sex ratio imbalances among the child population. The data applied in this booklet stem from a census sample that represents 15% of the entire population thus facilitating in-depth analysis of the major dimensions of social and economic changes based

on responses to the detailed census questionnaire including additional individual and household information. [2]

The census provided information on population distribution extending to individual demographic features and household characteristics. Importantly, the questionnaire also included items on women's reproductive history, thus shedding light on recent fertility behaviour. In addition to noting the total number of children in their families, all interviewed women in the age group 15 to 49, provided specific information on their most recent childbirth, noting sex and date of occurrence. Such information is extremely valuable given the existing lack of reliable birth registration statistics in Viet Nam. By singling out births that had occurred during the twelve months preceding 1st of April 2009 (the census reference day), census sample data provided an exceptionally precise picture of recent SRB trends.

Based on the 247,603 births reported by mothers in the census sample, SRB is estimated at 110.6 during the one year period from April 2008 to March 2009. Taking into account random fluctuations in sample size, actual SRB is estimated to lie narrowly within a range from 109.7 to 111.5 (95% confidence interval). As Table 1 indicates, this value matches previous estimates derived from other sources. However, it is important to keep in mind that, given its large sample size, the GSO census is the most representative data source available for estimating SRB values.

2 *For technical reasons, minor variations exist with figures published by the census (Central Population and Housing Census Steering Committee. 2010). See Appendix A for details on the sample data.*

Table 1: Sex Ratio at Birth estimates by source

Nature of data	Sex ratio at birth	Period	Number of live births	Source
Census 2009: births during the previous 12 months	110.6	01/04/08 to 31/03/09	247,603	2009 Census
Births reported by health facilities	110.8	2008	1,458,537	Ministry of Health
Annual survey: births during the previous year	112	01/04/07-31/03/08	23,475	2008 Population survey

The current SRB level in Viet Nam of 110.6 significantly exceeds the standard biological value of 105. The gap between the observed and standard biological values is 5.6 per 100 and corresponds to 2.6% of the total number of births, or 5.3% of all male births. This shows that it only takes a small increase in the number of male births to disrupt significantly male/female birth proportions. It is also of interest to compare the SRB estimates for Viet Nam with similar estimates recently observed in other countries and regions (Table 2). SRB values are often found significantly higher elsewhere in Asia, starting with China where the SRB was estimated at 121 for 2008 by the Chinese Bureau of Statistics.[3] Results from the Chinese 2005 survey also pointed to several provinces where birth masculinity rose above 130. In North-West India, SRB has also reached levels above 120. Indeed, several other countries in the Caucasus (Armenia, Azerbaijan, and Georgia) and in Europe (Albania) report SRB values as high as or higher than found in Viet Nam.

3 *This high figure for China might also be partly exaggerated by selective under-reporting of female births.*

Table 2: Sex Ratio at Birth in various countries, 2004-2009

Country / regions	SRB	Period	Data type
Albania	113.6	2007	Birth registration
Armenia	115.8	2008	Birth registration
Azerbaijan	117.2	2007	Birth registration
China (Mainland)	120.6	2008	National estimate
Jiangxi Province	137.1	2004	1% pop. census
Anhui Province	132.2	2004	1% pop. census
Shaanxi Province	132.1	2004	1% pop. census
Georgia	111.9	2006	Birth registration
India	112.1	2004-06	Sample registration
Delhi State	118.0	2007	Birth registration
South Korea	106.4	2008	Birth registration

Sources: National statistical offices, Eurostat

Even if the SRB in Viet Nam appears only moderately elevated compared with other regions, the national average rise is of serious concern for several reasons. First, the neighbouring countries in Southeast Asia such as Cambodia, Thailand and Indonesia, all with comparable demographic and socio-economic levels to Viet Nam, have not experienced any significant rise in SRB in recent decades. Second, and in contrast, all countries listed in Table 2 have experienced rises in birth masculinity during the last ten years and even for twenty years in China and India whereas Viet Nam's rise in SRB levels is relatively recent, dating from 2003. Based on the experience of other countries, predictions are that the SRB trend in Viet Nam will continue to rise before any likelihood of stagnation or even decline (Das Gupta et al. 2009; Guilmoto, 2009). The prospect of this pattern is borne out in the turnaround of SRB trends in South Korea. After reaching 115 in the early 1990s, the SRB steadily declined to achieve the current normal level.

Questions that cannot be answered by the available census data concern the mechanisms leading to an elevated SRB in Viet Nam, especially the role played by son preference and prenatal sex selection. As documented elsewhere (Institute for Social Development Studies. 2007), the most likely cause of this trend is the tendency of parents for sex selective abortions after learning through prenatal sex diagnosis that the foetus is female. But because prenatal sex selection remains an illegal practice in Viet Nam, information cannot be adequately or accurately captured either by surveys or census. In theory, factors other than prenatal sex selection also contribute to the high SRB figure. These include under-registration of female births, impact of excess female foetal mortality and other specified biological factors. While these factors cannot be discounted as contributing to rising SRB masculinity, prenatal sex selection must be viewed as of key and significant concern (UNFPA, 2009; Bang et al. 2008).

To understand the reasons behind son preference and the demand for prenatal sex selection requires identification of three necessary preconditions (Guilmoto, 2009). *The first and leading prerequisite* is the presence of an underlying preference for sons across society. This explains why parents, even in widely different contexts, insist on bearing a son. This complex dimension includes both traditional attitudes inherited from the past and modern social considerations fuelled by recent transformations in society. *The second precondition* relates to the existence of modern healthcare infrastructures necessary for prenatal sex identification and selection. It is important to keep in mind that prenatal diagnostic or safe pregnancy termination facilities are not commonly available in several Asian countries. *The third condition* relates to the low fertility rate whereby bearing fewer children automatically increases the risk of remaining sonless. While not designed to explore these independent factors, the census data does help to identify regional, social and economic characteristics of those population groups more inclined to practice prenatal sex selection.

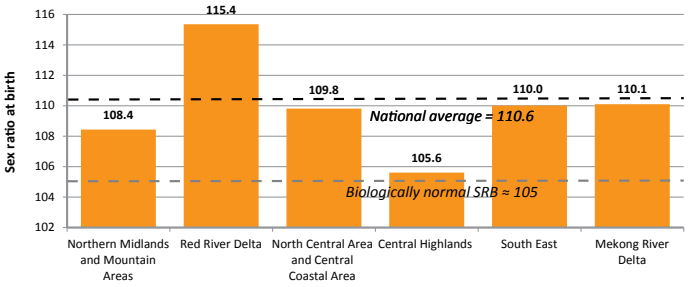
4. Sex Ratio at Birth: regional and demographic variations

Census data allow for detailed analysis of the distribution of birth masculinity across Viet Nam. In all countries where the SRB has increased during the last two decades, regions and social groups have not been uniformly affected. In particular, it has been possible to detect specific areas, communities, or social classes that have acted as forerunners in the initial diffusion of prenatal sex selection practices.

Geographical analysis of SRB values in Viet Nam furnishes similar findings. Graph 1 summarizes the observed variations in the SRB in the six regions and demonstrates clearly that the surplus of male births is not uniform across the country. The Central Highlands region, both less populated and less developed than other regions, is characterized by the lowest level of live

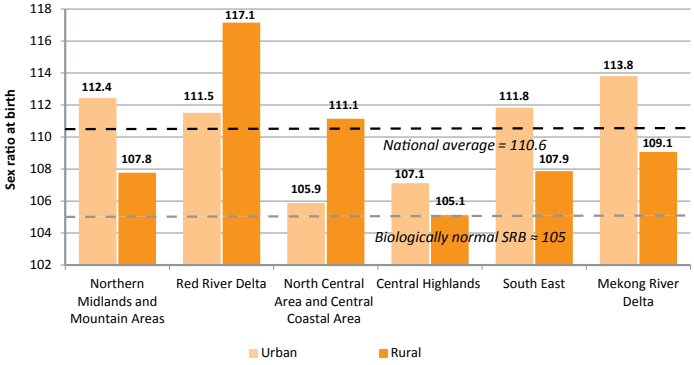
male births (105.6) throughout Viet Nam, corresponding to the biologically normal average observed elsewhere in the world. The other five regions, however, exhibit higher SRB levels, contributing to the skewed national average of 110.6. Among these, the Red River Delta appears particularly distinct with an average SRB of 115.4, significantly above the national figure.

Graph 1: Sex Ratio at Birth by region



The disaggregation of rural and urban areas highlights an additional and interesting feature of regional variations in Viet Nam. Even though the aggregate national level shows no apparent difference between rural (110.6) and urban (110.7) levels of SRB, disaggregation at sub-national levels confirms that birth masculinity is significantly higher in the countryside than in urban areas. In addition to the Red River Delta evidence confirms higher SRB levels in the adjacent North Central and Central Coastal areas by at least 5 points (Graph 2). In all other regions, SRB tends to be more an urban phenomenon than found in rural communes, including the Central Highlands where sex selection remains rare. These findings point to complex sociological processes.

Graph 2: Sex Ratio at Birth by region and urban/ rural areas



In view of regional heterogeneity, it is important to examine trends at the provincial levels. However, the number of recent births reported in each of Viet Nam's 63 constituent provinces is at times too small to allow reliable estimates. Therefore, it has been necessary to explore provincial variations by using the child sex ratio, calculated from the under-five population which is roughly five times bigger and provides more accurate estimates than the birth sample itself.[4] This indicator is mainly influenced by imbalances during the previous five years (2004-2009), but may also be slightly affected by infant and child mortality sex differentials and other biases.

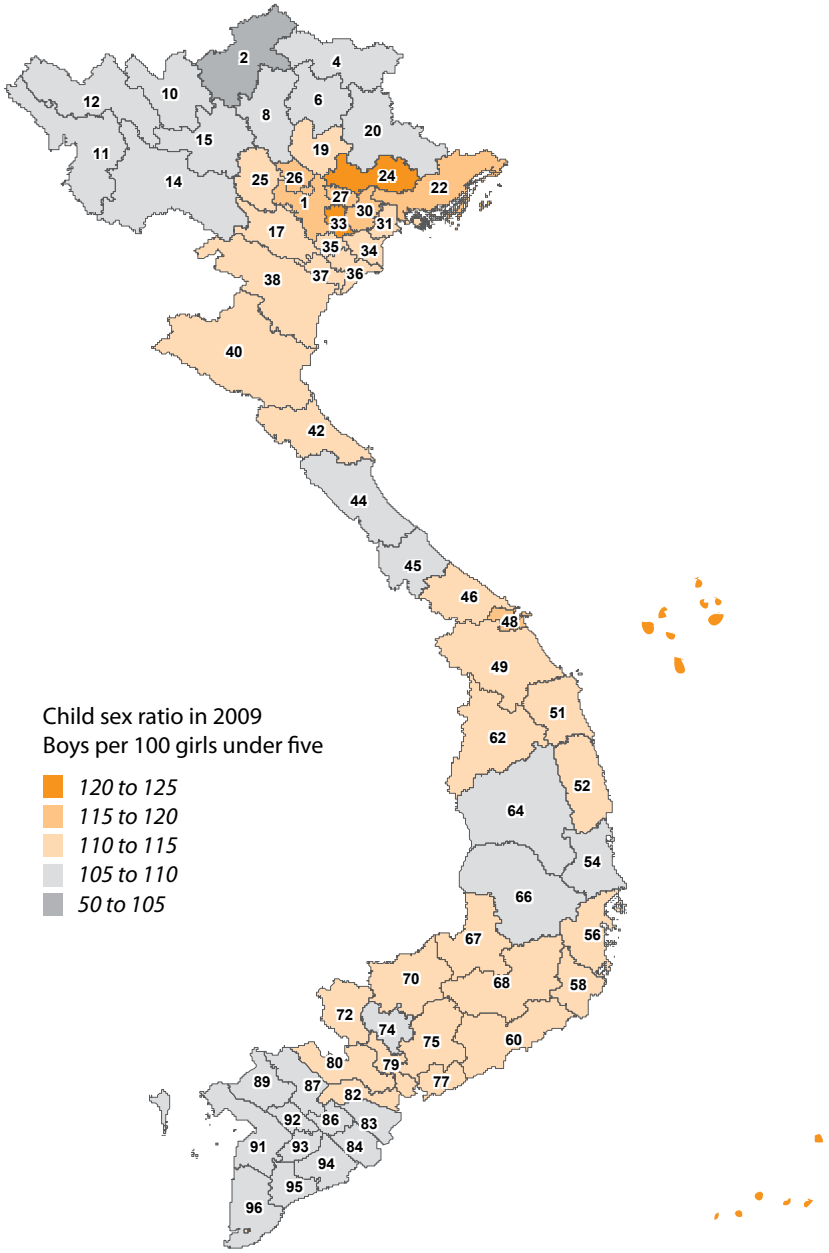
Map 1 displays more pronounced spatial variations than suggested by the regional averages shown in graph 1. For example, the child sex ratio depicted on this map ranges from a moderate value of 104 in Ha Giang Province to a highest figure of 124 recorded in Hung Yen Province.

4 *Province-level SRB estimates are reproduced in Central Population and Housing Census Steering Committee (2010). Data mapped here refer to the child sex ratio.*

Of the 63 provinces in Viet Nam, it is possible to identify seventeen where the child sex ratio does not vary significantly from 105. These are mostly located in the Central Highlands or in the Northern Midlands and Mountain Areas, all regions with a significant prevalence of minority populations. In contrast, the remaining 46 provinces reported abnormally high child sex ratio levels, eight of which recorded 115 or above. Indeed, the provinces of Bac Giang and Hung Yen were found to exceed 120.

Map 1: Child sex ratio by province

Code	Name	Code	Name	Code	Name
1	Ha Noi	34	Thai Binh	67	Dak Nong
2	Ha Giang	35	Ha Nam	68	Lam Dong
4	Cao Bang	36	Nam Dinh	70	Binh Phuoc
6	Bac Kan	37	Ninh Binh	72	Tay Ninh
8	Tuyen Quang	38	Thanh Hoa	74	Binh Duong
10	Lao Cai	40	Nghe An	75	Dong Nai
11	Dien Bien	42	Ha Tinh	77	Ba Ria-Vung Tau
12	Lai Chau	44	Quang Binh	79	Ho Chi Minh City
14	Son La	45	Quang Tri	80	Long An
15	Yen Bai	46	Thua Thien-Hue	82	Tien Giang
17	Hoa Binh	48	Da Nang	83	Ben Tre
19	Thai Nguyen	49	Quang Nam	84	Tra Vinh
20	Lang Son	51	Quang Ngai	86	Vinh Long
22	Quang Ninh	52	Binh Dinh	87	Dong Thap
24	Bac Giang	54	Phu Yen	89	An Giang
25	Phu Tho	56	Khanh Hoa	91	Kien Giang
26	Vinh Phuc	58	Ninh Thuan	92	Can Tho
27	Bac Ninh	60	Binh Thuan	93	Hau Giang
30	Hai Duong	62	Kon Tum	94	Soc Trang
31	Hai Phong	64	Gia Lai	95	Bac Lieu
33	Hung Yen	66	Dak Lak	96	Ca Mau


Child sex ratio in 2009
Boys per 100 girls under five
120 to 125
115 to 120
110 to 115
105 to 110
50 to 105
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10
11
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Several "hot spots" of birth masculinity (pockets of high sex ratio provinces) are visible on the map, such as the region around Ho Chi Minh City in the Southeast. However, the most distinct cluster of sex ratio imbalance lies in the northern plains of the country. Provinces located within the triangle formed by Vinh Phuc to the West, Hung Yen in the South and Quang Ninh to the East display child sex ratio figures above 115. Interestingly, the highest values are not observed in the metropolitan provinces of Ha Noi or Hai Phong, but in the more rural provinces of Bac Giang and Hung Yen. This cluster had already been identified from other sources (UNFPA, 2009; Guilmoto et al., 2009) and likely corresponds to the rural areas where the SRB has shown steady increase since the beginning of the 21st century.

Seen from a more global geographical perspective, the map of child sex ratios in Viet Nam presents a rather coherent pattern of spatial distribution, with adjacent provinces recording similar high (or low) values. This spatial clustering of SRB variations suggests that increased diffusion of prenatal sex selection may have occurred in rural localities of the Red River Delta and in urban localities elsewhere in the country. This geographical feature may also indicate that, in the near future, SRB imbalance could affect provinces that have so far remained immune to prenatal selective behaviours, thus causing a further rise in the national SRB average.

5. Masculinity and birth order

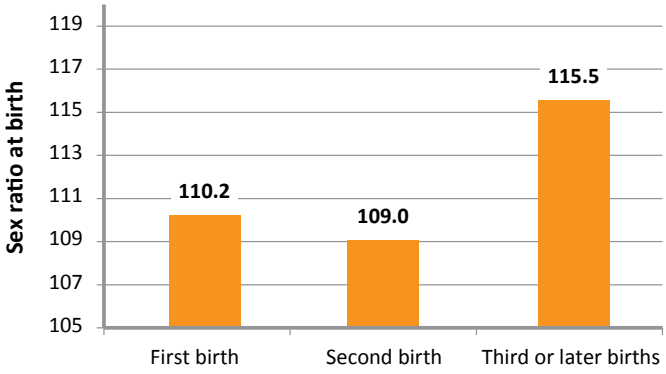
The SRB in Asia tends to vary across birth order (or parity). In almost all countries where the SRB has increased, the proportion

of male births is found almost normal for the first birth and augments progressively for later births, strongly suggesting that parents resort to prenatal selection to ensure a male child. The SRB increase among later births is also determined by the overall fertility level, with the sharpest rise observed for the second birth particularly in countries like China where fewer women bear more than one child. Until the 2009 census results, no reliable estimates of SRB by parity were available for Viet Nam.

Graph 3 indicates that the SRB in Viet Nam does not exactly conform to patterns observed elsewhere as was suggested by previous analysis (UNFPA, 2009). It should be noted that for the first two parities, the sex ratio appears already significantly above the biological standard. This means that some parents discriminate against female foetuses during the first pregnancy,

a feature rarely reported in other countries. As expected, the SRB at 115.5 for third and later births (accounting in our sample for only 16% of all births) is higher than for previous births. This is not surprising in view of the low fertility level in the country: the wish for a son following the birth of a daughter is often reasonable enough to have an additional child. Yet, in comparison with other Asian countries where SRB levels for higher-order births may easily exceed 140,[5] the rise by parity looks rather moderate as some parents in Viet Nam appear to have opted already for prenatal sex selection during their first two pregnancies.

Graph 3: Sex Ratio at Birth by birth order



No rural/urban variations emerge in the sex ratio by parity at the national level. Once again, only the sub-national disaggregation brings to light interesting patterns when distinguishing the first two parities (first and second births) from later parities (third and higher-order births). Parity differentials tend to be unremarkable in all regions except one: in the Red River Delta, where we observe an abrupt rise in SRB levels from the first and second births (110) to the third and later births (152). This extreme value corresponds to an excess of almost 50% over expected male births and, while based on a small subsample

5 *The Sex Ratio of Births of parity 2 was for instance 143 males per 100 females in China according to the 2005 1% sample census.*

of births, the high SRB figure for later births in the Red River Delta stands confirmed by additional estimates obtained from larger samples (such as births during the last three years). The provinces of this region appear to be characterized by a particularly severe regime of prenatal discrimination for high-order births. In this mainly rural part of Viet Nam, the desire and need for a son appears to be very strong and encourages a large proportion of parents who have not borne a son after two births, to resort to prenatal sex selection for subsequent pregnancies.[6]

6 *The patriarchal system existing in a village close to Ha Noi is described in detail in Werner (2009).*

6. Sex Ratio at Birth by socio-economic variations

Census tabulations usually provide little information on the links between birth masculinity and socio-economic characteristics of the mother and her family. Access to a large sampling from the latest 2009 census, however, has made possible a detailed study of these relationships through examination of the SRB based on various categories of women or households. In fact, a large array of factors account for significant differences in SRB levels, ranging from the mother's characteristics, such as ethnicity, education or employment, to household-level information such as housing quality. We will review only a few of them here starting with education.[7]

7 *Census data do not allow the systematic identification of each woman's husband when he resides in the same household.*

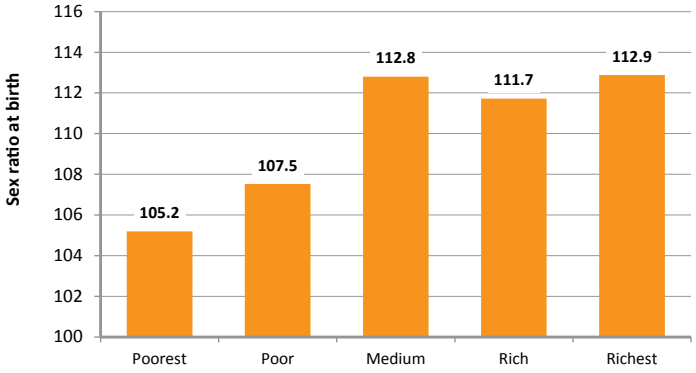
The level of education is usually one of the major determinants of demographic behaviour and the census sample confirms this hypothesis. Significant variations occur in the SRB when computed based on different maternal education levels. These extend from 107.4 for illiterate women (7% of the birth sample), and 107.1 for primary level of education and below, to 111.4 for secondary level education and vocational training until finally reaching 113.9 among college and higher educated mothers. The same positive correlation between education levels and birth masculinity is also observed from the number of years of schooling: women with more than 10 years of schooling report the highest proportion of male births (SRB=113.2).

This analysis indicates that the SRB is close to biologically normal levels among uneducated women and we have also observed lower SRB levels in the Central Highlands (Figure 1). In-depth analysis of the sample data points to several additional socio-economic variables associated with low sex ratios at birth, one of which is ethnicity. For example, the SRB among minority (non-Kinh) women is relatively low at 105.9. A few other indicators typical of underprivileged households such as lack of private toilets and hygienic drinking water, or poor-quality housing are also associated with lower than average SRB levels. However, several variables such as employment status, religion, and migration status cannot prove any distinct association with the masculinity of births.

While household variables often appear linked to variations in SRB levels, many of their characteristics have no explanatory power of their own and constitute only indirect proxies of each family's socio-economic level. This is the reason for the decision to devise a synthetic indicator of the household economic level that ranks all households and their members by socio-economic standards of living (procedure described in Appendix B). This indicator divides births according to the socio-economic status of the household, classified into five quintiles, ranging from the poorest 20% to the top 20%.

Graph 4 summarizes the findings by displaying the SRB values by socio-economic quintile. The relationship seems clear: on the left side, we see that the poorest segment of the population is characterized by a sex ratio at birth close to 105. Such a value corresponds to a normal proportion of male births, as was already observed from other individual characteristics of mothers such as illiteracy or ethnic minority. As one climbs the socio-economic ladder, the SRB gradually increases, moving to 107.5 in the second quintile and reaching 112.8 in the middle-income group. In fact, the top three quintiles accounting for 60% of the country's population appear somewhat similar in terms of birth masculinity with levels hovering around 112.

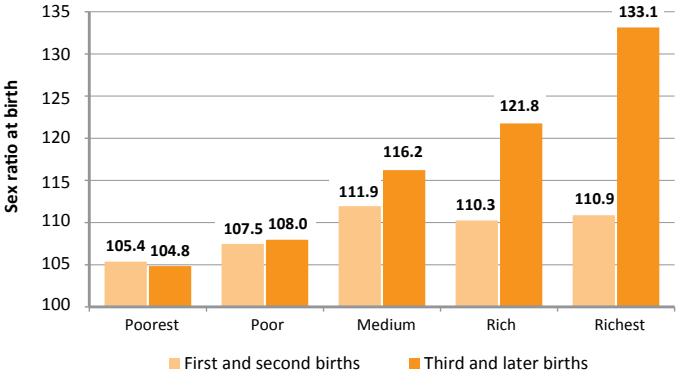
Graph 4: Sex Ratio at Birth by socio-economic quintile



When disaggregated by parity, the variations across socio-economic quintiles tend to become reinforced. Graph 5, which displays the SRB by socio-economic quintile and by birth order, demonstrates that the rise in SRB for lower-order (first and second births) births still levels off in the middle quintile. However, for higher-order births, the increase in birth masculinity is regular and continuous, moving from a normal level of 105 among the poorest mothers to 133 among the most

prosperous. Even if this latter category accounts for a limited number of births, the findings do illustrate the effort accorded to prenatal sex selection by the better-off parents following their first two births.

Graph 5: Sex Ratio at Birth by socio-economic quintile and birth order



The lessons from these figures are unambiguous: socio-economic status emerges as one of the strongest correlates of birth imbalances. Taking into account additional individual variables examined previously - such as employment, ethnicity, or educational level - just strengthens the strong correlation identified between better living standards and more active gender discrimination. Several intermediary factors may account for this link, such as the easier access to modern technology available in health facilities located mostly in urban areas. Furthermore, better-off households with more highly educated women and monetary means tend to have easier access to information and therefore more likely to be the frontrunners in gaining access to modern prenatal sex selection equipment. Another such factor typical of the richest and most prosperous households is low fertility, which tends to exacerbate the desire for prenatal sex selection. It stands to reason that smaller-sized

families are exposed to the higher probability of remaining sonless. It is not known, however, if son preference *per se* also increases with socio-economic status.

To conclude this section, the association between sex selection and various indicators of social and economic development such as education, material well-being and low fertility, does not bode well for the future. In view of Viet Nam's path towards higher socio-economic development, higher incomes and access to modern health facilities, smaller family size may contribute to a gradual rise in the SRB among the poor. In less developed regions of the country where son preference may already exist, the rise in birth masculinity could potentially rise above 115, as is already apparent in several provinces of the Red River Delta.

7. Simulating the demographic impact of the Sex Ratio at Birth

From a strictly demographic perspective, the impact of the relatively recent proportional increase in male births remains moderate in Viet Nam compared to other countries.[8] Nevertheless, in the long run, this imbalance will impact significantly on the sex distribution of the population, leading to a long-term sex disequilibrium that will reverberate for more than 50 years among Viet Nam's population. Future demographic impact largely depends on two factors: the intensity of the SRB imbalances and their duration. While it seems difficult to foresee

8 *See Guilmoto (2010) for demographic projections in China and India.*

exactly how the recent SRB masculinity trend will evolve, there is already evidence to suggest that birth imbalances are likely to affect new social groups and new provinces in the near future, potentially causing a further rise in the male birth rate at the national level.

To overcome predictive uncertainty, three demographic projections based on future SRB trends are set out below based on the already observed increase in male proportions across the population and their demographic consequences. While this exercise is a demographic simulation rather than a population forecast, it is based on three plausible scenarios of future change in birth masculinity derived from previous considerations on socio-economic and regional differentials and from the SRB trend observed since 2003.

First, according to the "no-intervention scenario", the SRB is predicted to rise to 115 by 2015, a level close to that observed in China in the 1990s and already observed in the Red River Delta. In this scenario, the SRB will stay at this level even beyond 2015 (see Appendix C for detail).

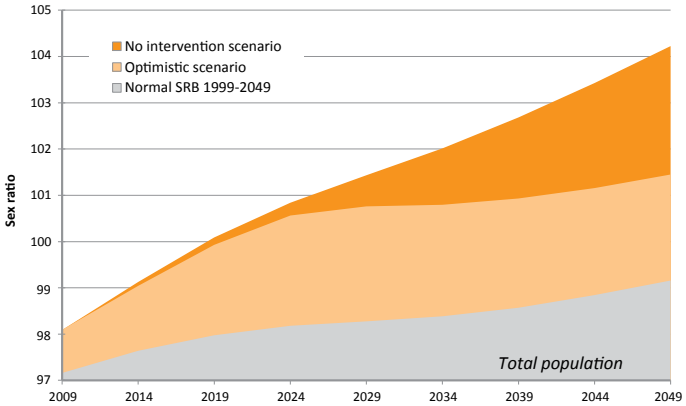
In contrast, the second, more optimistic scenario presupposes a slower rise to 115 by 2020, followed by a gradual return to normal (105) by 2030. The latter scenario suggests that social change and public policy initiatives will slow down the growth of the SRB and accelerate the downturn, thus preventing Viet Nam from treading the same path as several regions of China and India. Both scenarios should serve as the upper and lower limits of Viet Nam's forthcoming sex ratio imbalances.

The third simulation is based on an assumption of achieving a steady and normal SRB (105) over the entire period 1999-2049. This simulation presupposes that the 2009 population under 10 years was never affected by the recent imbalances.

All three scenarios agree that the sex ratio of the entire population will continue to grow slowly in all areas (Graph 6). According to both the optimistic and pessimistic scenarios,

start from 2020, the male population will exceed the number of female population. But in the high-SRB scenario, if not subject to interventions that reduce prenatal sex selection, imbalance in the overall population sex ratio will rise indefinitely reaching 104 in 2049. In comparison, according to the third set of simulations in which SRB remains at 105 during the entire 1999-2049 period, Viet Nam's population would continue to be predominantly female for at least the first half of the century.

Graph 6: Population sex ratio over time for three SRB scenarios

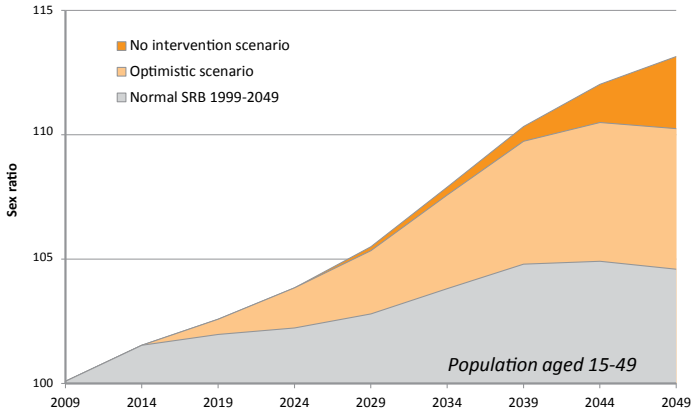


The negative consequences of a distorted SRB on Viet Nam's future demographic structure will impact on young adults, particularly the male capacity to find a female partner. This will exert pressure on women (gender violence, trafficking, etc.).[9] In order to reflect the intensity of sex imbalances among the adult population aged 15-49, graph 7 indicates that the adult population will experience faster and more significant changes in sex ratio levels than the overall population of graph 6.

9 *We cannot discuss here all complex processes that might be generated by the rising numerical predominance of men and how they may affect households and society.*

In the years following 2009, the sex ratio of adults of marriageable age will grow from today's 100 to 105 in 2029, independently of any changes in SRB levels. Thereafter, based on a no-intervention scenario, the sex ratio will increase up to 113 by 2049. This level corresponds to a potential structural surplus of men of approximately 12% among adults of 50 years of age and below. Such a proportional excess of men will lead to serious changes in gender relations in society, with implications of crisis in the marriage market (the so-called marriage squeeze). According to the second set of projections, the rise in the adult sex ratio would level at 110 in 2044 and decline thereafter. It also displays the long gap between the year when SRB starts decreasing and the years during which the impact of this decline becomes visible. The third scenario indicates the projected adult sex ratio in the absence of unbalanced SRB resulting in a slow rise towards levels below 105.

Graph 7: Adult sex ratio over time for three different SRB scenarios



From the no-intervention scenario, it is estimated[10] that the SRB would rise to 115, with no periods of decline, yielding an average excess of 58,000 male births per year over the 2009-2049 period. On an annual basis, the additional male births accumulating over one or several decades, would lead to significant numbers of excess men in a country like Viet Nam.

Such numbers demonstrate the great risks involved in a laissez-faire attitude of no-intervention to redress imbalanced SRB. An additional decade of unbalanced SRB will inevitably translate into tens of thousands of excess boys being born, in turn distorting the sex ratio among prospective spouses twenty years later. As a matter of fact, any effort towards the reduction of excess male births today through targeted interventions and advocacy campaigns will lead to a parallel diminution in the number of men condemned to delayed marriage or singlehood in the future.

The challenge that lies ahead consists therefore in finding the most effective ways to redress current son preference and prenatal sex selection practices in Viet Nam. Policy tools and potential domains for intervention are numerous. These include, among others, the close monitoring of demographic change from central down to provincial levels; the effective protection of the rights of daughters and women through laws and specific incentives to correct existing gender biases; the promotion of gender equity and equality in society through targeted campaigning combined with other advocacy activities; improvements in the living environment of girls and women; and the stronger enforcement of laws against prenatal sex selection. These initiatives should target both deep-rooted attitudes towards women without losing sight of the importance of the necessary transformations in the social and economic environment that directly affect gender relations. Civil society organizations and administrative bodies at different levels of governance will play a decisive role in these future changes.

10 *This estimation is based on the calculation of the difference between male and female births according to the population projections, of which the population of a biologically normal sex ratio (with SRB equal to 105) is subtracted.*

8. Conclusion

For years, the true extent and nature of geographical disparities arising from an imbalanced SRB in Viet Nam have remained ambiguous. Results from the latest census have dispelled doubts on these issues by providing extensive and detailed evidence of the gender imbalances at birth associated with sex selection practices and their wider spread within society. We can now confirm that the proportion of male births has increased over the last decade, especially from 2003. This incidents link to the fact that there has been a rapid increase in the introduction of modern, good quality ultrasonography during 2002 onwards.[11] The national SRB average today is close to 111, but may very well rise to 115 in the current decade thus pushing Viet Nam closer to the highest levels observed in the world.

11 *The rapid emergence of prenatal ultrasound has been described by Gammeltoft and Hanh (2007). The recent population survey conducted by the General Statistics Office in 2006 indicates that two thirds of mothers are aware of the sex of their child before its birth (UNFPA 2007).*

One important question that the census has elucidated with utmost clarity is the unequal spread of prenatal sex selection throughout the country. While a high-SRB cluster ('hot spot') is located in the Red River Delta region, prenatal sex selection has also reached parts of the more urbanized South East region. Although coming from different socio-cultural, industrial and historical contexts, both regions are among the most developed in the country. The census sample has also shown us that the poorer strata of society have so far remained almost unaffected by the rise in birth masculinity.

These observations suggest a careful monitoring of SRB trends in the years to come. Both regular statistics on birth masculinity and in-depth qualitative analyses of local gender and family arrangements will shed more light on prenatal sex selection behaviours and the various social and economic contexts underlying the preference for sons. These studies will yield important clues to the public for reflecting on the intensity and likely social consequences of prenatal sex selection practices. They will also assist policy makers in designing effective strategies and interventions for tackling rising SRB imbalances.

9. Appendices

a. Census and sample

The census counted 85.8 million persons distributed in 22.6 million households in Viet Nam in 2009 (Central Population and Housing Census Steering Committee, 2009a). These figures are based on individual questionnaires that provide information on individual social and demographic characteristics. Similarly, information gathered on households furnishes details on the type and quality of the housing as well as on goods and appliances used by that household. While tables based on the entire census will be gradually published as the analysis of information becomes available, the General Statistics Office has also canvassed additional information based on the long-form census questionnaire relating to a specific census sample. This sample accounts for 15% of the entire population and contains 14,177,590 persons (from 3,692,042 households). The sample data constitute the backbone for the analysis conducted here

and include 4.0 million women aged 15 to 49, corresponding to 247,603 births occurring during the 12 months before the 2009 census (weighted numbers). The computations used here are based on weighted births (including multiple births) rather than on women, and some minor variations with other published census results may therefore be identified.

While these data represent a fairly large number of individuals and households, the estimation process remains vulnerable to sample errors when the number of events (such as births) or the population size, become too small. The calculation of SRB is especially prone to such uncertainty and this is notably the case when producing complex cross-tables or using the 63 administrative provinces in the analysis. However, all figures reported here were tested for random errors and unless stated otherwise, results given are statistically significant at a 5% level.

b. Socio-economic quintile

A proper analysis of socio-economic differentials ideally requires either household-level income estimates or a detailed socio-professional classification of the labour force, both of which are missing from the census schedule. Instead, household-level information was used to devise a socio-economic scale based on available information on housing quality and amenities as well as on household property. This procedure identified the subset of household-level census questions in relation to socio-economic status, submitting to a factor analysis (in this case, a multiple correspondence analysis) to compute a synthetic index of living standards.

The resulting index, centred at zero (average level) sums up the following variables: household ownership of seven different goods (from motorbike to air conditioner), four types of amenities (lighting, cooking fuel, drinking water, toilets) and house construction materials (walls and roofing). All original variables are highly correlated – positively or negatively - to this synthetic household-level index. As could be expected,

the index also correlates independently to several individual characteristics (such as educational level or rural/urban residence). Finally, the living standard index is used to classify births into five quintiles, starting from the poorest 20% of households to the richest 20%.

c. Population projections

Population projections up to 2049 presented in this booklet are simulations based on the demographic parameters (fertility and mortality) of the most recent projections by the Population Division of the United Nations (2009). Age and sex structures from the 2009 census are applied as the baseline.

Starting with an SRB of 111 in 2009, two different scenarios have been developed. The first (no-intervention) scenario of long-term SRB increase posits a rapid rise in SRB up to 115 by 2015 followed by stabilization. The second, more optimistic scenario of SRB decline postulates a slower rise up to 115 by 2020, followed by return to biologically normal level (105) in 2030. The third simulation reflects the hypothesis that SRB never rose, thereby having remained stable at biologically normal levels since 1999. Age and sex structures for 2009 were corrected by using Thailand's population as reference point, and births were projected for the next forty years by using a normal SRB of 105. This simulation reflects the predicted Vietnamese age structure in the absence of prenatal sex selection.

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UNFPA Viet Nam
1st Floor, UN Apartment Building
2E Van Phuc Compound
Ba Dinh District, Ha Noi, Viet Nam
Tel: +84 - 4 - 3823 6632
Fax: +84 - 4 - 3823 2822
Email: unfpa-fo@unfpa.org.vn
Website:http://vietnam.unfpa.org