# RECENT CHANGE IN THE SEX RATIO AT BIRTH IN Viet Nam

## A REVIEW OF EVIDENCE

Ha Noi, August 2009


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

Design and printed by LUCK HOUSE GRAPHICS LTD
Printing 1000 copy size 210x297 (mm)
Publishing permit: 25-112/LĐ day 04/8/2009

# CONTENTS

# Abbreviations

| | |
|---|---|
| DHS: | Demographic and Health Survey |
| GSO: | General Statistics Office |
| HCMC: | Ho Chi Minh City |
| ISDS: | Institute of Social Development Studies |
| MICS: | Multiple Indicator Cluster Survey |
| PKS: | Prior Knowledge of the Sex of the Foetus |
| SRB: | Sex Ratio at Birth |
| TFR: | Total Fertility Rate |
| UNFPA: | United Nations Population Fund |
| UNICEF: | United Nations Children's Fund |
| WHO: | World Health Organization |

# LIST OF TABLES

# LIST OF FIGURE

# Foreword

The Sex Ratio of a population is a demographic indicator, reflecting the sex composition of that population, whereas the Sex Ratio at Birth (SRB) is primarily a concern of demographers. *Sex Ratio at Birth is conventionally defined as the number of boys being born per one hundred girls.* This ratio is normally between 104-106/100. An important note with regard to the use of this indicator is that under normal circumstances it is quite stable over time, across geographical regions, continents, countries and races. Any significant diversion of the ratio from the normal biological range implies, to some extent, an intentional intervention to this natural value. It also means that to produce an accurate estimate of the SRB, a large enough sample size is required, and moreover an appropriate estimation method.

Analysis of the SRB can tell us many things about the different dimensions of a society such as traditional cultural customs, socio-economic development levels, social welfare, political and health practices, and in particular public awareness and practices related to gender equality.

Studies in this area have indicated an unexpected trend of population changes, starting in the 1980's: a consistently rising SRB in some Asian countries, where the population is larger and population density is higher than most countries of the world. Along with declining fertility, this trend tends to spread throughout countries with large populations in Asia, thus threatening global demographic stability.

The concern that Viet Nam would face a risk of a potentially rising SRB was initially expressed in the first years of the 21st century after publication of the results of the 1999 Census. However, controversy surrounding this phenomenon had been minimal until 2006, when the General Statistics Office (GSO), with technical support from the United Nations Population Fund (UNFPA), collected essential data and published the SRB of Viet Nam as standing at a considerably high level of 110/100. These figures became available through the Annual Population Change survey in 2006, conducted by the GSO in the same year.

Since then, the UNFPA has provided support to the Population and Reproductive Health programme of Viet Nam to conduct a series of analytic investigations and activities with different scopes to monitor the variance of this indicator at national and sub-national levels. Preliminary findings and discussions have been disseminated by the concerned parties and have for the first time received attention of the public and political leaders of the country.

The current report titled ***"Recent increase in the Sex Ratio at Birth in Viet Nam: A review of evidence",*** will provide a comprehensive picture of an imbalanced sex ratio at birth occurring in Viet Nam. Dr. Christophe Z. Guilmoto, a demographer with substantive experience in SRB related research in China, India and other Asian countries, has provided technical assistance to the UNFPA by analysing the data and preparing this report. The report also offers a number of concrete conclusions and valuable recommendations for Viet Nam in the years ahead.

UNFPA would like to express sincere thanks to Dr. Christophe Z. Guilmoto for his contribution to this report. We are grateful to the GSO for providing data and valuable technical inputs. UNFPA also wishes to acknowledge the Institute for Social Development Studies for sharing their experience with SRB studies in Viet Nam. Furthermore, UNFPA wishes to thank the international and national consultants, as well as UNFPA program officers in Ha Noi who worked with Dr. Christophe Z. Guilmoto and provided support for the development and completion of the report.

UNFPA would like to introduce this valuable document to policy makers, managers, professionals, researchers and others who are concerned about Population and Reproductive Health in Viet Nam. Evidence presented in this paper comes at a critical time, as Viet Nam is now preparing a number of important population policy, strategy and legal documents which will have implications for many years to come.

**Bruce Campbell**

Representative of the United Nations
Population Fund in Viet Nam

# Executive summary

This report documents a review of the situation of the current Sex Ratio at Birth (SRB). The specific objectives of this report are to:

- *Analyze available data about recent changes in the SRB levels in Viet Nam;*
- *Examine the links between SRB variations and social features through maps and statistics; and*
- *Examine future demographic outcomes based on demographic forecasting.*

The report is based on a desk review of the current literature on the topic and a systematic analysis of original data sets from population surveys and other statistical sources. Additionally, several types of exchanges took place between various experts during an 8 day mission in Ha Noi in December 2007; a field visit was made to Thai Nguyen province and a seminar organized jointly by GSO and UNFPA in December 2007.

The review documents a major new trend in population dynamics in Viet Nam: the gradual rise of the proportion of boys versus girls among births. The sex ratio at birth for 2006 stood at 110 male births per 100 female births, a significant excess compared to the biological standard, which is known to be 105.

The inception of this increase of the SRB levels in Viet Nam dates back to the beginning of the present decade and has increased at a sustained pace of 1 SRB point per year. While the current level in the country is still below that of other Asian regions affected by the recent wave of masculinisation, *the ongoing pace of growth means that the SRB might cross the 115 mark in a few years from now.*

Using demographic forecasts based on two different scenarios of SRB evolution, *it was observed that the current skewed SRB values are unlikely to significantly impact the sex and age distribution of the country before 2025. After this date, sustained disequilibrium in the gender proportion of births would inevitably result in a surplus male population, a trend which will have many implications, but most notably will be affecting the young adult population at time of marriage.*

This rapid change of the SRB in Viet Nam is probably due to the fact that it was delayed in comparison to the skewed SRB in other countries such as neighbouring China. Recent access to sex determination technology has allowed many couples to adapt their reproductive behaviour to an "age-old" desire to bear sons. Their reproductive choice is now guided by two principles: low fertility and son preference. Sex-selective abortions thus become an option to satisfy both needs. *At this point however, it must be noted that a large majority of the population has still remained gender-neutral with respect to fertility choices.*

Further analysis projects a more detailed picture of sex selection by identifying the role played by specific factors or social groups in the rise of the SRB. These include the level of education of women, being part of the higher socio-economic strata in society, living in cities, more prosperous rural areas or metropolitan areas in and around Ha Noi or Ho Chi Minh city, lower fertility, and access to sex determination technology.

This report ends with summing up major findings and formulating general recommendations, with a specific focus on the improvement of the overall SRB evidence and knowledge base.

# 1. The Asian experience

## 1.1 The rising sex ratio at birth: levels and trends

The current process of masculinisation in Asia has first been noticed through the rising sex ratio levels among child populations. Child sex ratio as an indicator of gender imbalance combines the impact of both prenatal and postnatal gender discriminations. In the absence of discrimination against one particular gender group, values of the child sex ratio are expected to fall below the usual SRB value of 105 as a result of higher child mortality among boys. But in Asia as a whole, the child sex ratio has instead recorded a slight increase over the past half century, rising from 105 in the mid 1950s to 108 in 2005. The latter value is clearly above standard levels observed elsewhere in the world (Guilmoto 2007b).

More detailed data show that this overall rise of the proportion of boys among children is chiefly the consequence of an increasing distortion of the child sex ratio observed in Eastern Asia, while the situation remained almost normal in South-Eastern and Western Asia. Trends in Eastern Asia present themselves almost exclusively in China and to a lesser extent in South Korea, while trends in India heavily influence the figures observed in South - Central Asia.

Even if sex differentials of mortality in Asia are still exceeding standard values, this contemporary rise of the child sex ratio results predominantly from the parallel rise in the SRB. The SRB is supposed to lie within a range of 104 - 106, while subject to local biological variations. However, starting from 1980, China and other Asian countries recorded a gradual increase in the proportion of boys among births. A further deterioration occurred in the 1990's, with the SRB, under the influence of China, finally reaching 114 between 2000 and 2005 in Eastern Asia. In South-Central Asia, trends are mainly driven by India where the SRB increased to 107. Between 2000-2005, five countries in Asia recorded a very unbalanced SRB: three Caucasian countries – Azerbaijan, Armenia and Georgia –, but also China and South Korea with SRB values above 110 boys per 100 girls. India mostly remained in an intermediate position, with a SRB estimated at 108 between 2000 and 2005, although some Indian states – such as Punjab – did record much higher SRB levels for that time period. According to United Nations estimates used for this comparison (United Nations, 2007), Viet Nam is not yet among Asian populations with a skewed child sex ratio, but is now experiencing a rise in the SRB.

## 1.2 Determinants and implications

The origin of this rise of the SRB is linked to the introduction of sex selective abortions in many Asian countries. There are other methods to alter the sex ratio of the newborn available to couples in industrialized countries (such as pre-implantation techniques), but the abortion of female foetuses after sex determination is by far the most common practice and accounts for the skewed SRB values observed across Asia (Attané and Guilmoto 2007, Arnold et al. 2002, Guilmoto 2007a, 2007b, Kim 2004, Li 2007, Chu 2003). Introduction of these sex determination methods is closely related to the arrival of ultrasound and amniocentesis technologies in the late 1970's, which made it possible for parents to know the sex of their child in advance. Ultrasound (or ultrasonography, or "scan") was the first technique used to determine the sex of a child and became very common: the technology spread fast across hospitals and private clinics as the cost of the equipment recorded a rapid decline. Combined with favourable abortion legislation, sex determination has allowed the parents to avoid the birth of a child of a particular sex and this behavioural change immediately reflected itself in the sex ratio statistics.

Supply factors such as the introduction of new technology are highlighting only one part of the story: Throughout a number of countries in Asia, a strong cultural desire to have a son encourages parents to explore all strategies for sex selection, specifically, abandonment, adoption and infanticide, to ensure a male heir (Croll 2000).

Figure 1 sums up some of the main factors identified in a previous analysis of sex selection in Asia (Guilmoto, 2007b). Arguments in favour of boys seem to stem logically from many features typical of Asian socio-cultural and economic settings. Generally, investment in sons rather than in daughters is believed to bring more "returns" to families within a kinship system characterized by transfers from married sons to ageing parents, the customary practice in a patrilineal system. Traditional value systems have long favoured sons over daughters in family systems that are mostly monogamous. These trends have been reinforced under the impact of economic development and of fertility decline, both processes of social change which indicate that the economic value and costs associated with having children has become a primary concern to parents.

It appears that the availability of ultrasound facilities and abortion even if illegal[1] together with the presence of pronounced son preference and lower fertility, lead to more frequent sex selective abortions. At the same time, large regional pockets in affected countries such as in China or in India seem to have remained immune to this trend of masculinisation: in these specific regions, local gender arrangements are usually much more favourable to women and the absence of male offspring is not regarded as a family disaster.

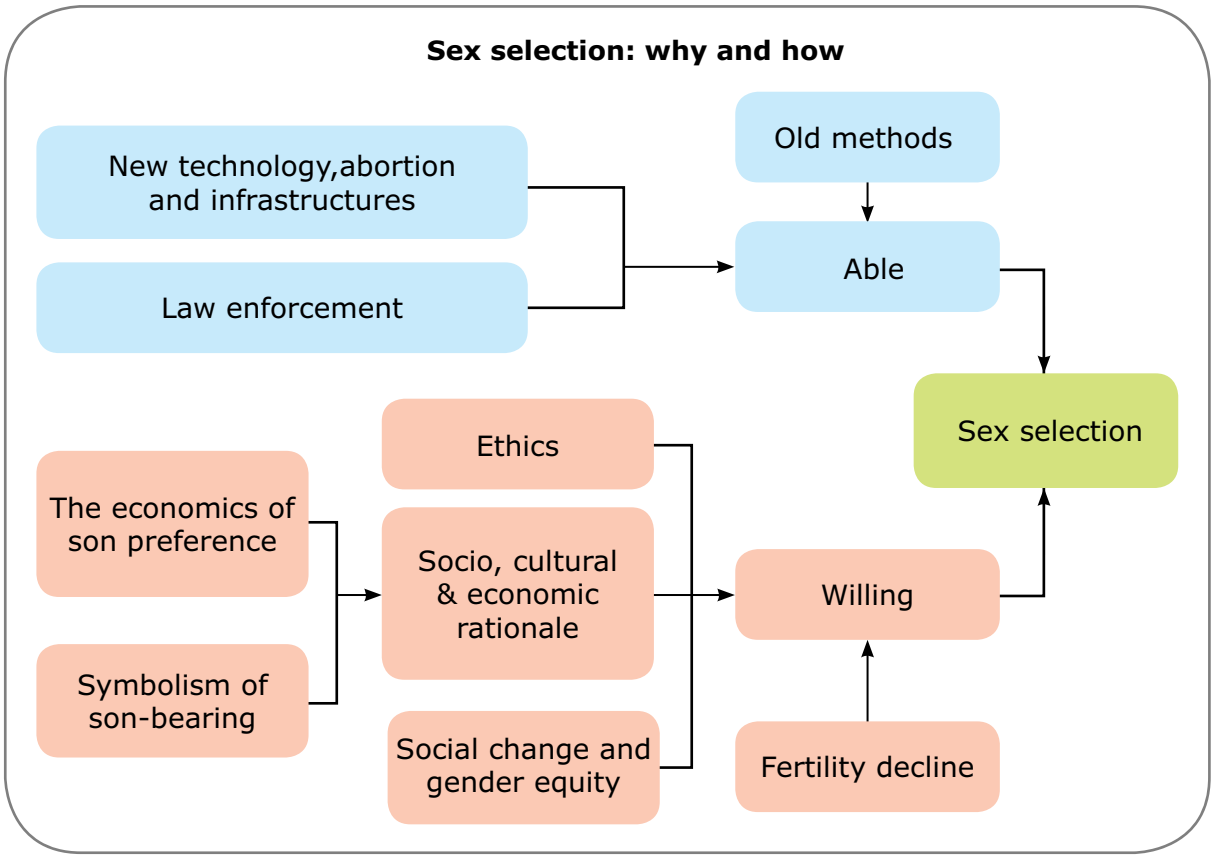


**Figure 1: Factors influencing sex selection in Asia**

[1] *A Population Ordinance of 2003 and the Law on Gender Equality which was passed in December 2006 specifically forbid sex-selective abortions in Viet Nam.*

# 2. Sources addressing gender imbalances in Viet Nam

In this section, available sources will be reviewed that describe SRB variations and gender imbalances. Here it must be noted that sources related to sex selective behaviour are scarce, largely due to a lack of adequately published data from the birth registration system in Viet Nam. This is in particular caused by the fact that the SRB as a statistical indicator is sensitive to sample size and needs to be computed based on a large number of births. In fact, since the SRB is a ratio rather than a proportion, its variability is larger[2]. *To give a simple illustration, a confidence interval of 5% for a SRB of 105 (biological average) for 10,000 births ranges from 101 to 109. For a sample two times smaller (5,000 births), the confidence interval of [99-111] is bigger. For a much larger sample of 100,000 births, the interval would still be of [103.7-106.3].* In fact, SRB series available from large countries with quality registration data always display minor year-to-year fluctuations that are partly attributable to random factors.

Another deficiency with regard to sources relates to the almost complete absence of reliable abortion statistics in the country. Prenatal sex selection relies heavily on selective abortions and lack of data about this phenomenon (number, age and parity of women etc.) is a major constraint to obtaining reliable information[3].

[2] *The 5-percent confidence interval for the percentage p of male births calculated for n observations is ±1.96.sqroot (p.(1-p)/n), a value close to 1/sqroot(n).*

[3] *There are however estimates for the high abortion rates in Viet Nam. According to some studies, in 2002, 46% of all pregnancies were terminated. The number of abortions per married woman is estimated to be 1.5 (1.7 in urban areas). For the purpose of this report however no attempt is made to explore the quality of these estimates or to make extensive use of them.*

## 2.1 Census data from 1999

A census is an excellent tool to detect any undue variation in the sex ratio of children, especially in countries like Viet Nam where the quality of age reporting is reasonably good. In the first place the census provides data for the entire population and is therefore based on very large samples. Secondly, data are systematically collected and often disaggregated at fine administrative level (such as provinces or urban localities) and for other population sub-categories (such as ethnic minority groups). Minor, local variations are thus detectable even when they may be invisible at a larger scale.

In Viet Nam the last census data available at the time of this study is from 1999 and provides a massive source of information regarding the social and economic conditions of the country and its regional components. Until the 2009 data are published, the 1999 census remains the single most important source of demographic information for Viet Nam.

The last census included two sections that are directly related to changes in the SRB. One is the usual age and sex distribution of the population, which allows insight into the sex ratio among children as a reflection of the SRB during the years preceding the census. The second one is the section about the "last birth" to women of child-bearing age, as this may also shed light on the recent variations in the SRB.

Yet, census data do present some limitations. In addition to a skewed SRB, age data also reflect other factors such as sex mortality differentials among infants and children or registration differentials. It is not possible to establish the respective influence of these various factors. Another drawback relates to the use of information about "last births" as an indicator for a skewed sex ratio. As our analysis below will demonstrate, data regarding last births as reported by parents suffer from a serious bias for

births that occurred several years before the census. Another shortcoming of using the census as a source relates to the fact that the census is only conducted every 10 years: this inhibits detailed monitoring of sex ratio trends. For the purpose of this report the 1999 census is limited to insight regarding the years directly preceding the census. In fact, the current analysis will suggest that no active prenatal sex selection existed at a significant scale in Viet Nam before 2000. Figure 2 for instance shows the sex ratio of the population by five year age groups: this indicates that at the national level, the sex ratio apparently remained stable at a value of around 105-106 among the population aged below 15 years of age[4]. Disaggregated regional analysis (see Figure 11 further below) does not indicate any significant or consistent imbalance for smaller geographical areas either.

The 2009 census will, in comparison, provide much more information as the SRB has undergone a rapid deterioration in recent years. It will in fact become the major tool to document the current process of masculinization in the country in detail, something that other currently available sources cannot present.

## 2.2 Demographic and Health Survey data from 2002

Demographic and Health Surveys (DHS) are often used to highlight son preference and discriminatory behaviours. These surveys are also of importance to provide reliable mortality estimates for children.

The last DHS survey conducted in Viet Nam in 2002 does indeed provide some valuable information. In particular Table 1 (extracted from table 7.3 in the original DHS report) indicates that the mortality differentials among boys and girls are not especially pronounced. Mortality is as expected higher among boys in childhood and under-five mortality is as a whole slightly higher at 34.2 per 1000 for boys than for girls at 31.4. The only perceptible irregularity relates to post-natal mortality (PNN) (between 1 and 12 months of age) and the PNN rate for females is slightly higher

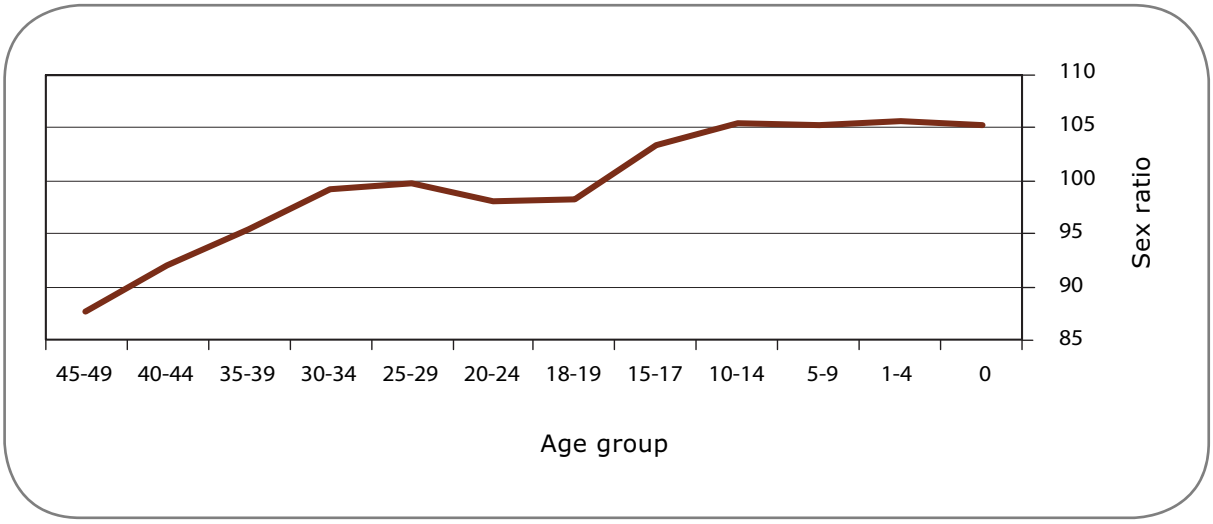


**Figure 2: Sex ratio by age group, 1999 census**

[4] *Please also note that skewed sex ratios among older age groups (population aged 40+) have been partly influenced by migration and war casuaties...*

than the rate for males (7.8 against 7.0). However, this small gap may be due to measurement errors related to the small sample size.

**Table 1: Sex differentials in child mortality, 2002 DHS**

| Mortality rate | Sex of child | |
|---|---|---|
| | Male | Female |
| Neonatal mortality (NN) | 17.5 | 17.4 |
| Postneonatal mortality (PNN) | 7.0 | 7.8 |
| Infant mortality ($_1p_0$) | 24.5 | 25.1 |
| Childhood mortality ($_4p_1$) | 9.9 | 6.5 |
| Under 5 mortality ($_5p_0$) | 34.2 | 31.4 |

Another potentially useful indicator obtained solely through DHS surveys is: the ideal number of children among Vietnamese women. The desired family size in 2002 was 2 children for more than 60 % of women and larger (>2) for another 38% of the sample. Women stated that they wanted at least both a son and a daughter, i.e. two or more children. While 30% of the women wished to have more than one son, only 23% wished for more than one daughter[5]. From these data the difference appears almost negligible. A similar analysis was performed to estimate the proportion of mothers with at least two children who wanted an additional birth. It showed only a modest difference between women who already had a son and women who had never given birth to a son: 2% among the former wanted more children as against 15% among the latter. On the whole, the 2002 DHS fails to exhibit serious differences that may account for gender imbalances.

Using the DHS surveys as a source to study SRB per se is of limited value, mostly due to the limited sample size used. As a result, not only are SRB values often unreliable, but small variations as occur in Viet Nam during the years preceding 2002 would be undetectable. This is especially true for the Vietnamese 2002 survey by which the number of births recorded was 13,586 (see Table C.3 in the original report). No more than 2,100 births were reported during the five years preceding the survey. It may be noticed that the SRB of these latter births is 105.5 and therefore appears to conform to the standard distribution.

In spite of the sample size, the SRB in relation with birth order was calculated[6] for all births recorded during the survey, as well as for more recent births occurring after 1995. As Table 2 indicates, the SRB for later births (parity 3 and higher) is 113.5 and tends indeed to be exceeding normal values. This would suggest that women with a high parity have more sons than expected and this may be related to their attempt at having a son. However, again the sample size remains too small to validate this result. (A chi-square was used for the cross-table and a logit model for the probability to bear a son. Both tests fail to confirm any significant relationship between

**Table 2: The SRB by birth order, 2002 DHS**

| The Sex Ratio at Birth | Birth order | | |
|---|---|---|---|
| | 1 | 2 | 3 or more |
| All births | 106.2 | 104.7 | 107.5 |
| Number of births | 5,390 | 4,273 | 2,325 |
| Births after 1995 | 109.9 | 105.7 | 113.5 |
| Number of births | 1,228 | 1,088 | 475 |

[5] *Values computed from raw DHS files.*

[6] *Tables computed from raw DHS files.*

birth order and probability to bear a son among Vietnamese women). Moreover, in comparison, the SRB at higher parity as observed in countries with well-established gender imbalances such as China or India tends to be distinctly higher: usually above 120.

For the purpose of this study DHS data were also used to work out the probability to bear a son among women who had only daughters. Usually the SRB reaches the highest levels among women who have failed to give birth to a single male child. To do this, the sample of births occurring after 1995 and of parity greater than one was used in order to compare the births to women without sons with those to other women. However, again no significant number of excess male births can be identified among mothers without sons. It must be noted that once more this may be due to the limited sample size (2004 births) used in this computation.

## 2.3 Annual population surveys

Lack of sufficient evidence from the above sources means that for estimates of the recent levels of the SRB in Viet Nam the annual population surveys by the GSO must therefore be relied upon. These surveys have been conducted every year by the GSO since the last census[7]. They are based on a 3% sample drawn from the Census. Information collected refers to the general population, individual households, as well as women of child-bearing age. They offer a reliable way to update demographic estimates for the country and to monitor some of the main trends in demographic behaviour, such as regional mobility, nuptiality, fertility, family planning and mortality. The samples used are of considerable size, compared to other surveys such as the DHS. During the last survey conducted in 2007, no less than 461,000 women aged 15-49 were surveyed.

Besides standard socio-demographic descriptors, some new questions about birth conditions and detection of the sex of the foetus were added to the survey in 2006. These questions include antenatal care, place of delivery and prior knowledge of the sex of the foetus by the mother.

Again, there are limitations with the data from this source. First, the sample may not be adequate for all estimation procedures and turn out to be too small for some detailed analysis of SRB differentials, in particular on a regional scale. Moreover, the sampling scheme has not been restructured or updated over the years: In Viet Nam spatial mobility is intense and entails not only considerable population redistribution between communities and regions, but also rapid urbanization and the emergence of new settlements, in towns and cities as well as in some rural areas. It is therefore plausible that the present sample does not accurately represent the Vietnamese population today as it did in 1999. Third, routine annual data collection by the local staff from the same units may have endangered the quality of the data themselves. In fact, this has been suggested as a possible reason for discrepancy between some of the data collected during the surveys.

Fourth, due to their scope, the annual surveys are less detailed than the Census in terms of collected information. Some useful variables needed to identify the main characteristics that can be associated with the skewed sex ratio levels, are missing. In particular, basic indicators of socio-economic status such as income levels or possession of household goods have been omitted. Other missing variables that are potentially of interest for this analysis include ethnicity, mother tongue, urban size and occupation.

[7] *The reference date for surveys is usually April 1 of the current year and records demographic events taking during the previous 12 months. As a result, survey conducted during year n tends to describe demographic trends for year n-1.*

## 2.4 Surveys of birth in 2007

In addition to the annual surveys, the GSO, with UNFPA support, conducted a special survey in 2007 throughout all health facilities in the country, in order to assess the number of births recorded in 2006[8]. In terms of sample size, this particular survey is the best source to estimate the SRB as it is based on almost 1.1 million births: approximately 76% of the expected births in 2007. Births covered by this estimate come from various administrative records kept in health centres as well in other higher-level institutions such as district hospitals. The crude SRB, calculated over all recorded births, was 109.4 for 2006.

However, there appears to be a potential bias as a large number of commune level health centres were omitted from the survey. In fact, only 3420 communes (out of more than 9080 communes in 2006) were covered. Traditionally, the SRB varies according to the type of health institution, with larger health centres such as city hospitals recording a higher SRB. This latter fact may be directly related to factors of supply (the availability of sex determination facilities), or of demand (the effects of fertility decline or prosperity). As a result, the selective under-representation of smaller health centres in rural areas tends to cause an upward bias to the overall SRB. To compensate for this a multiplying factor (a coverage correction coefficient) has been applied to the number of births recorded in communities[9]. Such a correction yields an adjusted SRB of 108.6 for 2006 (UNFPA 2007).

As will be seen, the correction coefficient is not negligible. In some provinces, the differences between crude and adjusted SRB values are quite large. The reason for such a gap is linked to the coefficient applied, which is simply the ratio of all communes to surveyed communes. This methodology assumes that births are equally distributed across communes and in particular that missing communes have registered the same number of births as communes covered by the survey of health facilities[10].

A further source of estimation for which no correction is available is the possibility of double counts, whereby some births would be recorded simultaneously in the hospitals where they took place as well as in the books of the local health centres in which mothers are registered.

Results indicate that this correction coefficient varies widely across the provinces: it may be as low as 1.2 in a commune of the Mekong River Delta province (where only 20% of communes were not covered by the survey), but rises in several provinces in North Viet Nam to values above 5, meaning that less than 20% of the communes were covered by the survey.

Corrected SRB estimates for the provinces are usually close to the crude SRB estimates with differences usually below 2 per 100. However, variation may be more significant for specific provinces: for instance, in Nghe An, the crude SRB is 113 while the corrected SRB value is 107. From this it may be concluded that while this estimate is likely to be more robust than the ones from any other source in view of the number of births recorded for 2006, it is still incomplete. (The issue of communes missing from the survey and thus its differential impact

[8] *The survey is described in UNFPA (2007). This study benefited from additional unpublished information from the UNFPA and GSO offices.*

[9] *A more tedious but probably more accurate method would be to weigh the covered and uncovered communities by their total population rather than by their number.*

[10] *A recent report for Plan International from 2006 indicates that birth registration in the country has improved dramatically since the year of Birth registration in 2001, from 72% in 2000 to 95% in 2005, an estimate which appears to be even higher than that derived from the MICS survey.*

on provincial estimates of the SRB has to be taken into account in the analysis of the results).

## 2.5 Multiple Indicator Cluster Survey

There are many other sources to monitor reproductive behaviour and gender discrimination in Viet Nam. One of these is the Multiple Indicator Cluster Survey (MICS), conducted by the GSO for UNICEF in 2006 and released in November 2007.

The MICS in particular provides detailed data regarding birth registration, according to which 88% of the births are currently properly registered in the country as a whole[11]. Interestingly, no differential under-registration emerges according to the gender of the child. The percentage registered is significantly lower in underdeveloped regions such as the North-West (75%) or the Central Highlands (78%). Percentages below 75% are also found among illiterate mothers, minority populations and the poorest strata of society. While this overall average may seem somewhat satisfactory, it unfortunately appears that only 75% of the children are registered during the first year. Registration only tends to take place after one year or later for more than 20% of them, a feature attesting to the lax attitudes of parents who, with the current registration policies are still allowed to register their children long after their birth. When asked, one major reason given for this delay in registering a birth is "lack of time". This suggests that the cumbersome registration process may to some extent discourage parents to make sure their children are registered properly. Other reasons given such as travel distance or lack of knowledge about the registration process also point to the need for a better communication system and administrative setup.

Quality of registration is indeed known to be inadequate in mountainous areas with ethnic minorities, especially among people who are not literate in Kinh– the language of the administration. Births that violate local family planning policies, as well as children born out of wedlock may also go under-reported. Fines imposed on parents may represent a further cause for late or incomplete registration.

Some additional data from the latest MICS confirm results derived from the DHS or annual population surveys. For instance, no excess female mortality among infants and children occur in present-day Viet Nam. Several other indicators from the MICS show that gender discrimination is on the whole moderate in Viet Nam. For instance, malnutrition appears to be less frequent among female children. Girls received necessary vaccinations as often as their brothers and have a health card more often than them. Similarly, domestic discipline –including physical punishment– is less frequent towards girls. Up to the age of ten, primary school attendance ratios are maximal (99%) for both sexes. In fact, girls are slightly more numerous in secondary schools than boys.

The only visible area in which girls may be at a disadvantage before the age of 15 relates to child labour, but this is mostly due to their more frequent participation in household chores. After 15, many female adolescents marry early and the overall picture becomes far less favourable for young women. Early pregnancy, lack of access to further education, gender segmentation in the labour force and poor employment opportunities as well as the frequent risk of domestic violence are among the many facets of discrimination faced by adult women. In terms of their role in public life and leadership positions in government at lower administrative levels remains limited.

[11] *The parity bias for the question regarding "the last birth" is linked to the fact that when posed to older mothers, the question about the "last birth" refers usually to their ultimate child, which more may often be a boy than a girl. The mechanisms behind this selectivity bias are discussed in greater detail further below.*

# 3. Recent trends regarding the sex ratio at birth

From the above, it can be seen that sources to assess the recent evaluation of the SRB developments in the country are limited. Since the survey of births described was conducted in 2007 only, the annual sample survey prior to 2006 has to be relied upon for estimates. Another potential source of information is the 1999 census, even if available data are also limited. In fact, thus far it has been customary to estimate yearly fluctuations of the SRB by using the births recorded in the annual population and labour surveys conducted since 2000.

## 3.1 Annual sex ratio at birth values

Each population survey records the number of births that have occurred to women aged 15-49. Initially, the information collected was focusing on the very last birth to women (with sex and date of birth). The latest annual surveys collected additional information regarding births during the three years preceding the survey. This provides a first estimate of the SRB during the years immediately prior to the survey. The 1999 census results based on the 3% sample may also be used as it provides information regarding the sex and date of the previous birth among women aged 15-49 years. For the purpose of the current report the three civil years including the survey year will be focused upon in order to avoid any bias linked to the concept of "last birth" as is common for births that took place a much longer time ago.

Table 3 shows the combined SRB estimates from various surveys, starting from the 1999 census. The 12 months preceding the survey date do not exactly match with the previous year as the surveys were conducted in April or July. Except for the 2000 and 2007 surveys, data were reproduced from the published 2006 Population Survey which had the limitation of many figures with only a single decimal point (GSO 2007). No clear trend becomes apparent until the year 2004 and SRB values seem to fluctuate almost randomly within the 106-109 range. While this interval is slightly above the expected values of a normal Sex Ratio at Birth (105-106), the difference is not significant as the limited size of the birth sample (about 22,000 births per year) may cause random variations: the 5% confidence interval of the SRB is in fact +/- 2.9 per 100 female births for such a sample size, which means that the observed SRB values in the successive surveys may be compatible with a normal SRB of 105-106.

However, SRB values based on births during the 12 months prior to the surveys seem to increase regularly from year 2004 and cross the 110 threshold in 2005 (2006 Survey). The latest SRB value for 2006 (2007 Survey) is now 110, a level significantly higher than the biological standard. This figure of 110 for 2006 lies in fact between the value of 108.6 estimated by the survey of births in 2006 (described above) and the value of 111.4 derived from the information on birth history also collected by the annual surveys (described below).

From 2006 onwards, the surveys also separately record the sex and date of birth of the last five children born to women aged 15-49. Among older women aged 40 or more, these births may have occurred more than 20 years before the survey. To some extent, this last question regarding the last five births is the most comprehensive variable to study past fertility over a long period: there is no time limitation (as for "births occurring during the three previous years") or parity bias (as for "last birth") like in previous survey questions[12]. Of course,

[12] *Apart from usual recall lapses by older mothers, the only biases related to this question regarding the last five births refers to two categories of births: 1) past births to women aged more than 50 at the time of the survey and 2) first births among women who had more than five births. Both categories probably have only a minor impact because of the limited amount of following births in these categories for the previous 15 years.*

**Table 3: The SRB from annual population surveys, Viet Nam, 1999-2007**

| Survey year | Source | Reference date* | SRB |
|---|---|---|---|
| 1999 | Census | April 1, 1999 | 107.0 |
| 2000 | Annual survey | July 1, 2000 | 106.2** |
| 2001 | Annual survey | April 1, 2001 | 109.0 |
| 2002 | Annual survey | April 1, 2002 | 107.0 |
| 2003 | Annual survey | April 1, 2003 | 104.0 |
| 2004 | Annual survey | April 1, 2004 | 108.0 |
| 2005 | Annual survey | April 1, 2005 | 106.0 |
| 2006 | Annual survey | April 1, 2006 | 110.0 |
| 2007 | Annual survey | April 1, 2007 | 111.6** |

* *SRB values calculated for births occurring one year before the survey date do not correspond to Calendar years.*
** *Estimated by the author*

the birth history recorded by mothers during the survey tends to overlap with the information about the "last birth". But birth history statistics offer other information such as an unbiased estimate for a period longer ago and allows for parity-wise statistics[13].

The two 2006 and 2007 surveys were used to reconstruct the birth history of women starting from 1990. The first chart (Figure 3) indicates that both sources are rather consistent, which is to be expected because 2007 and 2006 data were collected from virtually the same women. Differences are at times perceptible however, as for the years 1991 and 2002. It has therefore been decided to combine both sets of data into a single set by averaging the SRB until 2005 and to use this data set for further analysis.

To a large extent, the emerging picture is similar to that deduced from the data regarding "the last birth" (Table 3) over the 1999-2006 period. But the data set regarding birth history gives a more complex idea of the evolution of SRB over the last twenty years: oscillations in the SRB levels were apparent, with values fluctuating between 104 and 111 from 1985 to the late 1990's. These fluctuations around an average SRB value in 1985-2000 of 107.4 do not lie far above the biological standard and may reflect a somewhat negligible level of sex imbalance at birth. At the same time, the possibility of specific under-reporting of female births (or children) by mothers may not be completely ruled out as an explanation for this slightly higher SRB in the past. The oscillating character of the data sets until 2000 is more puzzling as is the fact those extreme values such as 104 or 111 lie outside the confidence interval of the average SRB at 107.4. However, at this point no information is available to analyze these specific pre-2000 features.

From 2000 onwards, an upward trend distinctively appears from the annual data shown in Figure 4. The SRB starts

[13] *The only drawback of this method relates to mothers who had more than 5 births: in their case, the birth order is underestimated.*

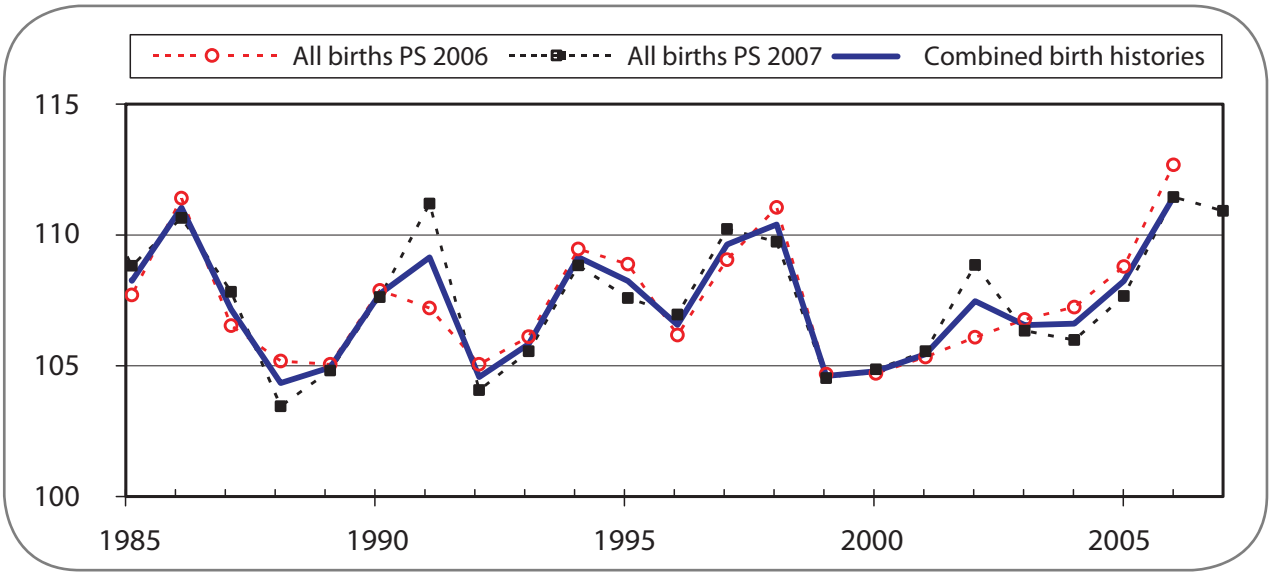


**Figure 3: The SRB computed from birth history, 2006 and 2007 annual population surveys (PS), 1985-2007**

from levels below 105 and increases somewhat regularly until 2006 when it reaches 111. Except for the apparent stalling in 2003-2004[14], the SRB keeps on increasing every year during this period. Annual estimates even suggest that this rise has been accelerating since 2004. The overall increase from the time span 1999-2000 to 2005-2006 of more than 6 points in SRB values is strongly significant. Equally significant is the difference between the 1985-2000 average value calculated previously at 107.4 and the most recent average SRB value for 2006.

## 3.2 The sex ratio at birth and prenatal sex selection

What does the SRB signify in terms of sex selection? No survey will ever offer accurate estimates of the proportion of women undergoing an unlawful sex selective abortion. However, in order to support given survey results, a simulation is possible if the SRB is assumed to be normal (105) and various probability levels to opt for prenatal sex selection are used.

For Viet Nam, it was decided to simulate family formation mechanisms by using a parity progression ratio (PPR) similar to what was observed during the recent surveys. Pregnancies – to be followed by birth or abortions – were simulated according to the PPR's and given probability to bear boys or girls. The only specification at this point is that the PPR's for third – or higher – order births are now supposed to be *twice* as high for mothers who have never given birth to a son (probability of 60%) than for other mothers (30%). The theoretical fertility of 2.1 children per woman derived from such a model remained equal to the TFR measured in 2006 (2.09), which suggest that our model somewhat accurately reflects current fertility outcomes in the country.

[14] *It may be noted that the 2003-2005 fluctuations are entirely due to data generated by the 2007 survey. In contrast to the 2007 survey, the first survey addressing birth history (conducted in 2006) indicates a regular rise in SRB from 1999 to 2006. As the 2006 survey data on SRB are more regular than that of the 2007 survey and the number of births recorded is larger, despite the fact that the sample remains the same. We are thus inclined to think that the 2006 survey (which was the first to record these data) may have been of better quality than the subsequent one.*

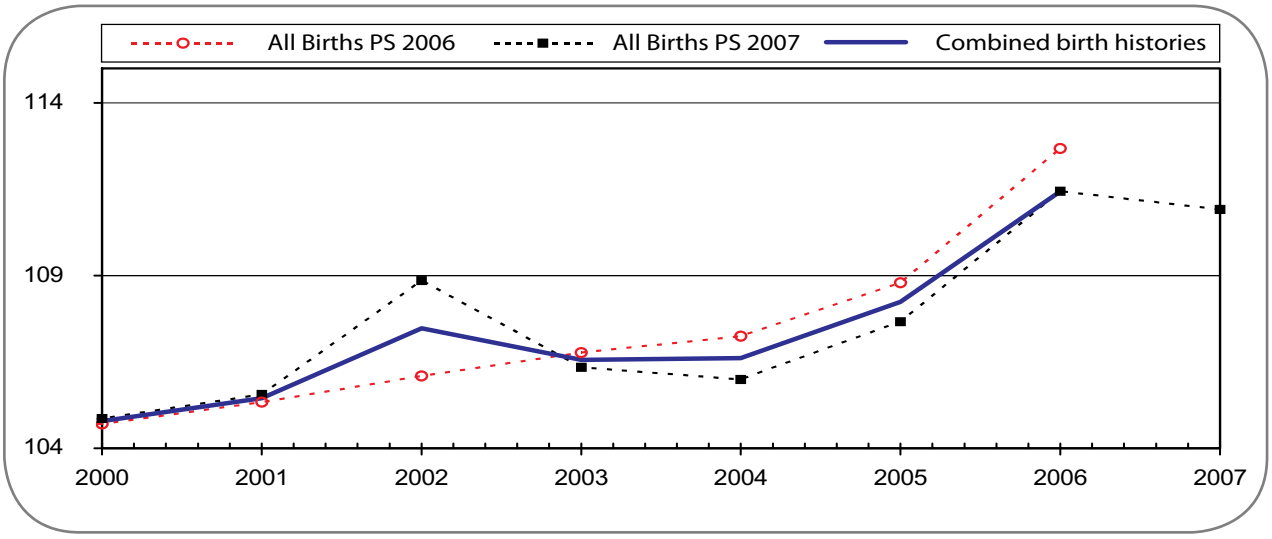


**Figure 4: The SRB computed from birth history, 2006 and 2007 annual population surveys (PS), 2000-2007**

At the same time, a normal SRB for 105 mothers who already had a male child was assumed: in other words, sex selection was considered not to be practiced among them. For other women (including childless women) the probability to abort female foetuses was made to vary between 0% and 25% in order to assess the overall impact on the SRB. After several experiments, it appeared that, according to the simulation model the average SRB of 111 observed in Viet Nam of today corresponds precisely to an 8% probability to abort female foetuses. Thus, if 8% of all women who never gave birth to a son undergo a sex selective abortion, the ultimate SRB for the entire population will be similar to that observed in the country today.

This value can then be taken as a preliminary estimate of the frequency of prenatal sex selection for pregnancies among women who never gave birth to a son (irrespective of birth order). Conversely, this simulation suggests that 92% of women without sons who are pregnant with a girl would not resort to sex selection. In fact, most women in this category either don't know the sex of their foetus or do not want to terminate their pregnancy.

## 3.3 Conclusion: a rapid but belated rise of the sex ratio at birth

The most recent data from the 2007 Population Survey demonstrate that the high SRB value observed for 2006 significantly exceeds the normal SRB values observed elsewhere in the world[15]. It also lies significantly above the fluctuating SRB values observed in Viet Nam prior to 2000. The current SRB figure is lower than values observed in China as a whole or in affected Indian States-such as Punjab, Gujarat or Haryana, but it attests of the indisputable existence of sex selection among parents.

The rise of the SRB seems to have taken place from 1999 onwards at an average annual rate of 1 SRB point. Interestingly, the increase did not occur during the late 1990's when it was noted by some careful observers through the results of the 1999 census that the SRB may be on the rise in Viet Nam (Bélanger et al. 2003). In fact, qualitative research regarding son preference by Bélanger in

[15] *SRB for the first 2007 semester is 110.9, but has not been used here as the number of corresponding births is less than 6,000.*

Ha Tay province in 2006 did not confirm the large occurrence of sex-selective abortions in 2000-2002, while more recent work conducted in 2007 does (ISDS 2007). While this increase of the SRB is much more recent in Viet Nam than in other Asian countries, it may be observed that it proceeds at a rather rapid pace.

In China and in Korea, during their respective periods of rapid SRB increase in the periods 1979-2000 and 1980-1993, the progression rate of their SRB was slower at about 0.65 point per year. China is not only much bigger than Viet Nam, but also more heterogeneous in social, ethnic and geographical terms which may account for the slower rate of its increase of the SRB. South Korea on the contrary, is smaller in terms of area and population, sociologically more homogeneous and more densely populated than Viet Nam and, in the 1980's, not less developed than Viet Nam is today. These social and geographical features would point towards faster diffusion mechanisms within Korea as compared to Viet Nam. This further reinforces the perception that the rate of SRB degradation in Viet Nam appears unusually rapid even in relation to the Asian environment overall.

The reason for such a rapid rise is unlikely to reside in demand factors since the attitudes and mindsets of people are not known to change so fast. This is particularly true when it comes to son preference, an attitude based on a well entrenched family and gender system (Bélanger 2002 and 2006; Haughton and Haughton 1995). The only factors that may have played a role would be population policies and fertility decline, but again there probably is not a large enough change during the period under consideration in Viet Nam that could support this hypothesis.

Supply factors are more likely to be the main reason causing such a rapid change. Abortion services became easily available throughout Viet Nam from the 1960's onward and is in fact a rather frequent event as abortion estimates indicate. At the same time there is no reason to believe that abortion supply conditions underwent any specific change over the last 10 years. *This suggests that the main determinant factor behind changes in the supply domain actually relates to sex determination facilities.*

The fact that the SRB started to rise much later in Viet Nam in comparison with other Asian countries, is commonly explained by the lack of adequate facilities such as private clinics and in particular by the lack of proper equipment such as modern ultrasound machinery. Ultrasound technology first started to appear in the major hospitals of the country during the mid 1990's and was subsequently offered through the private sector (Bélanger et al. 2003). The equipment may initially have been of poor quality. A recent Viet Nam health report (2006) indeed emphasizes the improvements made regarding the quality and availability of medical equipment in the country during the past 10 years. Also: not only has it been easier more recently to import equipment from various countries (including second-hand or refurbished machines), but the quality/cost ratio has improved with the new availability of portable or 3-D units and decreasing production costs. In fact, some joint-venture companies are now producing imagery equipment (X-Ray machines, ultrasound apparatus) locally as well.

Recent research by Gammeltoft et al. (2007) does point to the actual "overuse of obstetric ultrasound methodology" in today's urban Viet Nam. Their work in particular, reports that prior

determination of the sex of the foetus and its later confirmation through renewed scans are a major objective among pregnant mothers. While the authors' contention that this overuse mainly represents an illustration of the current trend to use modern equipment in prenatal care seems justifiable, there are also reasons to believe that their study has underestimated the specific role ultrasonography plays for sex determination of a foetus.

Hard data regarding sex determination procedures are extremely scarce. But one cannot fail to notice that the proportion of mothers with prior knowledge of the sex of their foetus, a variable collected for the 2006 and 2007 population surveys, has regularly increased over the measurable period, rising from 60% in 2003 (2006 survey) to 73% in 2007 (2007 survey). While it is probably too early to firmly conclude which are the main factors causing the observed rise in SRB, it does however seem most plausible to link this trend with an increased accessibility to sex determination technology through the booming private health sector in urbanized or semi-urbanized areas[16]. Latent demand for son preference, somewhat exacerbated by fertility decline, may have finally met a new, hi-tech solution allowing parents to sort their pregnancies according to gender.

[16] *The private sector is not uniformly better equipped than commune health centres in rural areas however. See Tuan et al. (2005)*

# 4. The impact of parity and sex composition

Whenever effective prenatal sex selection exists, the SRB usually displays significant variations by birth order or gender composition. In many regions in China or India, the first birth often shows a somewhat regular proportion of boys and girls, while the SRB among higher-order births tends to be skewed. This stems from the desire of parents to correct their family composition in view of the children already born: more specifically, parents who want to have a boy but thus far have had only girls will try to influence the sex of the next child (Li 2007).

The interplay between the SRB and the family composition tends to be more complex however and varies according to the tools for fertility limitation used by couples. Three different situations may be identified. The first situation is that of the traditional setting in which fertility and SRB are almost beyond the control of individuals due to the lack of contraceptive or sex selection methods. The SRB remains at its normal, biological level. Yet parents may resort to neglect their newborn or commit infanticide to eliminate unwanted births. More recently, contraception has allowed women to avoid any further pregnancy when they already have the number and gender of children they desire. In this second situation, women can simply decide to have or not to have another child, although they have no way to influence its gender. Finally, the third situation corresponds to areas in which sex selection technology is available and pregnant women may avoid giving birth to children of a particular undesirable gender.

From the Vietnamese data set, it can be seen that the second scenario as described above was prevailing in the country since the 1980s. *However, the very recent rise in the SRB indicates that many couples have now taken advantage of the new technologies to actively influence the sex of their children.*

## 4.1 Parity progression ratio and previous births

First it will be examined to what extent pregnancies (not births) are influenced by the family composition i.e. whether mothers without a son tend to have more children than other women. A precise measurement of family formation processes is based on the calculation of the Parity Progression Ratio (PPR). The PPR is the probability that parents with a given number of children will bear an additional child. *The PPR can be computed from the birth distribution among women who have completed their fertility*[17].

In order to take into account the gender composition of the family, a more refined indicator will be used: the PPR values among mothers without sons and other women will be distinguished to assess the impact of the absence of a son on the decision to have an additional child. Findings are shown in Figure 5.

First the overall PPR for all births is 93% for the first birth, meaning that 93% of all women have had at least one child. This somewhat moderate value may be related to the fact that a number of older women could not marry during the 1980s because of the adult male deficit. The PPR at 90% remains high for the next child, but decreases to 61% and 50% for higher-parity births. These numbers can be similarly read as the proportion of women with two or 3 children already who had an additional third (or fourth) birth. They represent the overall fertility levels among Vietnamese women of the older generations for which this calculation is possible.

[17] *For reasons related to the sample size, the category of 60,000 women above age 39 in 2006 was used even though a minority among them may still bear a child after the 2006 survey.*

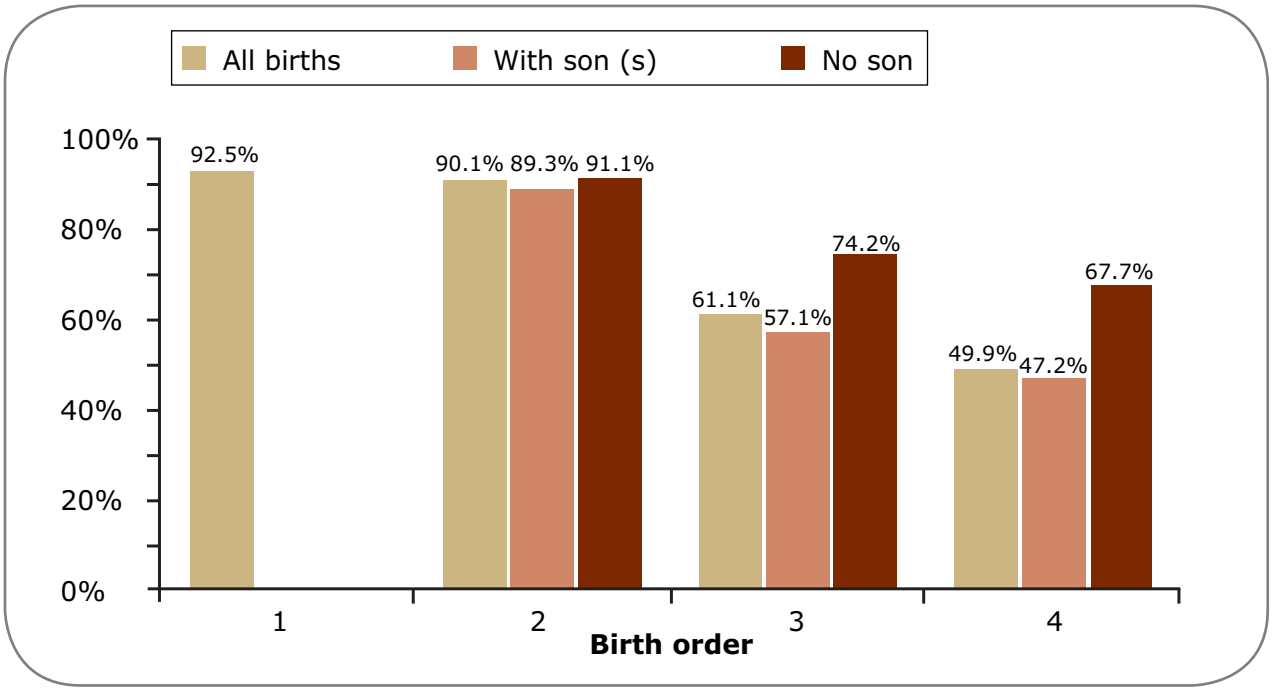


**Figure 5: Parity progression ratio by order and family composition, 2006 population survey**

Further classification of women into women without sons and women with (at least) one son yields ratios that now depend on the attained gender composition of the family. *Here it can be seen that women without sons tend to have an additional birth more often than other women.* This is not true for women with only one child. This illustrates previous fertility levels in Viet Nam according to which single-child families were rather uncommon as well as the fact that 90% of parents had another child regardless of the gender of the first one. *But the difference in PPR is most apparent in 17% of the women who had at least two children, with almost 75% of mothers without sons deciding to have another pregnancy.*

This tendency is even more pronounced among women who have three children already: 68% of women with no male offspring will bear a fourth child as against 47.2% of women who do have one or more sons. The probability to give birth to an additional child is in this case 21% higher among mothers without sons (68% minus 47%). Similar results were derived from studies focussing on unintended pregnancies and abortion, showing in particular that the number of previous sons tends to increase the probability of abortion (Le et al. 2004; Le 2006; Bélanger et al. 2007).

These trends do not correspond to active sex selection however and only depend on the parents' ability to avoid additional births by resorting to contraception or abortion irrespective of the sex of the foetus. Furthermore, these figures do not imply any specific sex ratio outcome. In the absence of "modern" sex selection methods, the sex ratio of additional births remains normal[18].

[18] *In fact, if there is any subpopulation within the country among which SRB is biologically lower than the rest, this subpopulation would be likely to bear more children than the rest of the population in order to have sons. This would then somewhat paradoxically result in a lower overall SRB as the population with a biologically low SRB would bear proportionally more children than the rest.*

## 4.2 The sex ratio of the last birth

There is another dimension of family formation processes that heavily influences gender preference and this is the sex ratio of the last births. As mentioned before, many routine questionnaires only refer to the last children born to surveyed mothers. Although appropriate to assess fertility over a short period before the time of the survey, this measurement is biased when referring to older mothers as will be shown below.

### 4.2.1 High sex ratio among last births in the past

Data from the 1999 census will illustrate this process easily. Figure 6 plots data of the sex ratio of the "last birth" per year of births prior to the census. The distribution of the child population classified by year of birth was added, which is almost regular for children aged less than 15. As can easily be seen, the sex ratio of last births tends to increase staunchly when moving backward in time from the census year. Values above 110 are observed for last births recorded more than 2 years before the census, while the sex ratio is higher than 120 for births occurring before 1993.

A similar figure (Figure 7), based on the 2007 Population survey, is shown below. The sex ratio of the "last births" is plotted on the chart by year of the last birth reported by mothers. Also included is the SRB data set based on birth history collected in the 2007 survey. The SRB values based on last birth estimates also tend to increase strongly for births occurring a longer time ago, reaching unlikely SRB levels above 130 for births taking place before 1992. This value tends to stabilize at 130-135 for older births, a level almost analogous to what the 1999 data suggest.

What can be concluded from such puzzling trends in SRB deterioration? The answer lies in the re-examination of the notion of "last birth", explained in Vietnamese as "more recent birth" (and not necessarily as "final" or "ultimate" birth). As Santow (2006) observed while examining data from the 2006 Survey, this is a "deceptively simple descriptor". More precisely, it introduces a selective bias as one goes back in time. While the "most recent birth" applies to all births during a short and recent span of time, the situation changes for longer time spans: women who had their "most recent birth" more than ten years ago are likely to be on average older than other

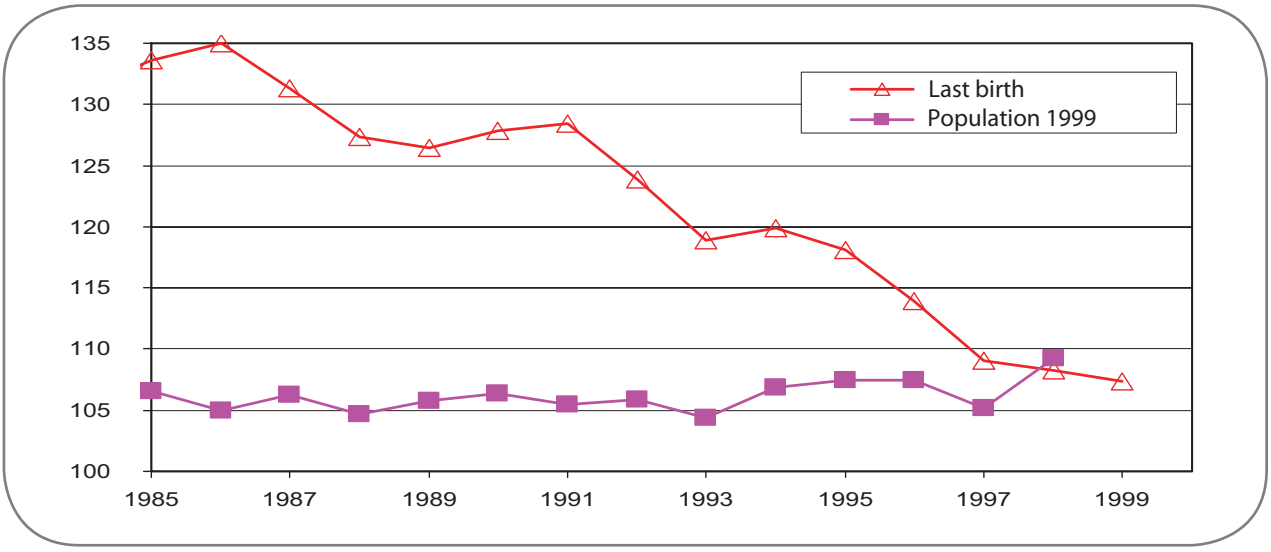


**Figure 6: Sex ratio of "last births" and child population by year of birth, 1999 Census**

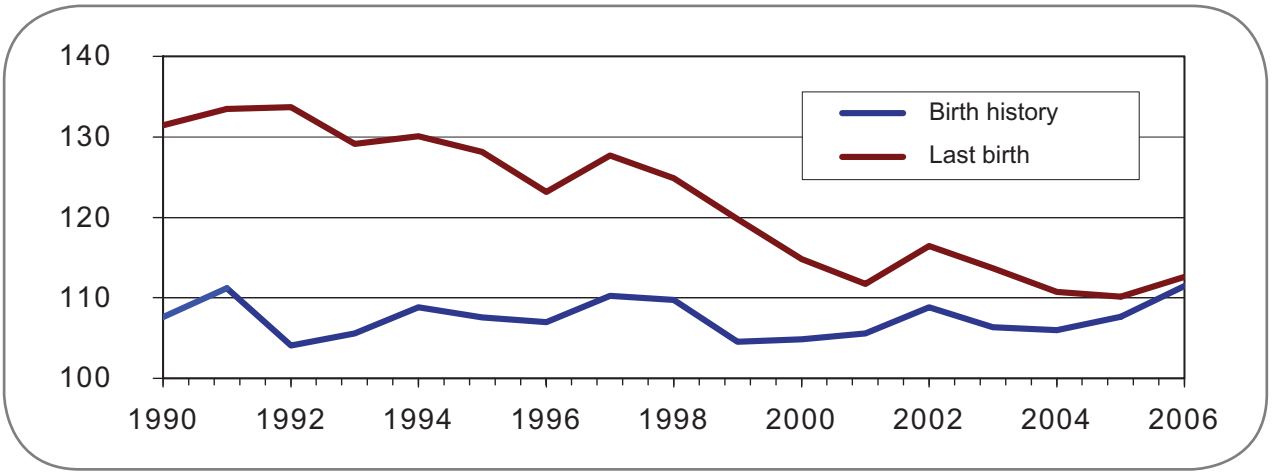


**Figure 7: Sex ratio of "last births" by year, 2007 population survey**

women and therefore refer to their final birth. Conclusively, as one goes back in time, last births will constitute a growing majority of the final births experienced by older women.

In most other countries, the concept of "last birth" would have no impact whatsoever on the SRB since birth order and gender are somewhat unrelated. But in Viet Nam, where women have additional children in order to have a boy (see the Parity Progression Ratio), the final birth may be more often than not the birth of a boy child. This relates to the traditional "stopping" rule whereby gender is more than parity, a decisive factor to cease bearing children. The selective bias means that the proportion of the "final birth" versus the "last birth", which was recorded in the surveys, will be increasing as one moves back into the past of birth history, and therefore, the percentage of male births will more likely be disproportionate[19].

### 4.2.2 Calculation of the sex ratio of the final birth

Further confirmation of the strength of the "stopping rule" follows from the analysis of data from the last Population Surveys in 2006 and 2007, which included detailed information on birth history. Such data make it possible to compute a "reverse birth order", in which final ("ultimate") births will be distinguished from other births. In order to do this, the sample has to be restricted to births that occurred at least ten years before the survey in 1988-1997, assuming that these "last births" are most probably the "ultimate births" that occurred to the women concerned. Births were then identified by reverse order, starting from ultimate births. Table 4 gives the sex ratio of these 300,000 reported births for the period of 1988-1997.

**Table 4: The SRB between 1988-1997 by reverse birth order, 2007 population survey**

| | SRB |
|---|---|
| Ultimate birth | 134.2 |
| Penultimate births | 105.4 |
| Anterior births | 73.3 |
| **Total** | **107.0** |

[19] *A similar bias would e.g. be found when asking people whether they have been successful during their last driving test. When this question is posed to older people, the answer is more likely to be positive than among younger people who may have recently failed the test.*

The results show a very pronounced pattern of SRB imbalance. Final (ultimate) births are strongly masculine with an SRB of 134. This high value is not surprising now since 130-135 was previously identified as the maximum SRB value for "last births" that occurred long before the population surveys. In fact, it corresponds closely to what may be taken as the "traditional"[20] Vietnamese "stopping rule" in the absence of effective sex selection techniques.

To illustrate this mechanism, one can suppose all women stop bearing children at parity $n$. The SRB of ultimate children will then have an SRB with a normal value. If others without sons decide to have one more pregnancy to try and have a son, this can be seen as the $n+1^{th}$ pregnancy with the usual probability $p$ to bear another son or a daughter while $1-p$ is assumed to be equal to 51.2% (SRB=105). Women without sons, after $n$ pregnancies, keep the proportion roughly equal to $(1-p)^n$. For simplicity's sake, it is finally assumed that these women try to have another male child only once after giving birth to n children. As a result, most women stop bearing children after parity $n$ since they already have a son. But women without male offspring have a further $n+1^{th}$ pregnancy and slightly increase their chances to finally have a son.

The only undetermined variable in this simulation is parity $n$. With $n=3$ and the "stopping rule" described below, the TFR will rise from 3 to 3.11 as a small proportion of women opt for an additional pregnancy for want of a son. This TFR figure is close to the average TFR level at 3.27 children per woman during the 1985-2000 period in Viet Nam as estimated by the United Nations (2007). Of interest now is that the SRB for the final child derived from this simulation is 133. Again this number is very close to the aforementioned values observed in the previous, different analysis of the sex ratio among last births. This suggests that if the simple "stopping rule" works as described previously, the overall demographic outcome will be similar to what is observed from the data on women's last births presented in this report.

### 4.2.3 Conclusion

There are many strategies available to parents in Viet Nam to guarantee there will be a male descendant in the family, ranging from adoption to fertility decisions (Bélanger, 2006; ISDS, 2007)[21]. The "stopping rule" has since a long time been the most efficient among them. During times when fertility was as high as 6 children per woman, the odds of remaining without a son was in fact limited to 1.5 percent –notwithstanding the impact of child mortality.

Extensive change came during the last three decades with the introduction of modern contraception, which allowed parents to plan their offspring of a desired gender and avoid any further births. Contraception introduced a far more effective method than the more traditional birth prevention techniques widely used before such as abstinence. But the "stopping rule" ceases to be optimal when costs of an additional child rise –as entailed by the very process of fertility decline. Modern contraception and abortion offer a way to avoid births, but since it is "sex-blind", it does however not satisfy the gender requirements of clients searching specific fertility strategies.

It is at this stage that sex determination technology emerged as a powerful method to screen pregnancies by gender. In some countries such as China, a "parity-wise" SRB indicates that the final boy "stopping rule" has actually been reinforced by sex selection methods.

[20] *This so-called "traditional" strategy is however recent when it relies on contraception or abortion to adjust parity progression to previous fertility outcomes.*

[21] *See description in Bélanger (2006) or in ISDS (2007).*

On the contrary, in Viet Nam, it appears that SRB is also high for first births. Moreover, the SRB of the ultimate birth appears to have declined during the last decade. It now stands at 109 for the period 1998-07 among women aged 40 and above in 2007[22].

## 4.3 Parity-wise sex ratio

The SRB tends to significantly worsen for higher birth order children. The SRB values observed in several Indian or Chinese regions may often be above 120 for the second birth and above 150 for the third birth. Data from the latest 2007 population survey with an almost complete birth history for the first time offer the possibility to examine the impact of birth order on the gender composition of births.

In order to increase the sample size, the 128,000 births (reported by mothers in 2007) that have occurred *since 2002 were used.* Results are shown in Figure 8. The overall sex ratio of this cohort is 108.1, a value slightly above the normal SRB. This sample is also compared with that of the 125,000 births dating from 1997 to 2001 that were reported by women during the same 2007 survey.

The results for the 1997-2001 time period is easier to interpret, as there are little variations by birth order. While the average SRB over this period is 107, variations by parity order are limited to -1.1 or + 0.8 and statistically negligible. To a large extent, this can easily be explained by the absence of an active sex selection process: When parents are unable to influence the sex of the child to be born (and in the absence of infanticide disguised as still births), birth order has no impact on the SRB.

For the most recent time period, the situation appears somewhat complex. First, it should be noted that sizeable variations around the mean SRB value of 108.1 appear since parity-specific ratios now range from 104.2 to 110.8. This immediately confirms that sex selection exists and that it varies according to birth order, with parents adapting their behaviour to family composition. However, SRB variations encountered here are rather uncharacteristic. While a higher SRB among last births (rank 2 or more) is a common feature in other countries, the difference is not really pronounced

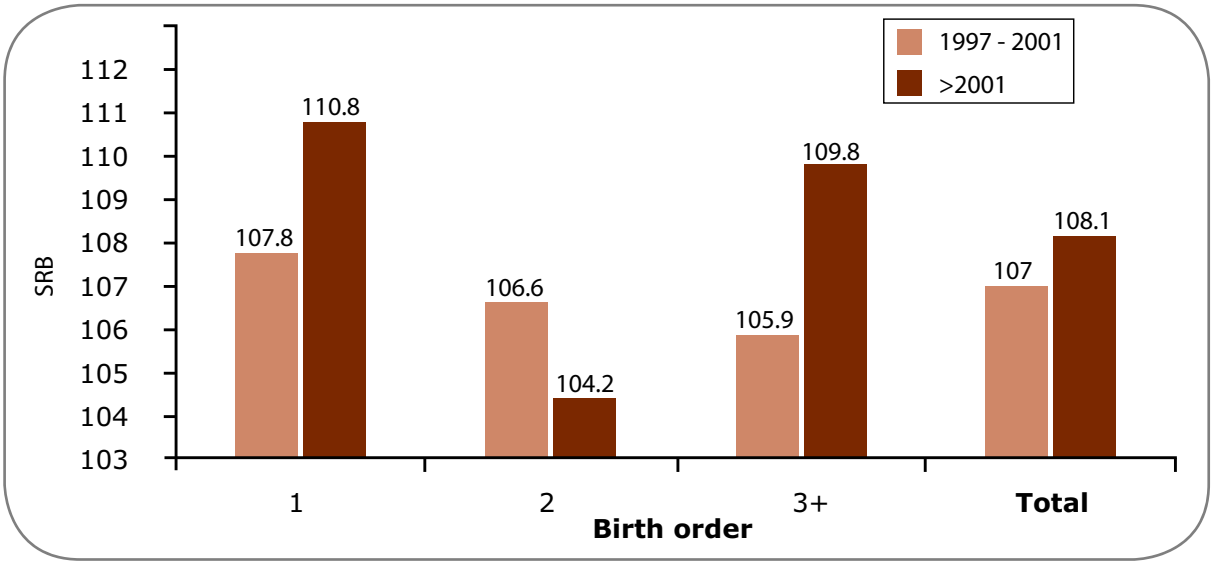


**Figure 8: The SRB by birth order, 2007 population survey**

[22] *The 40-year age limit used here assumes that women above this age will probably have no more children.*

in Viet Nam. Moreover, the highest sex ratio is found among first births (110.8) and second births have the lowest ratio (104.2). As a preliminary conclusion, it can be said that contrary to what is found elsewhere, and even if significant, variations are modest and that first births appear to be unusually targeted for sex selection.

For the purpose of this study the sample size for analysis of the 2007 Survey was kept rather small and with a focus on the most recent birth data (2005 - 2007).

thus calculated once again and the results are compared with previous calculations based on birth history reconstruction (see Figure 9). Although the SRB values computed from last birth data are somewhat higher than those from birth history[23], the same distribution of the SRB by parity can be observed. In particular, it becomes clear that SRB for second-order births is distinctively lower than for other parities. Available data on parity-wise SRB from other sources, such as Bélanger et al. (2003), concur with these findings.

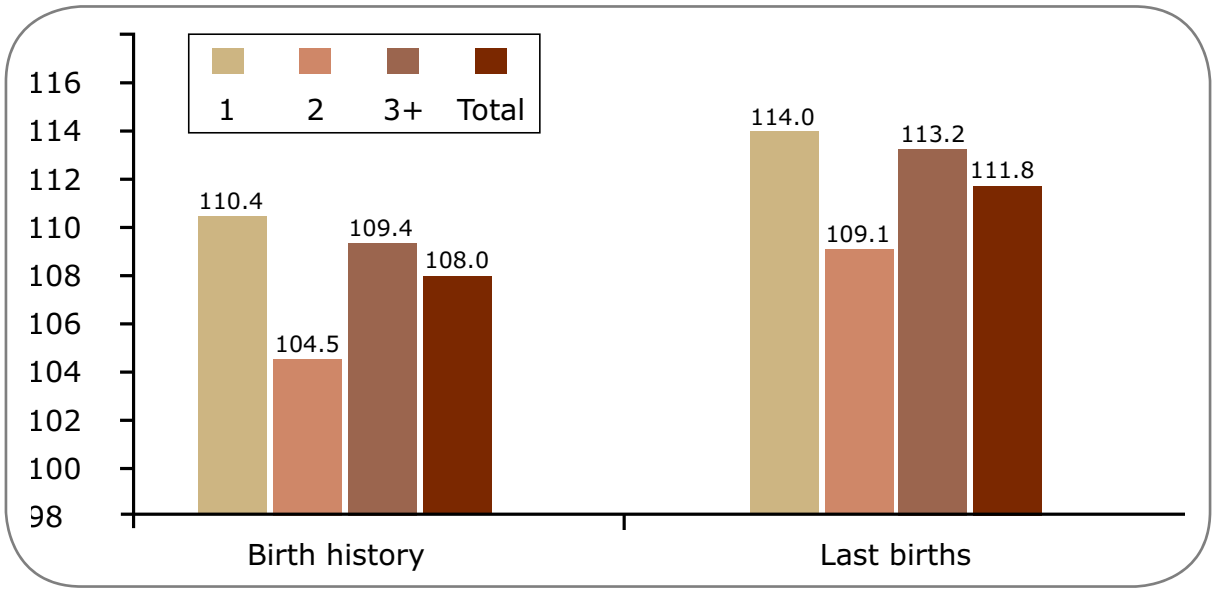


**Figure 9: The SRB by birth order, birth history and last birth, 2007 population survey**

While the gender balance level is, as expected, more masculine due to the rapid degradation of the SRB in 2005 - 2007, the SRB for first and third births remains higher than average, while the SRB for second order births show a value close to 106, i.e. within the normal range.

In addition to the birth history used thus far, there is an alternative estimate of the SRB, which can be derived from the population survey data as well. This estimate is based on the total number of children ever born to a mother which information can be converted into the SRB estimates for the last births recorded during the three years immediately prior to the survey. The SRB by birth order is

A preliminary conclusion of these relatively unusual results is that in Viet Nam families utilise a variety of different strategies to influence the gender of their offspring. Parents do discriminate against higher-order female births. But at the same time they do resort to the practice of sex selection for their first births. Comparatively, the value of the SRB for second births, which tends to be extremely skewed in low-fertility regions such as Eastern China or Western India, is normal in Viet Nam.

[23] *There is no clear explanation for this difference. GSO colleagues usually assume "last birth" information to be of better quality than the subsequent birth history collected during the survey.*

A valid explanation for such unexpected SRB levels relates to the heterogeneous character of the population. One more traditional part of the population which often favours more than 2 births may not practice sex selection. Among them the "stopping rule" is the only way to influence the gender composition of the family. At the same time, a smaller, yet growing part of the population does practise sex selection and this is even visible for first pregnancies.

## 4.4 The sex ratio at birth and previous births

When parents wish to have a son, it can easily be presumed that the absence of a son in the family is a better predictor of the gender of the next child than the mere number of previous births. To verify this assumption, births occurring between 2000 and 2006 were used to calculate the sex ratio for third children (data based on the 2006 Survey)[24]. In order to gain more specific insight into the specific characteristics of the parity-wise sex ratio observed above, this calculation was purposefully restricted to the category of third parity births.

Table 5 shows the sex ratio for third children according to the previous gender composition of the family. The sex ratio value for the third child now shows to be over 110 for mothers who previously had only female children. Among mothers with already one or more sons, the ratio is significantly lower: at around 103 male births per 100 female births. This value reflects the process of sex-selective behaviour. It may also be observed that the differential between mothers without sons and other women remains on the whole moderate. In other Asian countries, where sex selection is common, it tends to lead to SRB levels above 125 as parents are determined to bear a son after two births of female children.

**Table 5: The SRB for third-order births according to the previous number of sons born between 2000-2006, 2006 population survey**

| Number of sons | SRB |
|---|---|
| No son | 110.3 |
| One son | 103.5 |
| Two sons | 102.2 |

*[24] The sample is here limited to only 9,400 births.*

# 5. The sex ratio at birth differentials within the country

One main character trait of SRB values is that, even when they have been observed to rise in specific countries, they are subject to variation. Sex selection is a typical result of demographic innovation that spreads unevenly within a country over time. Unlike other population changes, which tend to affect the whole population size and structure, sex selection occurs less uniformly and simultaneously.

There are several questions related to the "forerunners" of sex selection in Viet Nam: who are they and where do they live? In other Asian countries, the first couples to use active sex selection methods tend to be slightly better-off or more educated than the rest and live in more advanced, urban areas: this may be associated to having access to better information regarding new technologies, as well as to these technologies themselves (e.g. in private clinics). A better financial capacity to invest in sex selection contributes to this process as well.

On the "demand - side" there are several factors that may contribute to the variations observed across the population desiring sex selection as well: Of particular interest are here the degree of intensity of son preference, but also the pace of fertility decline and at times local family planning regulations.

## 5.1 Analysis of regional differentials

The diffusion of innovation invariably follows specific spatial channels similar to the way epidemics progress. This holds true for fertility decline as well and similar trends may be expected for an increasing SRB in Viet Nam as in China or India. One of the main difficulties in mapping regional differences in sex ratio however, relates to the sample constraints.

For the purpose of this study, both the exhaustive data from the last census as well as more recent sources will be utilised to gain more insight regarding geographical variations in the SRB within Viet Nam.

### 5.1.1 The 1999 Census

Census results at the province level can be used to calculate the sex ratio among children (also see Bélanger et al. 2003). Values of the sex ratio for the population below one year of age appear to be normal in 1999, with the exception of nine provinces where values are between 108 and 110. While these local values are significantly higher than the expected levels for the sex ratio of young children, the difference remains moderate and may be difficult to attribute to a given factor with certainty. It may also be observed that the provinces where the sex ratio among infants is above 108 are scattered over the Central or Southern parts of the country and none are found in the North. On the contrary, the most

apparent regional irregularity can be found in the two Northern provinces of Cao Bang and Lang Son where the sex ratio is in fact low: below 100. Such values are probably due to a severe underestimate as there are very few reasons to believe that local SRB could be skewed towards female births or that intense mortality differentials in favour of female infants during the first months of life could reduce the sex ratio to such a low level among children.

Maps of age data are available at a disaggregated commune level. In 1999, there were more than 10,000 such communes. To limit sample problems related to the large number of administrative units that at times only cover populations of a smaller size, the map created by Epprecht and Heinimann (2004) is based on a larger age group, i.e. the population aged 0-5. However, this detailed mapping fails to provide evidence of any type of local regularity. This suggests that either these census data did not reflect any visible sex ratio imbalances in 1999 or that communal data were not more reliable than the provincial statistics discussed previously.

### 5.1.2 The survey of births in 2006

In 2007, the annual demographic survey was conducted throughout Viet Nam by the GSO. One of its major objectives was to obtain a more exhaustive picture of the current distribution of births by sex[25]. A big advantage of this survey was to produce an overview of series of births, classified by province for 2006 and based on large samples. As the first map in Figure 10 indicates, estimates for most provinces are based on birth samples that are greater than 10,000[26]. However, several provinces such as the mountainous areas in the North-West are sparsely populated and characterized by a weaker health infrastructure. As a result, birth samples have been significantly smaller than average in these areas and estimates are to be used with care.

The second map in Figure 10 displays the SRB estimated for each province after correction for incompleteness. Values range from 99 to 120. The minimum value of 99 was in fact observed in Cao Bang Province, in which only 4,236 births were recorded. Similarly, in a few provinces with SRB values close to 120 such as Son La and Yen Bai in the North-West and Ninh Thuan, original samples included less than 10,000 births. However, most other results are based on larger numbers of births and should correctly depict inter-regional variations.

Such sample variations may lead to questioning of the overall quality of the data. However, one independent way to confirm the consistency of data is through geostatistical analysis. In such an analysis the spatial autocorrelation observed across provinces is tested, i.e. the correlation of the SRB between adjacent provinces. To do that, a standard procedure to calculate the correlation coefficient between observations and their respective "neighbours" (i.e. adjacent provinces) was used. This rendered a coefficient of 0.24 and corresponds to the Moran's index of spatial autocorrelation as used in geostatistical analysis. Higher Moran values were found when applying this methodology of analysis to provinces classified by geographical distances[27]. Moreover, these increased values are statistically significant and suggest the existence of strong spatial autocorrelation. It may therefore be inferred that the obtained regional distribution shown on the maps is not random at all. Additionally, the data set based on the survey of births at health centres is therefore reliable and–save for extreme values based on small

[25] *See presentation of the survey in the previous section. Samples from annual surveys are too small for regional disaggregation.*

[26] *The number of 10,000 births is used as a benchmark for more robust estimates.*

[27] *The procedure used here is based on the routine analysis included in the GeoDa software. When Moran is calculated for distance, the closest provinces in fact exhibit an even higher level of autocorrelation (above 0.75 for provinces that are closer than 50 km).*

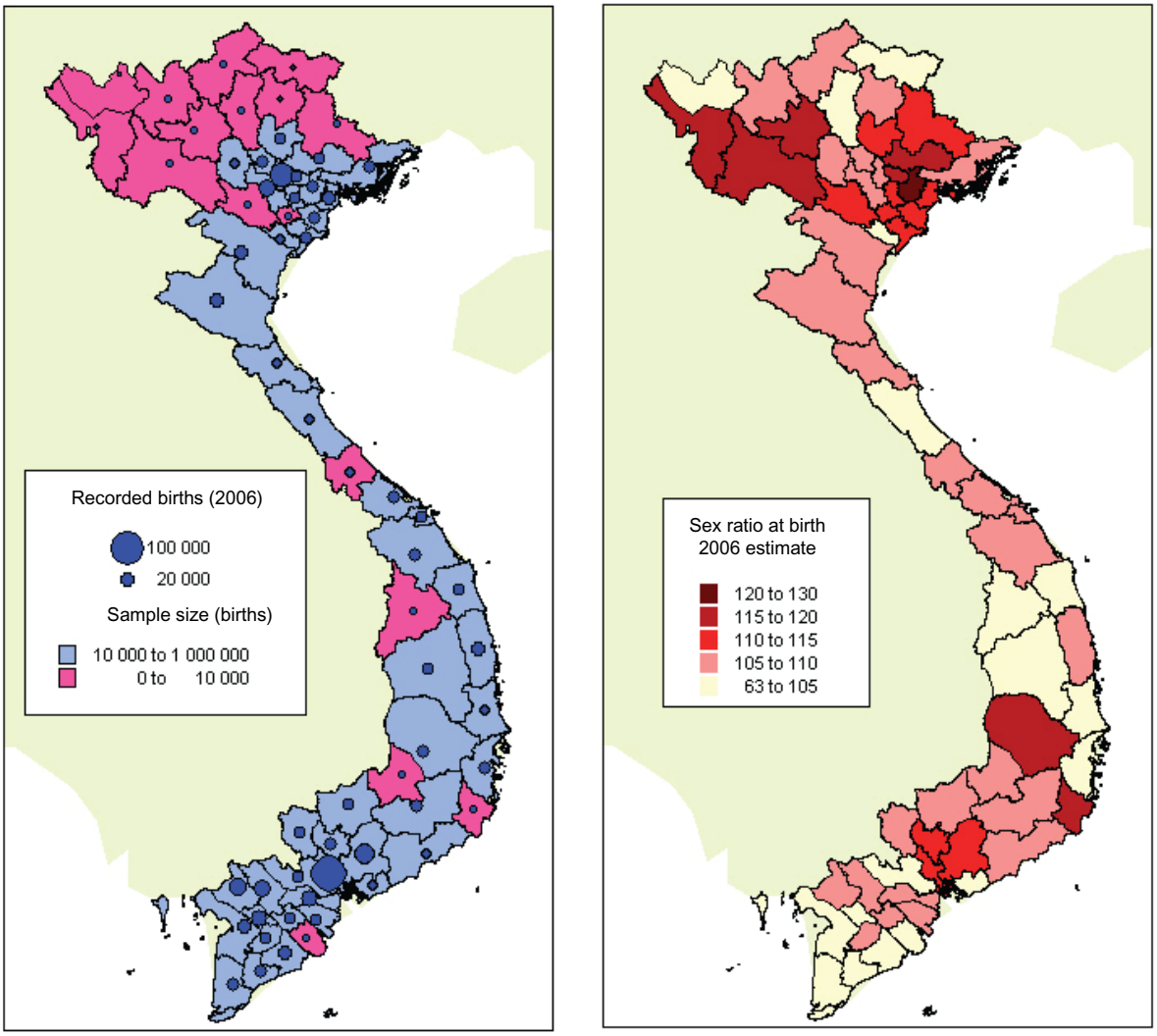


**Figure 10: Number of recorded births and the SRB by province, 2006 survey of births**

samples– the data used here are likely to accurately reflect variations of SRB levels across Viet Nam.

Using similar geostatistical analysis tools*, a central "hot spot" with high SRB values was identified in the Red River Delta region. This hot spot includes the adjacent provinces of Hai Duong, Hung Yen, Thai Binh, Bac Giang and Bac Ninh where SRB ranges from 111 to 120.* The above provinces are typically rather prosperous rural areas close to Ha Noi that have benefitted from industrial development over time. As detailed maps from Figure 11 indicate, these core provinces in the North are themselves surrounded by several additional high SRB provinces stretching from Nam Dinh to the South to Lang Son along the Chinese border. Interestingly, the city of Ha Noi, where sex selection was initially detected (see Bélanger et al., 2003) as well as several provinces located further West today exhibit only moderately high SRB levels: within the 105-110 range.

There are a number of local pockets with high SRB values which *are not significant in geostatistical terms,* among them the North-West region lying along the border with Laos. The concentration of higher SRB values is indeed unexpected in provinces such as these, which are characterized by lower development indices, higher fertility levels and ethnic minority groups of a rather large size – Son preference may be presumed to be less entrenched here. *Another local*

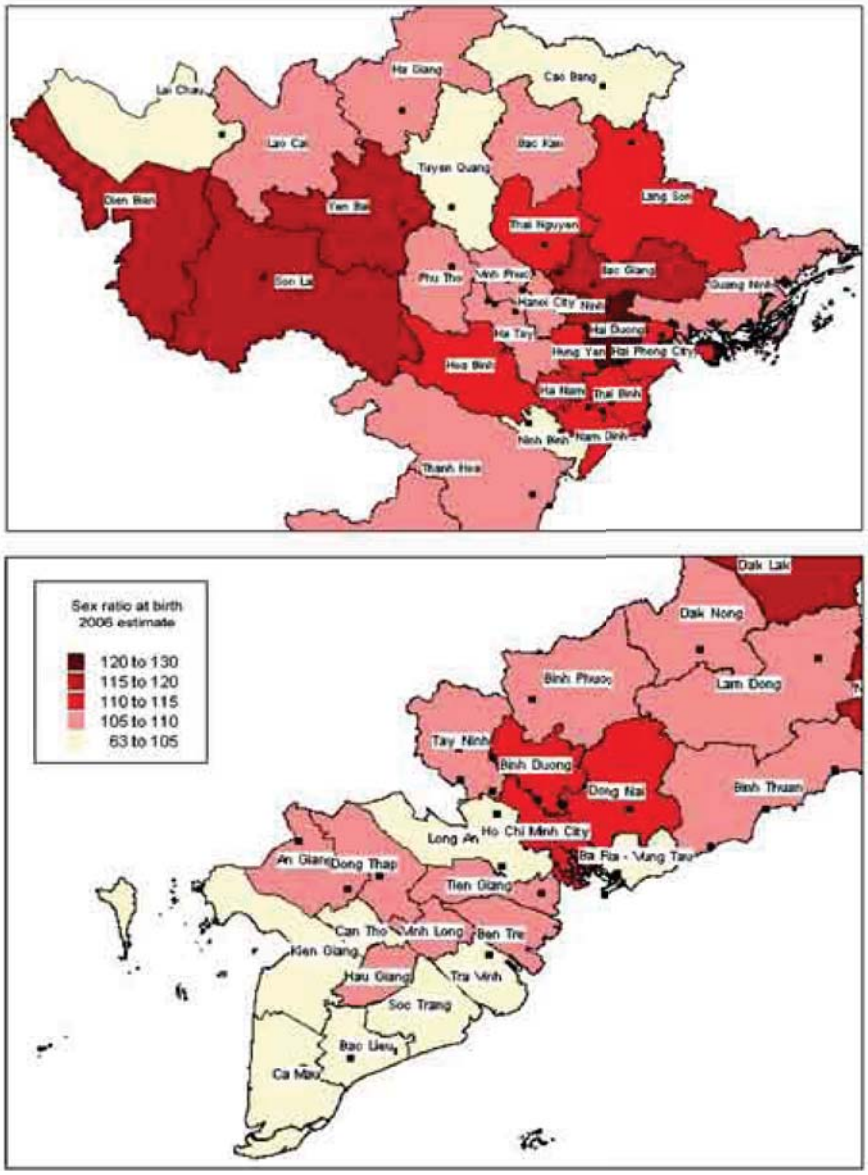


**Figure 11: The SRB by province, close-up of North and South regions, 2006 survey of births**

*concentration of high SRB values can be found around Ho Chi Minh City as well as in two more provinces in the South-East region (Binh Duong and Dong Nai) where the SRB is above 110.* This metropolitan region is one of the most developed in Viet Nam and is therefore to some extent comparable to the Red River Delta provinces previously identified.

It may also be observed that the SRB appears low instead (below 105) in many provinces, including in several adjacent provinces located in the Mekong River Delta or in the South-Central regions of Viet Nam. In this regard, the Mekong region is therefore quite distinct from the Red River Delta.

In conclusion, it may be observed that SRB variations across regions derived from the data about birth records in 2006 are sizeable and clustered from a geographic point of view. The maps based on the 2006 birth data bear no relation whatsoever with differences observed during the 1999 census and *this would confirm the probable absence of active sex selection during the 1990's. When trying to understand the origin*

*of such regional variations, it seems obvious that in prosperous regions that are either urbanized or densely populated and close to large cities, health infrastructures are available and on the whole more accessible.* Accessibility mapping during the 1999 census (Epprecht and Heinimann, 2004) clearly relates poverty to the lack of proximity to urban agglomerations. Populations in such urban regions are both better educated and more affluent: two preconditions required to be both aware of the new technologies and to be able to afford making use of them. In addition, regional location close to the metropolitan areas means proximity to a denser network of public and private health institutions.

It would probably be a mistake to attribute such spatial variations in SRB levels to supply factors alone. While health facilities are indeed necessary for easy access to modern sex selection technologies, *major factors determining regional differentials are, specifically, the intensity of son preference and more broadly speaking, fertility levels, socio-economic levels and cultural settings.* In Viet Nam's case, increased prosperity in specific rural areas such as the villages and towns of the Red River Delta region precisely correspond with fast fertility decline and a more traditional son preference regime, characterized in particular by specific inheritance patterns, patrilocality, and patrilineal ancestor worship (see Bélanger, 2002). Further below in this analysis, a distinction is even made between rural and urban populations living in more advanced areas.

A final, but important note should be made. As the SRB values derived from annual survey data are based on small samples, confirming regional analysis is not feasible at this stage. The next survey of births to be conducted in 2008 and the 2009 Census after that will therefore be of crucial importance to validate the present analysis.

## 5.2 Prior knowledge of the sex of the foetus

A necessary precondition for active sex selection is Prior Knowledge of the Sex (PKS) of the child to be born. In many Asian rural settings including in Viet Nam, parents do try to influence the sex of their children before conception, using various strategies such as going on pilgrimages or adhering to a specific diet. Parents may also claim to know the gender of the foetus in advance by inspecting the mother's body or interpreting various physical or other signs during pregnancies. But the modern technology – ultrasound and amniocentesis – offers a means to detect the presence of a male foetus with reasonable assurance and is therefore a more powerful tool to opt for an abortion if required.

The annual population change surveys conducted in 2006 and 2007 registered the number of women who displayed awareness of the gender of their child prior to its birth. The 2007 survey indicated that not less than 63.5% of women knew their child's gender before its birth. Among these women, a vast majority (98%) gained this knowledge through ultrasound technology while 80% of them stated that they learnt about the sex of the foetus after 16 weeks of pregnancy when sex determination is usually only feasible[28]. Not surprisingly, the SRB values for these women will prove slightly higher than for the rest of the sample. To some extent, prior knowledge of the sex of the child may be used as a condition for discriminatory behaviour. It of course does not indicate that all these women will actively discriminate against children of a particular sex (only a small minority among them will), but PKS is an indispensable precondition for sex selection. *In fact, an earlier derived estimate indicates the proportion of aborted pregnancies for reasons of sex*

[28] *90% of the mothers indicated they learnt about the sex of their child during weeks 16-29. This sample based on reported births of course omits women who decided to undergo an abortion.*

*selection to be 8% among women who had never given birth to a son.* If in this calculation only 63.5% of women without sons are considered to have advance knowledge of the sex of their future child (equivalent to the overall proportion of women knowing the sex of the foetus prior to birth), the proportion of sex selection related abortion rises to almost 13% among women without sons.

## 5.3 Demographic, social and economic correlates

The following section presents the results of a detailed analysis of various social and demographic indicators related to women of child-bearing age[29]. As elsewhere in this report, results shown have been weighted according to the sampling scheme of the annual population change survey. For this particular analysis some of the major dimensions of social differentiation that can be deduced from the information collected by the 2006 survey were selected[30]. However, it is important to mention ethnicity, economic status (income levels, household goods, housing characteristics etc.) and details regarding agricultural holdings or status, among major variables that were missing in the survey yet are likely to influence sex selection behaviour.

Results from a first analysis are shown in Figure 12. Here, variations in SRB and PKS values are compared between age groups. As the chart indicates, knowledge of the sex of the foetus tends to increase fast with age and levels off among women aged 25-39: at 66%. But differences in terms of the SRB are limited: the highest SRB level reaches slightly above 110 and is recorded for the 25-34 age group. *One conclusion that can be derived from the analysis of these data is that younger mothers seem to be less preoccupied by the gender of their offspring than women above 25 years of age. The same may be said of women above 35.* Keeping in mind that early maternity is more common

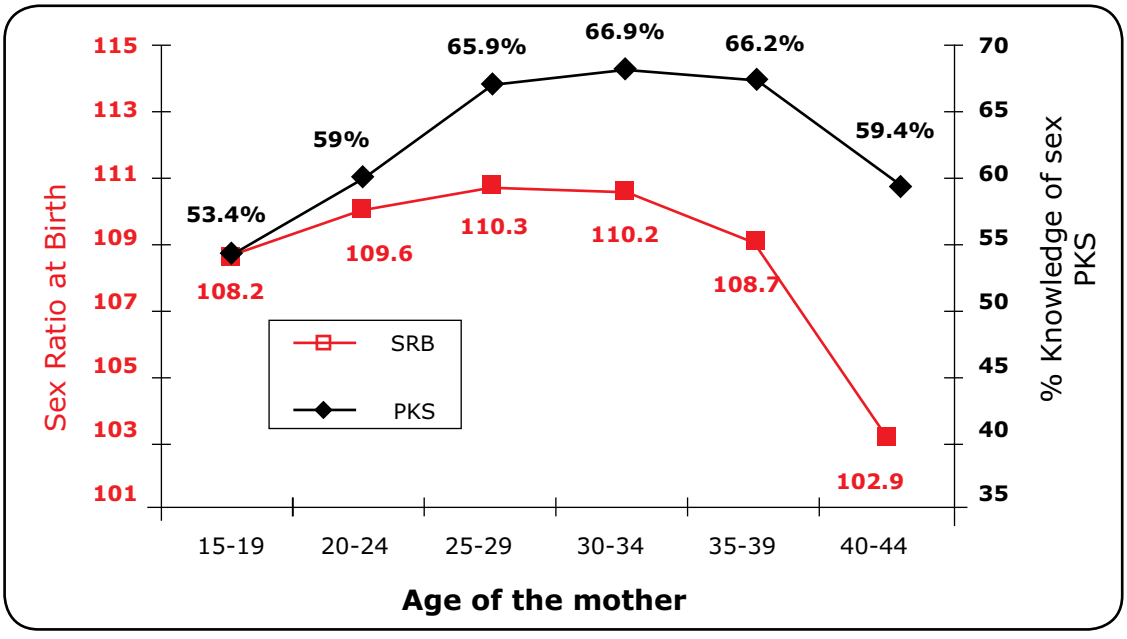


**Figure 12: Advance knowledge of the sex of the child and the SRB by age group, 2006 population survey**

[29] *A more detailed analysis would take into account other household level data such as household structure or particular details regarding husbands.*

[30] *It has been necessitated to use data from the 2006 survey, since many socio-economic variables were not available in the more recent 2007 survey.*

in less developed, rural areas in Viet Nam, it is important to emphasize that age and duration of child-bearing is also determined to a large extent by social dimensions such as ethnicity, residence, education or occupation.

Table 6 provides many details regarding the potential or likely users of sex selection methods. Many groups can be labelled as potential users as they are characterized by a higher probability to know the sex of the child in advance, a necessary precondition for sex selection. This is especially the case for urban residents as well as for the more educated segment of the population. For instance, 87% of women with a graduate degree knew the gender of their child. Knowledge about the sex of one's child before birth is especially common among women working for foreign organizations or at home. Advance knowledge is, logically, also more frequent among women reporting the largest number of prenatal visits during their previous pregnancy[31]. What is less clear is whether PKS per se is the ground for repeated antenatal visits.

On the contrary, the proportion of women aware of the sex of their child is at its lowest among those with no or minimal education. No more than 28% of illiterate women had prior knowledge of the sex of their child. Lack of detailed information inhibits the ability to distinguish between the specific impact of education or of socio-economic status on PKS. This is also true for women with very limited access to health facilities either before or during the birth of their child. The lowest proportion of women knowing the sex of their child is found in Viet Nam among women who did not go for one single prenatal visit (7%), who did not deliver in a health centre (23.5%) or whose delivery was attended by a traditional midwife or family member (17.5%). Logically, this in particular concerns women living in remote areas where sex determination technology such as ultrasound is rarely available or deemed too expensive. Interestingly, women who don't know the sex of their foetus often desire another birth and are less often contraceptive users. *It also appears that women who don't use contraceptives at the time of the survey display an especially low SRB (92.6) for their previous birth. This may to a certain extent reflect the consequence of an unwanted female birth following the prior pregnancy: according to the so-called "stopping rule", women without opportunities (or desire) to practice sex selection may try to have an additional birth as soon as possible.*

Variations in terms of the SRB tend to be significantly less pronounced and are, due to the small sample size, at times difficult to interpret. As emphasized before, the highest level of SRB (111) is indeed observed among women who had a sex determination test performed beforehand and may therefore have resorted to sex selection. However, the difference with the rest of sample is rather modest, suggesting that a vast majority of women who had advance knowledge of the gender of their child did not resort to sex selection: either because they did not have a gender preference or because they expected a child of the desired sex. The results also show that antenatal care tends to be associated with a higher SRB, most probably in conjunction with ultrasound tests performed during pregnancy.

Other correlates for a high SRB are: employment with foreign organizations (small sample) and a higher education for women. The SRB indeed tends to increase gradually with the level of education, rising from 103 (for illiterate women) to 113 (for women with a graduate education). This variation across education levels is closely linked to the prior knowledge of the sex of the child, confirming that sex determination technology as a tool to decide about the

[31] *Population survey data indicate that not less than 70% of the women had three or more prenatal visits. See also Gammeltoft et al. (2007) regarding the high frequency of ultrasound testing.*

**Table 6: Advance knowledge of the sex of the child and the SRB by various social and economic indicators, (2006 population survey)**

| | PKS % | SRB | Sample size |
|---|---|---|---|
| All women | 63.5 | 109.7 | 71,448 |
| Urban residence | 83.1 | 109.2 | 18,890 |
| Household head | 73.1 | 104.4 | 5,093 |
| Other member of the household | 65.8 | 112.9 | 22,227 |
| Illiterate | 28.1 | 103.4 | 4,429 |
| Never attended school | 25.4 | 105.1 | 3,880 |
| Primary level of education | 59.6 | 107.4 | 16,512 |
| Graduate | 87.2 | 113.2 | 2,979 |
| Highest grade 0-2 | 63.4 | 102.6 | 4,636 |
| Highest grade 10+ | 74.3 | 111.1 | 10,751 |
| Household work | 81.3 | 106.7 | 14,304 |
| Work in foreign organization | 84.9 | 117.3 | 1,380 |
| No prenatal visit | 6.9 | 108.6 | 7,607 |
| 5+ prenatal visits | 87.1 | 113.6 | 12,277 |
| Delivery outside health centre | 23.5 | 106.5 | 6,759 |
| Birth attended by traditional practitioner or family member | 17.5 | 101.4 | 4,570 |
| Previous Knowledge of Sex | 100 | 111.1 | 45,066 |
| Contraceptive user | 65.7 | 112.7 | 52,199 |
| Doesn't use contraception | 58.1 | 101.9 | 17,077 |
| IUD user | 60.1 | 117.4 | 26,526 |
| Doesn't use contraception as she wants more children | 49.1 | 92.6 | 5,342 |

fate of a pregnancy is on the increase among more educated women. However such a result may be contrasted with the fact that the SRB in urban areas does not appear higher than the national average, in spite of the frequency of advance sex determination. This would suggest that for urban residents who enjoy better socio-economic conditions and easier access to health care facilities, sex selection may not be especially acute.

Additionally it may be observed that the SRB is undoubtedly lower among the poorest sections of society. This is especially true for illiterate women or women deprived of access to health facilities and personnel, such as ethnic minorities or residents of mountainous areas. In fact, normal SRB levels –including values that may even appear to be abnormally low– are also associated with many different variables such as school attendance, level of schooling and trained versus untrained birth assistance. This indicates that the category "rural areas" may encompass a rather heterogeneous entity for sex selection: On one hand there are the poorest, remote areas where smaller sized ethnic minority groups live and where women give birth at an earlier average age than in other parts of the country. On the other hand there are the more affluent villages –often near or adjacent to the main metropolitan areas of Ha Noi and HCMC (as our mapping analysis has shown) where agricultural productivity is much higher and options to find non-agricultural work more extensive.

Statistical data to substantiate this analysis are unfortunately missing from the current survey sources. It would for example be important to gain more insight into the upper layers of rural society which may be both more affluent than the rest of the peasantry as well as closer in distance to modern health care facilities, while at the same time display a more traditional mindset than urban residents when it comes to son preference. Pioneer field work conducted for a sample of provinces, including specific localities close to Ha Noi (ISDS 2007), provides some confirmation of this hypothesis. This situation reminds to some extent of similar regional differentials found in China where SRB values are at their highest among population groups in somewhat more prosperous areas in the countryside when compared to both populations in remote areas and in metropolitan populations.

# 6. Projected trends

Present day SRB levels in Viet Nam reflect the intensity of discrimination against girls today, but they may also serve as an indicator of future gender imbalances in the population. To some extent, it may be said that the same excess proportion of boys born since 2000 in Viet Nam will be found among men twenty-five years later and will thus generate a male surplus among young adults.

The following section intends to shed some light on this process by presenting results of demographic forecasting for both Viet Nam as a whole and for a specific sub-region between 1999 and 2050. These are more elaborate demographic projections than usual as they take into account possible future variations in the SRB[32].

## 6.1 Projection hypotheses for 1999-2050

Several sets of population projections are already available for both Viet Nam and its regional components (United Nations, 2007; GSO, 2001). However, these forecasts present various limitations such as having been calculated for too short a time span to be able to show the impact of current SRB values or having relied upon a single scenario for the future evolution of SRB. In this study instead, different future pathways will be explored in order to appreciate the impact the SRB fluctuations may have on population trends and its composition in Viet Nam till 2050.

First, projections were made for the entire country. Then, a parallel set of projections was calculated based on a regional subset of data comprising areas affected by higher SRB levels than the rest of the country. The regional subset used here

**Table 7: Hypotheses used for demographic forecasts, 1999-2050**

| | Viet Nam | | Sub region | |
|---|---|---|---|---|
| **Hypotheses** | 1999 | 2050 | 1999 | 2050 |
| Fertility | 2.43 | 1.85 | 2.3 | 1.85 |
| Fertility pattern: Asia | | | | |
| Male life expectancy | 69.86 | 78.23 | 73.864 | 78.23 |
| Female life expectancy | 73.39 | 82.46 | 77.386 | 82.46 |
| Mortality pattern: East Asia | | | | |
| Migration: No migration | | | | |

[32] *Projection exercises usually assume a fixed level of SRB at around 105-106.*

includes two administrative regions: the Red River Delta and the South-East. As a composite region (hereafter referred to as "metropolitan sub-region") the subset encompasses the two metropolitan areas of the country, but several adjacent rural provinces in the Red River Delta and in the South-West as well. On the whole, these areas are characterized by an extremely high population density as well as the most favourable economic and social development indicators in the country: They have recorded the lowest incidence of poverty in the country (Vietnamese Academy of Social Sciences, 2006). What further makes these two metropolitan areas distinctive from other areas in Viet Nam is their advanced demographic profile, with both fertility and mortality rates lower than elsewhere in the country.

Hypotheses for this set of projections (shown in Table 7) have been kept extremely simple. Mortality and fertility rates for Viet Nam follow the United Nations estimates for 1999-2050. For the metropolitan sub-region, the national estimates were simply corrected by assuming the same differentials for the country as a whole and the corresponding regional zones as observed today. The projection procedure further assumes no migration takes place at all[33]. For both sub-regions the East Asia mortality models and the Asia model for age-specific fertility rates were used.

Keeping in mind the available data sources are still unreliable, two different possible scenarios are presented in Figure 13, with a maximum plausible SRB level of 125 (although values above 135 have already been observed in Chinese regions).

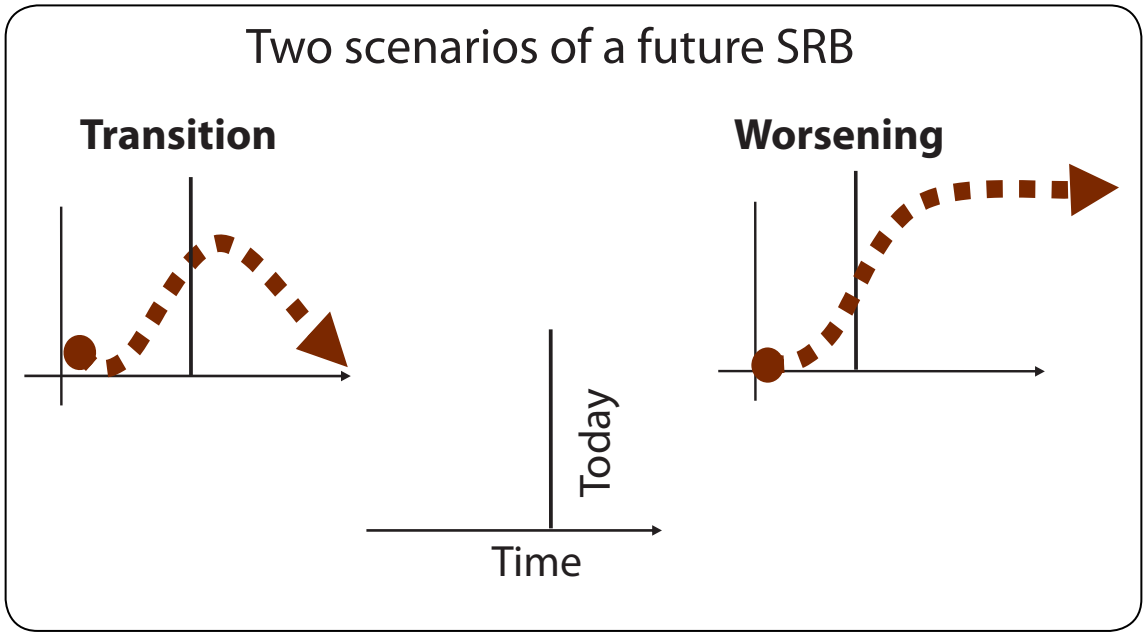


**Figure 13: Scenario of possible evolutions of the SRB in Viet Nam till 2050**

[33] *This is a somewhat unrealistic assumption in view of the sizeable influx of immigrants in these provinces.*

- **Transition scenario:** the SRB will increase to 115[34] in 2010 and will decline afterwards. SRB is back to 105 in 2025 and stays at this level subsequently.

- **Worsening scenario:** the SRB keeps increasing till it reaches 125 in 2025 and from then on stays at the same level until 2050.

For comparative purposes a flat scenario in which SRB remains stable at 105 throughout the 1999-2050 period was created as well.

The SRB scenarios indicated above may seem rather implausible at first, but have been devised to delineate the contours, or extremes, of possible evolutions. In comparison, the transition scenario presents a more optimistic picture as it suggests that the SRB will return to a normal level in the future. It does however take into account the current rapid increase of the SRB and assumes that SRB values will not exceed 115 in 2010.

The more pessimistic (worsening) scenario is presented here mostly to determine the ceiling levels of the current projection. Yet in view of China's experience it such a development is not entirely unrealistic for Viet Nam, some provinces of which –such as Henan or Anhui– have recorded SRB levels well above the 125 threshold posited here. However, the future trajectory of the SRB in Viet Nam may in fact lie in between these two scenarios.

## 6.2 Population totals

According to our SRB scenarios the current projections show in the first place that a higher SRB tends to have an impact on overall population growth. The scenario of a worsening SRB indicates that Viet Nam will have a population of 116.9 million in 2050 as compared to 117.7 million according to the transitional scenario. This difference is due to the consequences of a deficit of females on the fertility potential: fewer female births translate today mechanically into fewer births after 25 years, irrespective of the size of the corresponding male population.

Figure 14 presents findings related to the overall sex ratio of the populations under study. These projections start in 1999 at a sex ratio level that was in fact below 100, as a result of the absence of sex selection and of a historical female surplus. The population will only become more masculine in 2002 when the sex ratio crosses the 100 mark.

As can be expected, the transitional and worsening scenarios lead to different outcomes after 2010: In the transitional scenario, the overall sex ratio increases till 2020 towards 102 and decreases only slightly afterwards. In the worsening scenario, the sex ratio keeps on increasing under the sustained influence of an extremely high SRB, reaching 109 at the end of the period. Comparatively, the impact of a high SRB on the overall sex ratio in population is proving more noticeable after 2020. As a result, if the SRB was to stop increasing in the 2020's, the overall impact on the population's sex ratio would remain modest. However, a more damaging scenario relates to the hypothesis of a sustained worsening, as the overall sex ratio in Viet Nam is shown to increase until 2050 and would most probably keep on increasing for many years during the second half of the century.

Interestingly, the metropolitan sub-region selected for this study does not display a more dramatic rise of sex ratio in its population, in spite of the higher SRB levels being assumed here. Reason for this is that the initial regional sex composition in 1999 was different, with a sex ratio of only 95 men per 100 women. This lower sex ratio, recorded at the time of the last census, related to historical trends as well as to migration patterns which brought new immigrants to these

[34] *120 is the SRB value for the sub region in which the rise in the SRB proved more rapid.*

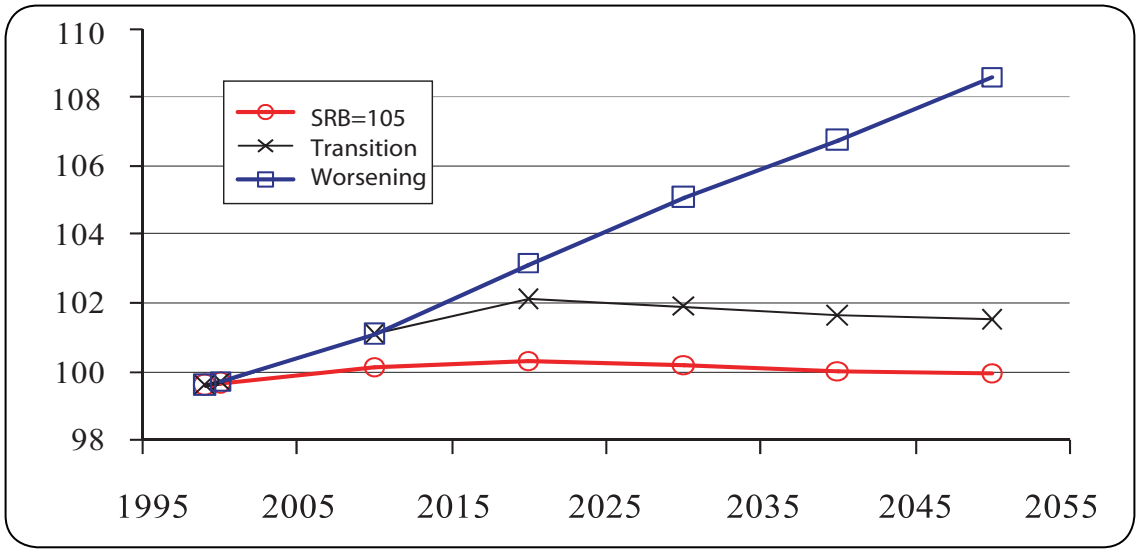


**Figure 14: Projected sex ratio of population, Viet Nam, 1999-2050**

areas, thus having the impact of reducing SRB values for the sex composition of the general population. The regional population will therefore become predominantly masculine only after 2010 and in the transitional scenario; the sex ratio will slowly increase to 102 in 2050. In the worsening scenario, the overall sex ratio reaches 106 in 2050 and remains below that of the whole country for the entire period.

## 6.3 Implications for society

The projections above also allow for a detailed disaggregation by age group. As can be expected, the sex distribution among the population below 10 years of age tends to react almost immediately to changes in SRB levels. For older groups, there is a time lag and the influence of the initial age and sex distribution is more visible over time. This is for instance the case in the group of adults aged 20-64. In the worst case scenario the maximum sex ratio of 110 will be reached in 2050. According to the transitional scenario, the sex ratio among adults will plateau at 105 in 2050 as compared to 102 if the SRB had remained constant- at 105 male births per 100 female births. The progression will be even slower in the metropolitan sub-region where in 1999 females outnumbered males. This inertia effect is remarkable and is in the first place caused by the low SRB values recorded in the contemporary history of Viet Nam at the beginning of the 21st century, when again, there were more women than men. In correspondence to this fact, it is even observed that the sex ratio of the elderly will decrease towards 82-83 between 2000 and 2040.

An important dimension of changes in the sex and age distribution pertains to the potential gender imbalance among adults and the consequences of this for the marriage market. Based on the actual marriage traditions observed in Viet Nam according to which the male, at the time of marriage, is at an average 3.5 years older than the female, specific results focusing on the 15-44 age group for women and the 20-49 age group for men were explored for this study. The sex ratio values shown below thus reflect the imbalance between these two age and sex groups.

Figure 15 indicates how this sex ratio will evolve during the first half of the century. As can be seen, the starting value of 86 observed in 1999 was extremely low. This period of significant *male deficit* is one legacy of Viet Nam's troubled past (Goodkind 1997). The subsequent increase of the SRB – predicted to have taken place by 2020, when the sex

ratio value will have crossed 100 – is entirely due to the gradual recovery of the age and sex structures. More recent generations born after 1970 have almost not been affected by the adult specific mortality and migration differentials that distorted the older population structure of Viet Nam.

in several areas of China and India. If such a deficit should occur in Viet Nam after 2020, marriage patterns will be impacted in different ways. In the first place, a widening female deficit means that a significant proportion of men will have to delay their marriage, the first necessary adjustment to adverse sex ratios. By delaying their marriage by

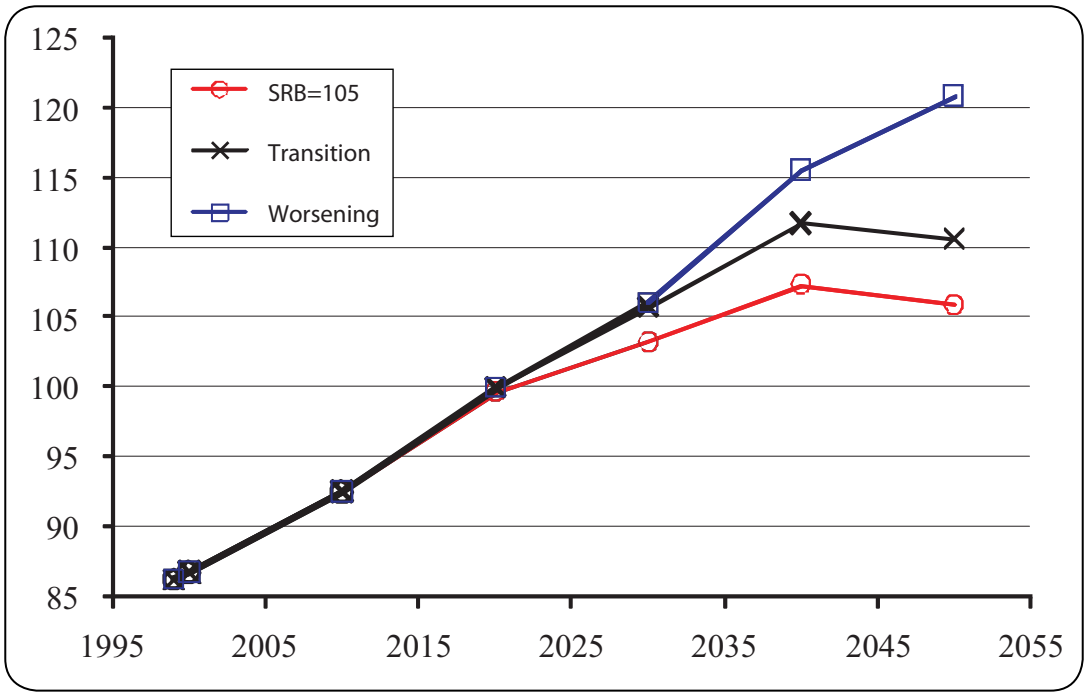


**Figure 15: Projected sex ratio among adults, Viet Nam, 1999-2050**

After 2020, the impact of the current SRB will make itself felt on the age and sex structure among adults. A rising gap between men and women will emerge and the surplus of men will finally reach 12% by 2040 (the SRB is then 112). This surplus is bound to increase further according to the pessimistic scenario, thus exceeding 20% before 2050 (with the SRB above 120). The respective sex ratio for adults of marriageable age would be even higher in the mentioned sub-regions (with values of 114 and 123 in 2050). In absolute terms, in Viet Nam in 2050 the gap between men and women would range from 2.3 to 4.3 million according to our two hypotheses.

Such a deficit of women of marriageable age has in fact already been observed

a few years, men can expect to have a larger pool of marriage candidates comprising of younger women available to them. However, this bottleneck may not be solved exclusively by delaying marriages because of the cumulative impact of a skewed SRB on several generations. A proportion of men may in the end have to forego marriage altogether. This means that not only will a significant share of men may still be single at age 30, but that some of them will not be able to marry at all.

This of course assumes that marriage patterns do not undergo highly improbable changes that would only reduce tension in the marriage market such as marriages of females at an earlier age or extremely high levels of

divorce and re-marriage among women. Marriage migrations (such as imports of brides) are unlikely to solve the problem either. Of note is here that on the contrary, Viet Nam is nowadays witnessing reverse flows as a large number of women are marrying foreigners and settling abroad. This trend may in part be a response to the current unfavourable sex distribution also shown in Figure 15. Moreover, the rising age at marriage among women in Viet Nam may further reduce the number of potential brides in the future. Combined with the fact that a rising number of women may finally opt out of marriage, as is observed in countries such as Japan, Korea or Singapore, it becomes clear that future trends may exacerbate - rather than ease away– demographic tensions felt by the surplus of men on the marriage market in 20 years from now.

If SRB values will continue to rise over the next decades, a growing surplus of young men is inevitable in the future. The exact consequences on the society of such gender imbalances are difficult to anticipate, but studies based on the experiences of China and India suggest that many adverse effects will be felt on the family structure of regions affected by skewed SRB's. The patriarchal system prevailing in most of Viet Nam requires male descendants, but difficulty to marry for excess men in 20 years from now may jeopardize the feasibility of patrilineal transmission. The political system may depend on men even more as their proportion in society increases as well.

As for women, the deficit situation may not improve their status at all. Scarcity of women would not enhance their position in society because of the increasing pressure to marry, the higher risk of gender-based violence, the rising demand for sex work and the development of trafficking networks. Several examples of gender-based violence and human trafficking have been already observed in Viet Nam and point to some of the risks to be faced by women.

# 7. Conclusion and recommendations

## 7.1 The sex ratio at birth today and tomorrow: current trends and policy options

The present study has shown that a significant of the SRB has been recorded in Viet Nam since 2000. While in 2000 the SRB levels were most likely still normal, it was estimated to be about 111 male births per 100 female births for 2007. This figure is still below that of other Asian regions –such as East China or Northwest India – affected by the recent wave of masculinization where SRB levels are often above 125.

What may appear striking in Viet Nam is the unusually rapid rise of the SRB recorded over the last 8 years. As a result, Viet Nam's SRB is today already higher than that of India[35]. If the current pace of increase continues unabated, SRB would cross the 115 mark in three years from now. *The fast increase may in the first place be related to supply factors rather than to an increasing preference for sons. The recent access to quality sex determination technology has allowed many couples to adapt their reproductive behaviour to the desire to bear sons.* Their reproductive choice is now guided by two principles that make sex-selective abortion a practical solution to satisfy both objectives: low fertility and son preference.

Further analysis of data collected by the GSO – through both the annual population surveys and the 2007 survey of births - give a more detailed picture of the mechanisms and factors behind this sudden rise in the proportion of boys at birth. The recent rise of the SRB is directly linked to the increasing proportion of pregnant women who have access to information regarding the gender of their future child. Forerunners in practicing sex selection in the country appear to consist of women with a higher education and from the more affluent sections of the population. This is especially the case in more privileged rural or semi-rural areas in the vicinity of Ha Noi and Ho Chi Minh City. A concentration of higher SRB values is also clearly found in a few provinces in the Red River Delta and the South-East regions of Viet Nam.

The fact that the increase of the SRB has only started to occur in recent years means that the overall sex distribution of Viet Nam's population is not yet skewed like in other countries in Asia. In fact, while a higher SRB immediately impacts the sex ratio of the child population, the consequences of the current situation may not be felt at the national level before at least two decades have passed. Not only will the overall sex ratio of the country remain below 102 till 2020, but the sex ratio of adults will also stay predominantly feminine up to 2020. However, if the SRB continues to increase after 2010, the population's sex structure will be significantly affected. The impact would then be felt by men who are born after 2005 and are getting into marriageable age from 2030 onward: this cohort would find themselves in surplus in comparison to women of matching age. By 2035, the excess of adult men would amount to 10% of the male population or even more if the SRB does not resume its normal biological level within the next two decades.

This scenario should be taken into account in future policy decisions regarding the need for an enhanced regulation

[35] *According to the latest National and family Health Survey (which included 44,000 births) the SRB in India was 108 for the time period between 2002-2006). Regional sex ratio values are however much higher in North-West India.*

of sex selection in the country. In this regard, it is important to note two rather different kinds of factors influencing the rise of the SRB: *supply and demand dimensions* that determine when sex selection is feasible and within reach and when people are ready and willing to use those particular services. These factors are not directly related and need to be examined separately.

On one hand, sex selection is clearly connected to changes in the "supply-side": sex determination services prior to birth and abortion services for foetuses of the unwanted sex. Rapid improvement in the quality and availability of reproductive health facilities has played a key role in this change. This is in particular related to the development of a mixed public-private health sector, in which for instance personnel from public hospitals may also act as private practitioners. Stricter regulations to prevent illegal sex determination and sex selective abortions may represent an easy option, but such regulations are usually defined by charging higher costs for quality reproductive health services such as antenatal care and limiting free access to pregnancy termination. A core dilemma faces policy makers: Reluctance to jeopardize fragile reproductive rights and the political drive for a slower population growth is indeed one of the chief causes for the late reaction to the rising SRB by some Asian governments.

On the other hand, the latent desire to have sons has been strong in many parts of the country, especially in more traditional rural households. This means that the current fertility decline has exacerbated the risks of sex selection among parents and that more families in Viet Nam may soon feel the need to discriminate against female foetuses, which in its turn contributes to the potential further deterioration of the SRB in the years to come. Such traditional attitudes, based chiefly on patriarchal family systems, are unlikely to change overnight. As with many other aspects of gender inequity, there is no easy way to tackle discriminatory attitudes against women. They stem from all dimensions of traditional gender arrangements on which the family system is based, e.g. inheritance, marriage rules, religious tradition, social identity, and division of work.

## 7.2 Recommendations

This section will present several recommendations based on the results of this study. Since this report does not encompass all aspects of the SRB issue in Viet Nam, it is impossible to offer specific suggestions. Thus these recommendations will remain general in nature.

The study at hand has demonstrated that even if incomplete, issues related to the rather recent rise of the Sex Ratio at Birth in Viet Nam are more thoroughly documented than was the case in other Asian countries when the same phenomenon was detected during the 1980's and the 1990's. In fact, it seems that in Viet Nam there is a general public awareness about this issue as well as concern about how to solve it. This level of awareness has indeed been reported in a recently conducted UNFPA-sponsored qualitative study (ISDS 2007) and is also illustrated by frequent mention of some SRB issues in the press. This suggests that the lessons drawn from the experience of other countries have benefited policymakers and public leaders, as well as have had a real impact on media awareness and ultimately the public at large. However, this study emphasizes three different objectives that may need to be achieved over the coming years to ensure a better monitoring of the SRB deterioration and adequate policy responses to the challenges this poses to Vietnamese society.

### 7.2.1 Data needs and registration data

As this report has made clear, there is a serious scarcity of data in Viet Nam to examine the intensity and the distribution of sex selection behaviour across the country, and most of our estimates rest on various indirect estimation techniques. The most useful source of data regarding sex-wise distribution of births would naturally be data from the civil registration of demographic events. SRB data from developed countries are almost only derived from civil registration, since that is almost exhaustive and little affected by any particular bias. Publication of the number of registered births, cross-classified by gender, is usually available by year and has been useful to monitor trends. These registration statistics are also systematically available for regional sub-units (regions or municipalities) and would allow easy identification of any suspicious "hot spot". Such data are available not only in more developed Asian countries such as Japan or South Korea, but also in some other countries– like Sri Lanka– which have maintained a long tradition of quality registration of demographic events.

The lack of civil registration data is usually due to the poor quality of the administrative bureaucracy combined with the relative lack of interest from the population in registering their demographic events. However, as the MICS and other studies have indicated, this is hardly the case in Viet Nam where a vast majority of births tend to be registered. For one thing, most births now take place in health institutions or with the assistance of health workers. Additionally, actual registration by the People's Committee is almost systematic when births take place in the usual residence place of the mothers[36]. Births are also often registered in the local health centres, where the delivery takes place or where the child's health status is followed up. The Government of Viet Nam has also introduced various legislations –such as the Government Decree 158/2005/NP-CP of December 2005 – to simplify and streamline birth registration. Overall, registration systems are in place but analysis becomes complicated when compilation and publication of the birth registration data are missing or not completed correctly.

It is, therefore obvious that long-term improvement of SRB monitoring should first come from civil registration statistics. There is room to improve the level of registration to 100% by both strengthening the administrative system and simplifying the registration process for the population itself. In addition, parents should be encouraged to systematically register births within one month after delivery instead of being allowed to postpone the official registration to a later date and only when in need of an official birth certificate. (Typically, birth certificates are needed in order to enrol children in school). Raising awareness among parents, communities and officials appears essential for the improvement of birth registration. Systematic dissemination of the data is another necessary step towards ensuring a reliable birth record system.

Demographic statistics will come from other sources such as the annual population surveys, birth surveys from health centres and the 2009 census as well. Some potential use for data from these sources is described below.

The annual surveys provide the most important tools for monitoring demographic change in Viet Nam. They have been indispensable for detecting the recent rise of the SRB, even if some crucial social and economic variables are missing from the current questionnaire. For future use, the survey should be better adapted to the new data requirements and availability. Its findings and results should be regularly published and made available to the scientific

[36] *Unregistered migrants may fall into a different category as they have to register births in their home area and not where they may reside.*

community[37]. As mentioned in this report, an additional survey focussing on births, to be conducted by the Ministry of Health throughout the country, would provide an almost exhaustive picture of the current SRB imbalances and of its regional parameters within the country. Such a survey would in particular serve to confirm the preliminary analysis offered here.

The next, 2009 Census will include two main variables to gain more insight in SRB trends. First of all, age and sex distributions will in great detail reflect the imbalances within the country during the years preceding the census. Secondly, the sex ratio of the last births will provide a fuller description of all social, regional and economic characteristics of mothers and households practicing sex selection.

### 7.2.2 Causes and mechanisms of sex selection

From a more qualitative point of view, the practice of sex selection in Viet Nam is still poorly documented and understood. More sociological or anthropological research needs to be conducted in the country to better document and understand the mechanisms and factors lying behind this sudden change in sex selection practices. While some studies regarding abortion and various aspects of reproductive health do exist, there is a lack of research on what was labelled the supply- and demand-side of sex selection in this report: on one hand, the existing of facilities and the ways in which women gain access to sex selection technology, and on the other hand, the reasons and context behind this strong preference for sons. In fact, given the scarcity of research results, it is difficult to provide insight into the social mechanisms of sex selection beyond making general statements about the need for male offspring, and about the hypotheses regarding the likely role of selective abortions in explaining the skewed SRB levels.

To start with, many rural communities all over Asia express a need for male descendants although it is never clear how far parents are willing to go to ensure the birth of a son. Parents may resort to a large variety of strategies to favour the birth of a boy, from traditional folk methods thought to facilitate the conception of boys to the "stopping rule" or selective abortions (ISDS 2007). Re-marriage, adoption, abandonment and infanticide also feature among alternative strategies. Many such practices have little impact on the overall SRB, but may tend to increase fertility. It is therefore crucial to understand when and how parents move from passive to active sex selection strategies. The broader context of fast social, economic and demographic change in post-1980 Viet Nam that has accompanied the rapid fertility decline translates into increasing "costs" associated to additional births. Sex selection for first births may become necessary. In this respect, the rather surprisingly high SRB level among first births in Viet Nam needs to be documented as it appears to be an unusual feature of a skewed SRB.

There are many other dimensions of son preference that require further analysis such as the role of economic growth, urbanization and change in employment that have affected the status of men and women within households. Specific mechanisms such as remittances from children to aging parents – a major security in a state of poverty among the elderly (Evans et al. 2007)– needs to be factored in as well. Moreover, traditional normative systems are based on various strands of the patriarchal system in Viet Nam of today and thus are far from homogeneous (Bélanger 2000; Jayakody 2005)[38]. Not only do they vary between

[37] *While annual estimates of basic vital and migration rates are required, a detailed report could be published on a biannual basis; this would, among other things, strengthen the quality and robustness of sample estimates.*

[38] *One such instance is the higher frequency of nuclear family patterns in the Red River Delta as compared to the Mekong region*

ethnic groups (Kinh vs. minorities), cultural regions (North vs. South) and in economic orientation (peasantry vs. urban dwellers), but they are also greatly influenced by the current socio-economic and ideological transformations in society. Little is known about the interplay between various local and traditional gender arrangements across Viet Nam and the components of social change. Any policy addressing the specific need for sons expressed by a large number of couples requires a thorough understanding of the gender bias across society and the evolution it is likely to have in the future.

Exploring the supply side of the development of sex determination is equally important. To do this, a fuller description of the recent spread of new technologies and in particular of sex identification methods such as ultrasound and amniocentesis is required. The rapid diffusion of these methods, first through the government health facilities and later on through the private sector, has to a large extent been left unnoticed[39]. In particular, the fast developing web of clinics and other health centres throughout the country has probably been the major channel through which women have accessed the new sex selection technologies during the last decade. Without doubt there are potential difficulties with investigating the sex selection strategies of parents and the functioning of facilities to meet this demand: not only is abortion widely underreported by women, but resorting to sex selection is also illegal and clinic operators are unlikely to freely discuss such activities. But any sensible policy response requires a better understanding of the role of these various actors and the ways in which they operate. Unless a great deal more is known regarding the availability of sex selection services, it may be difficult to monitor their practices without endangering the quality and the functioning of existing reproductive health facilities.

### 7.2.3 Information and dissemination

Information and dissemination are crucial components of the previous research activities. Findings from qualitative studies and from demographic analysis have to be shared with various stakeholders, starting with the general public, civil society and the medical community, but also with political leaders and health authorities. Sex selection ranges among human activities that may be seen as individually beneficial, but are at the same time harmful at the societal level (labelled as "externalities" by economists). In addressing such double sided issues, a preliminary step of action, before introducing any regulation, consists of sharing all information about current conditions and the extent of discriminatory behaviours as well as their consequences on the demographic fabric of society with the general public.

Information sharing will in turn encourage other actors to intervene, including the media and civil society organizations. This, in its turn, will generate more data as well as further reports and analyses on the current rise in sex selection. The experiences of other Asian countries facing older and more pronounced sex imbalances will help to enrich the debate about sex selection and its potential impact on the population structure. A specific approach would be to encourage the research and academic community, through both training and research support, to get more involved in the current endeavour to monitor and interpret the current rise in the SRB. Research by students in demography and other social sciences and by established experts will be an important dimension of this process, especially since gender discrimination constitutes a complex phenomenon at the crossroads of traditional value systems, demographic modernization, and rapid economic and social change in contemporary Viet Nam.

[39] *Interestingly enough, while there are several qualitative and other studies of abortion in Viet Nam, almost none seem to have identified the increasing demand for sex selection as a particular component of abortion practices in the country.*

# References


Arnold F., Kishor S., Roy T.K. , 2002, "Sex-selective abortion in India", *Population and Development Review*, 28 (3), 759-786.

Attané, I. and Guilmoto, C.Z., eds., 2007, *Watering the Neighbour's Garden. The Growing female Deficit in Asia,* CICRED, Paris.

Bélanger, Danièle, et al. ., 2003, *"Are sex ratios increasing in Viet Nam?" Population,* vol. 58 no. 2, pp. 231-250.

Bélanger, Danièle, 2002, "Son preference in rural Viet Nam", *Studies in Family Planning,* Vol. 33 no. 4, pp. 321-334.

Bélanger, Danièle, 2006, "Indispensable Sons: Negotiating reproductive desires in rural Viet Nam", *Gender, Place and Culture,* Vol. 13, No. 3, pp. 251–265.

Bélanger, Danièle, and Khuat Thi Hai Oanh, 2007, "Second trimester abortions and sex-selection of children in northern urban Viet Nam", paper under submission.

Chu Junhong 2003, "Prenatal Sex determination and Sex-Selective Abortion in Rural Central China", *Population and Development Review,* 27(2), 259-281.

Croll, Elisabeth, 2000, *Endangered Daughters. Discrimination and Development in Asia,* London: Routledge, 207 pages.

Epprecht M, and Heinimann A, editors. 2004. *Socioeconomic Atlas of Viet Nam. A Depiction of the 1999 Population and Housing Census.* Swiss National Centre of Competence in Research (NCCR) North-South, University of Berne. Berne. 168 pp.

Evans, Martin, et al., 2007, *The Relationship between Old Age and Poverty in Viet Nam,* UNDP, Ha Noi.

Gammeltoft, Tine and Hanh Thi and Thuy Nguyen, 2007, "The Commodification of Obstetric Ultrasound Scanning in Ha Noi, Viet Nam", *Reproductive Health Matters*, 15(29), 163–171.

General Statistical Office, 2001. *Results of Population Projections for Whole Country, Geographic Regions and 61 Provinces/Cities Viet Nam,* 1999 - 2024, Ha Noi.

General Statistical Office, 2007, *The 2006 Population Change, Labour Force and Family Planning Survey. Major Findings,* Statistical Publishing House, Ha Noi.

Goodkind, Daniel, 1997, "The Vietnamese Double Marriage Squeeze", *International Migration Review,* 31(1), 108-127.

Guilmoto, Christophe Z., 2007a, "Characteristics of Sex-Ratio Imbalances in India and Future Scenarios", report for UNFPA.

Guilmoto, Christophe Z., 2007b, "Sex-ratio imbalance in Asia: Trends, consequences and policy responses", report for UNFPA.

Haughton, J., & Haughton, D. (1995). Son preference in Viet Nam, *Studies in Family Planning,* vol. 26 no. 6, pp. 325-338.

Hoang Kim Dzung and Nguyen Quoc Anh, 2006, "Induced abortion in Viet Nam: Facts and solutions", in Susana Lerner and Eric Vilquin, eds., *Reproductive Health, Unmet Needs and Poverty,* Paris, CICRED, 399, 423.

Institute for Social Development Studies, 2007, New *"Common Sense": Family-Planning Policy and Sex Ratio in Viet Nam. Findings from a qualitative study in Bac Ninh, Ha Tay and Binh Dinh*, report for UNFPA.

Jayakody, Rukmalie et al., 2005, "The Impact of Social Change on Vietnamese Families", communication presented at the World Population Conference, Tours, July.

Kim Doo-Sub, 2004, "Missing Girls in South Korea: Trends, Levels and Regional Variations", *Population (English edition)*, 59(6): 865-878.

Law on Gender Equality, 2006, last accessed in January 2008 on http://www.ubphunu-ncfaw.gov.vn/?lang=E&func=newsdt&CatID=132&newsid=1700&MN=132.

Le, Linh C. et al., 2004, "Reassessing the Level of Unintended Pregnancy in Viet Nam and its Correlates". *Studies in Family Planning,* Vol. 35, no. 1: 15-26

Le, Linh C., 2006, "Unintended live birth vs. Abortion: What factors affect the choices of Vietnamese women and couples?." *Asia-Pacific Population Journal,* Vol. 21, no. 2:45-66.

Li, Shuzhuo, 2007, "Imbalanced Sex Ratio at Birth and Comprehensive Intervention in China", report for UNFPA.

MICS, 2007, Multiple Indicator Cluster Survey 2006 Viet Nam, GSO and UNICEF, Statistical Publishing House, Ha Noi.

Ministry of Health, 2006, *Viet Nam Health Report 2006.* Medical Publishing House, Ha Noi.

Plan International, 2006, "Birth Registration in Viet Nam", Country Report prepared for the Fourth Asia and Pacific Regional Conference on Universal Birth Registration, Bangkok, Thailand, 13-17 March 2006

Sabharwal, Gita and Than Thi Thien Huong,(nd) Missing Girls in Viet Nam: Is High Tech Sexism an Emerging Reality?, ELDIS library

Santow, Gigi, 2006, *Review of data on fertility, mortality, and the sex ratio of births as derived from the 2006 population change survey,* Report on consultancy mission to the Department of Population and Labour Statistics, General Statistics Office, Ha Noi, Viet Nam and to UNFPA Viet Nam.

Tuan Tran, et al. , 2005, "Comparative quality of private and public health services in rural Viet Nam", *Health Policy and Planning,* 20(5):319-327

UNFPA, 2007, *Population Growth in Viet Nam. What the Data from 2006 tell us. With a Focus on the "Sex ratio at Birth",* a booklet published UNFPA, Ha Noi.

United Nations, 2007, *World population prospects, The 2006 Revision Population Database, United Nations, Population division,* on the website http://esa.un.org/

Viet Nam Poverty Update Report, 2006, *Poverty and Poverty Reduction in Vietnam 1993-2004,* Vietnamese Academy of Social Sciences, Ha Noi.

Vo Anh Dung, Phuong Thi Thu Huong, Nguyen Ngoc Huyen, Le Thanh Son, 2005, "Sex ratios at birth in Viet Nam and some localities: Current situation and comments", International Conference on *Female deficit in Asia : Trends and perspectives,* Ceped-Cicred-Ined, Singapore, 5-7 December 2005.

UNFPA, the United Nations Population Fund, is an international development agency that promotes the right of every woman, man and child to enjoy a life of health and equal opportunity. UNFPA supports countries in using population data for policies and programmes to reduce poverty and to ensure that every pregnancy is wanted, every birth is safe, every young person is free of HIV/AIDS, and every girl and woman is treated with dignity and respect.

This booklet can be accessed at
http://vietnam.unfpa.org