SPECIAL REPORT

Where have all the flowers gone?

At least 117 boys were being born for every 100 girls at the beginning of this century in China. **Philip Ball** asks whether Chinese birth rates can be controlled without exacerbating the gender imbalance.

A common female name in China, Laidi, encapsulates one of the country's biggest problems of population management. It means 'a little boy is following', betraying the widespread longing for a son. But tight restrictions on family size have meant that, for many, that son never follows.

The conflict between population policy and the traditional preference for sons is now leaving a legacy of imbalance in the gender ratio, which could foment social tension over the next few decades as the most-affected generation reaches adulthood. "In ten years' time, it will be a real problem," says Therese Hesketh of University College London, who is a specialist on childcare issues in east Asia.

The population challenge for China is very real. The country's last population census in 2000 revealed an increase of 750 million over half a century — more than a doubling. The unsupportable nature of the modern population boom led China's then leader, Deng Xiaoping, to introduce in 1979 the one-child policy, which nearly all citizens were supposed to observe. Financial incentives were provided for compliance; failure to do so drew fines and confiscations of property, and in some cases led to enforced abortions.

The one-child policy has had a dramatic impact: the birth rate per woman dropped from 5.4 in 1971 to 1.8 in 2001, and is even lower in urban areas. But the effectiveness of the policy varies. Resistance in rural areas has led to an allowance of a second or even third child, particularly among ethnic minorities. "It's rather like a one-child-and-a-half policy," says Christophe Guilmoto of the Research Institute for Development in Paris. "In many areas, you're entitled to a second birth if the first is a girl." Moreover, he and Isabelle Attané at the National Institute for Demographic Studies, also in Paris, say that "birth control is slipping out of the hands of the regime's cadres, and coercive measures are failing"¹. The Chinese government has now shifted

its emphasis from coercion to voluntarism, with a focus on health issues and education rather than population control per se.

The current Chinese population stands at more than 1 billion — about a fifth of the global total — and is growing at a rate of 8–10 million a year. This growth could impact on China's economic miracle. Niu Wenyan of the Institute of Policy and Management of the Chinese Academy of Sciences (CAS), Beijing, estimates that nearly a fifth of the newly increased gross domestic product is consumed in feeding the population, although this proportion has been dropping steadily since the late 1980s².

Niu, who is a specialist on sustainable development, says that achieving strictly zero population growth is essential. In 1999, a CAS report stated that this target should ideally be reached by 2030. "From 2020 on, the high peaks of total population, aged population and working-age population will come in succession," Niu says. "This will put heavy pressure on China's sustainable development."

The reasons for the Chinese preference for a son are deep-seated, especially in rural areas. The motivation is partly economic: a son may

"This trend could lead to increased levels of antisocial behaviour and violence."

be considered able to work harder in the countryside, or be more likely to get a lucrative job in the city. In part it is about welfare: a son is duty-bound to look after his parents in their old age, whereas a daughter's obligations are transferred to her in-laws when she marries. The importance of a male heir is also a legacy of patriarchal Confucian culture.

In past decades this has led to the abortion, abandonment and even infanticide of females. In 1982 the average male-to-female ratio at birth in China was 1.07 (as opposed to the normal level of 1.03–1.06); by 2000, various estimates put it at 1.17–1.21. And according to even official figures, the female-to-male infant mortality ratio rose during this period from around 0.95 to 1.46. The timing seems to imply a direct link to the one-child policy, although Guilmoto points out that the sex ratio has also increased in recent times in countries where no such restrictions

apply, such as India and South Korea.

Infanticide is now extremely rare. Hesketh says that the higher mortality of baby girls probably stems mostly from a greater reluctance to take sick newborn girls than boys to hospital, where intensive care is very expensive. And modern prenatal and reproductive technologies have created new opportunities to manipulate the outcome of conception.

Missing girls

Hesketh says that the dominant cause of the sex-ratio imbalance is sex-selective abortion, which could account for around 95% of the 'missing females'. "Ultrasound scanning is readily available, even in poor rural areas," she says. Sex-selective abortion is illegal but hard to police. Hesketh feels that stricter enforcement could have a big impact, but new techniques for determining fetal gender could add complications. "The new method is now DNA blood testing, which is much more convenient than anything else," says Guilmoto. "It's not common in China yet, but things may change rapidly."

There is some evidence that couples may be enhancing their chances of having a son by using fertility drugs to increase the likelihood of twins. That is suggested, for example, by a doubling of the number of twins born recently in some hospitals in southern China, where fertility drugs may be available from Hong

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explicit concerns about the dangers for society and security. In 2004, Li Weixiong, vice-chairman of the population, resources and environment committee of the National Committee of the Chinese People's Political Consultative Conference, said that "serious gender disproportion poses a major threat to the healthy, harmonious and sustainable growth of the nation's population".

Better prospects

The sex ratio at birth should even out. Niu's calculations predict that China's natural population growth rate should drop sufficiently by 2015 for the one-child policy to be adjusted, and that by around 2030 a couple will be able to

have two children on average. He therefore predicts that "the sex ratio will drop to 113:100 by 2030, and by around 2050 it is expected to be close to the normal level". Hesketh concurs, saying "I suspect things will settle by 2050".

The Chinese government is eager to change attitudes, and has been running a 'Care For Girls' campaign, which promotes the value of daughters, for the past decade, even in remote rural parts of the country. Legislation has made it easier for girls to inherit, and some provinces have introduced perks and incentives, such as waiving school fees, for daughter-only families. Such efforts may now be bringing results. According

to the results of a 2005 micro-census, the sex ratio at birth has already stopped increasing; in fact, Hesketh suspects there is "probably a small downturn occurring". The next national census in 2010 might provide a clearer picture.

"We might have indeed reached a plateau at the national level," says Guilmoto, "although in some inner provinces it might still be increasing." He believes that "China may be entering a new stage in which demand for sons will decline, as it has in South Korea". But he adds that "the excess of male births is bound to seriously disturb the marriage market for decades to come".

1. Guilmoto, C. Z. & Attané, I. *Watering the Neighbour's Garden: The Growing Demographic Female Deficit in Asia* (eds Attané, I. & Guilmoto, C. Z.) 109–130 (CICRED, Paris, 2007).
2. Niu, W. Y. *The Overview of China's Sustainable Development* Ch. 10, 259–288 (Science Press, Beijing, 2007).
3. Hesketh, T. & Xing, Z. W. *Proc. Natl Acad. Sci. USA* **103**, 13271–13275 (2006).

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CHINESE SEX-RATIO IMBALANCE (2000)

(Mainland China)

Kong. Hesketh says that such accounts remain anecdotal, but "I wouldn't be surprised if this were happening".

Yet Guilmoto and Attané have shown that national average figures mask a complex geographical picture¹. The sex-ratio imbalance in mainland China is generally greater in the countryside than in cities, and it also seems to be concentrated in pockets (see map). "There exist large zones characterized by extreme sex-ratio values bordering areas where recorded values are almost normal," they say. Hesketh says that just three provinces — Henan, Guizhou and Jiangxi — account for much of the elevated female infant mortality. Meanwhile, regions with high proportions of ethnic minorities, such as the far western and northern provinces, tend to have more normal sex ratios. This distribution has remained fairly stable between 1990 and 2000, despite attempts to eliminate sex selection, suggesting that state intervention has had little effect.

In 2006, Hesketh and Zhu Wei Xing of Zhejiang Normal University in China warned that the male–female imbalance could cause serious social tension and disruption in the future³. In China there is a strong expectation that young people will marry and have a family, whereas Hesketh predicts that over the

next two decades this may be impossible for up to 15% of men. The imbalances are greatest in poorer, rural areas, and because women from this background will be able to 'marry up', it is mostly the poorest men who will find themselves with no marriage prospects. Already, she says, 94% of unmarried people aged between 28 and 49 are male.

"This trend could lead to increased levels of antisocial behaviour and violence," Hesketh says. "When young men congregate, the potential for more organized aggression is likely to increase substantially, and this has worrying implications for organized crime." Already, girls have been abducted to become future brides for families with a son. Female trafficking is on the increase, says Hesketh, and so too is the sex industry. But she cautions that it is very hard to attribute cause and effect when the economic situation in China is changing so fast.

The Chinese government has expressed