# A study on rural—urban differences in neonatal mortality rate in China, 1996—2006

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## ABSTRACT

**Objective** This study examined the differences in neonatal mortality rates between urban and rural areas in China.

**Methods and Results** Data were taken from a database collected by the Chinese surveillance network for mortality of children under 5 years of age. The risk ratio of neonatal mortality for rural versus urban areas was between 2.2 and 2.7 for 1996—2006 and it declined to 2.0 in 2005—6. Pneumonia, birth asphyxia and preterm birth or low birth weight were the major contributors to the urban—rural differences in neonatal mortality, together with a relatively high proportion of home delivery and a relatively lower proportion of hospital treatment in rural areas.

**Conclusion** The urban—rural differences reflect the gap between the developed and the underdeveloped regions in China at that period. The neonatal mortality rate in China's rural areas could decrease further if continuous efforts are successful to increase the rates of hospital delivery in rural areas.

In order to achieve the world Millennium Development Goals of lowering the under-5 mortality rate of 1990 by two-thirds by 2015, it is critical to reduce neonatal mortality rates.[1—6] In China, a wide gap exists in terms of people's income and health status between urban and rural areas, and the gap explains the regional differences in children's health status and survival between urban and rural areas.

The Chinese Ministry of Health has established a nationwide mortality surveillance network, which collects children's health information from representative population samples, to obtain accurate mortality estimates among Chinese newborns, infants and children under the age of 5 years. Out of the 13 million population under the surveillance, there are approximately 100 000 live births and 982—1856 neonatal deaths per year.[7—9] By analysing the data extracted from the network, this article presents the differences in neonatal mortality rate between urban and rural areas in China.

Table 1 shows that the neonatal mortality rate in the rural areas during 1996—2000 declined more slowly than that in urban areas (0.9 per 1000 vs 2.7 per 1000). The risk ratios (RR) of neonatal mortality in rural versus urban areas in China were 2.2 in 1996 and 2.7 in 2000, and the data do not suggest a gradual decline. Instead, both rural and urban areas experienced a significant decline in neonatal mortality between 2001 and 2006, with a higher rate reduction in the rural area (10.5 per 1000) than in the urban area (3.8 per 1000). After 2000, there was a gradual decline in rural—urban rate ratios. Preterm birth or low birth weight, birth asphyxia, congenital abnormalities, pneumonia and intracranial haemorrhage account for more than 80% of neonatal deaths in both areas. Compared with cities, rural areas had much higher death rates from pneumonia (RR 3.0 in 2006), birth asphyxia (RR 1.5 in 2006) and preterm birth/low birth weight (RR 2.1 in 2006). These differences are the most likely factors explaining the higher mortality rates in rural areas.

Neonatal mortality caused by birth asphyxia is associated with low rates of hospital delivery. The current study shows a higher proportion of neonatal deaths resulting from home birth delivery in rural areas.[10 11] Approximately 25% of neonatal deaths in rural areas between 2003 and 2006 resulted from home delivery. By contrast, only 1.5% of neonatal deaths were related to home delivery in the city. Home delivery in rural areas, mainly assisted by a village doctor or midwife without sufficient knowledge and skill, is strongly linked with poverty, poor transport connection or superstition. To improve rural hospital delivery rates, the Chinese government is implementing a subsidy project to allow rural pregnant women to give birth in hospitals.[12]

Mortality from pneumonia, which declined only slightly in the rural areas during 1996—2006, is linked with bad access to medical care. Between 2003 and 2006, 61.1% of newborns in the rural areas who died of pneumonia received no hospital treatment. Worldwide, the proportion of newborn and infant deaths attributable to preterm birth or low birth weight is increasing. In the USA, for example, 17% of neonatal deaths in 2002 were due to preterm birth or low birth weight.[13—18] In Chinese cities, neonatal mortality due to preterm birth or low birth weight accounted for 22.7% of all newborn deaths in 2001—6 compared with 27.9% in urban areas.

With the 'New Socialist Countryside' policy in force, the Chinese government is establishing a rural cooperative medical and healthcare system,

### What is already known on this subject

- In most countries, the neonatal mortality rates vary by socioeconomic status.
- In China, the neonatal mortality rates in rural areas are higher than in urban areas. This study explores the trends in neonatal mortality rates in urban and rural areas in China.

**Table 1** Neonatal mortality rate (per 1000 live births) and risk ratios between 1996 and 2006

| Areas | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Reduction 1996–2000 | Reduction 2001–6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Urban | 12.2 | 10.3 | 10.0 | 9.5 | 9.5 | 10.6 | 9.7 | 8.9 | 8.4 | 7.5 | 6.8 | 2.7* (22.1%) | 3.8* (28.4%) |
| Rural | 26.7 | 27.5 | 25.1 | 25.1 | 25.8 | 23.9 | 23.2 | 20.1 | 17.3 | 14.7 | 13.4 | 0.9 (3.4%) | 10.5* (48.1%) |
| RR (95% CI) | 2.2 (2.0 to 2.4) | 2.7 (2.4 to 3.0) | 2.5 (2.3 to 2.8) | 2.6 (2.4 to 2.9) | 2.7 (2.4 to 3.0) | 2.3 (2.0 to 2.5) | 2.4 (2.2 to 2.7) | 2.3 (2.0 to 2.5) | 2.1 (1.8 to 2.3) | 2.0 (1.7 to 2.2) | 2.0 (1.8 to 2.2) | | |

*$p<0.05$, statistically significant; Cochran–Armitage trend test. RR, risk ratio.

## What this study adds

- The risk ratios of neonatal mortality in rural and urban areas slightly increased between 1996 and 2000 and declined between 2000 and 2006; the declining trend was most evident after 2004.
- Pneumonia, birth asphyxia and preterm birth or low birth weight were the three major causes of deaths contributing to the rural–urban difference in the neonatal mortality rate.

aimed at having over 80% of the rural population insured by 2010. The government has launched another policy to provide the women in underdeveloped regions with financial aid. These benefits will enable women in these regions to give birth in a hospital free of charge. It is hoped that this policy will ultimately reduce the neonatal mortality rate. In the next step, the Chinese government should takes measures to reduce mortality related to preterm birth, low birth weight and pneumonia in rural areas by improving antenatal care for pregnant women and improving children's healthcare.

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