

Chapter 2

Health Status of Infants and Children

China's efforts to improve the health status of infants and children have been impressive since liberation in 1949. The recent Summit of Children in 1990 has prompted more attention on children and China has set national goals to further improve the health status of infants and children by year 2000. This chapter reviews extant data on the incidence and management of mortality and morbidity among infants and children, and strategies for achieving the national goals.

Mortality Rates

An important indicator of the health status of infants and children is the mortality rates. Figure 2-1 shows the infant mortality rates (IMR) between 1950 and 1993. For this analysis, the IMRs from 1950 to 1980 are based on estimates from Young and Prost (1985), which showed that the infant mortality rates (IMRs) have declined steadily from about 250 deaths per 1,000 live births in 1950 to about 50 deaths per 1,000 live births in 1980. The sharp increase in IMR between 1959 and 1961 reflected the excess mortality during the period of the "Great Leap Forward" when much of the country suffered one of the worst famines in history¹³. The data since 1980 is shown here as a range because there are some uncertainties about the estimates of IMR. The best guess, after reviewing data from the surveillance system of the Ministry of Health (MOH), Department of Maternal and Child Health (MCH), and other sources, is that the IMR has remained fairly stable at about 40 to 50 deaths per 1,000 live births during much of the decade in the 1980s. Mortality rates have been stable for both the neonatal period (within the first 28 days) and the post neonatal period (between 1 to 12 months of age) of infancy. The neonatal mortality rate (NNMR) is estimated at about 28 to 35 per 1,000 live births and the post-neonatal mortality rate (PNNMR) at approximately 12 to 15¹⁴.

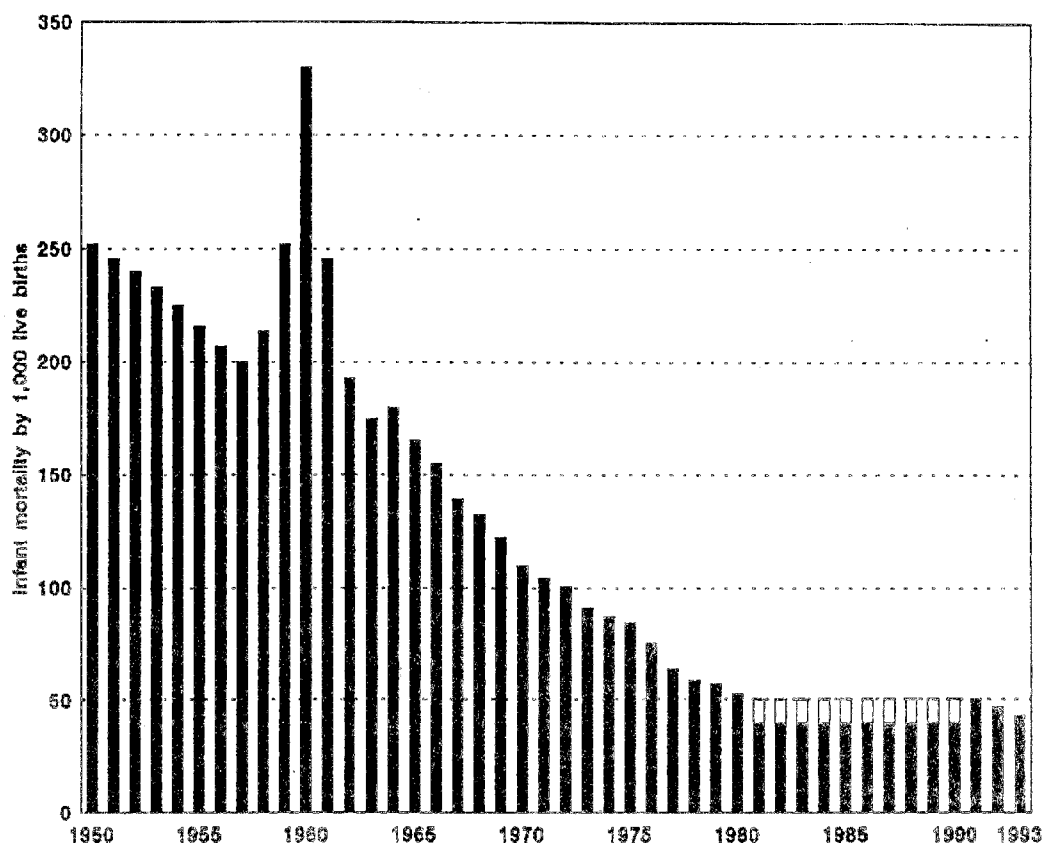
Other studies have quoted somewhat lower IMRs in China depending on the source of data. For instance, estimates based on the 1992 National Sample Survey of the Situation of Children found that the IMR is close to 30 deaths per 1,000 live births in 1991. Another study has also estimated the IMR at 31 female deaths per 1,000 female births in 1992¹⁵. Considering the problems of under-reporting in most surveys, UNICEF's best guess, after careful reviews, is that the higher estimates of about 40 to 50 deaths appear to be more realistic.

¹³ During the "Great Leap Forward" excess deaths in the population have been estimated at nearly 30 million.

¹⁴ The IMR is the sum of the NNMR and PNNMR.

¹⁵ "Statistical Indicators on Women: An Asian Perspective." Statistical Brief 93-18, Bureau of the Census, U.S. Department of Commerce.

Figure 2-1. Infant Mortality Rates in China, 1950 to 1993.



Source: Young and Prost, 1985 p. 84 (1950 - 1980); UNICEF estimates (1981 -1990); Surveillance System of Maternal and Child Health Department, MOH (1991-1993).

At 40 to 50 infant deaths per 1,000 live births, the IMR in China compares favourably with other developing countries in spite of the lack of improvement in the last decade. For instance, the IMR in China is lower than the IMR in Afghanistan, Pakistan, and Bangladesh; but higher than the rate among the Asian Tigers (e.g. Singapore, Hong Kong, and South Korea), Sri Lanka and Malaysia.

For young children between 1 and 4 years of age, the estimated mortality rate for each year of age is about 3 to 4 deaths per 1,000¹⁶. When the mortality rates were combined, the total under-five mortality rate (U5MR) in China is estimated to be between 50 and 65 per 1,000. This rate also has remained stable through the 1980s.

Mortality By Areas of the Country. Table 2-1 shows the NNMR, IMR, and the U5MR by rural and urban areas, and by coastal, inland, and border areas of China, between 1991 and 1993. The mortality rates in rural areas was about three times the rates in urban areas during this time. The tendency of under-reporting of mortality is typically higher in

¹⁶ Mortality rate is computed as the ratio of total number of deaths in children 1 to 4 years of age per year over the total number of children between 1 to 4 years of age in that year.

rural areas than in urban areas because a large number of births occur at home. Therefore, the true rural and urban difference may be even higher than the difference shown here. Besides rural and urban differences, there are also substantial difference between border, inland, and coastal areas of China. Table 2-2 shows that provinces with high IMRs over 60 per 1,000 live births are: Jiangxi, Guangxi, Guizhou, Yunnan, Tibet, Qinghai, and Xinjiang.

Table 2-1. The NNMR, IMR, and U5MR By Urban and Rural Areas, and By Coast, Inland, and Border Areas in China, 1991 and 1993.

Area	NNMR			IMR			U5MR		
	1991	1992	1993	1991	1992	1993	1991	1992	1993
Whole Country	33	33	33	50	47	46	61	57	55
Urban	13	14	13	17	18	16	21	21	20
Rural	38	37	35	58	53	49	71	66	59
Coastal	19	18	20	27	24	25	34	31	30
Inland	37	36	38	55	50	51	66	60	62
Border	48	51	43	78	80	67	100	99	81

Source: A Situation Analysis of Children in China, National Working Committee for Children and Women, Centre of Child Development, December 1994, Beijing, Tables 2.3 and 2.4.

Table 2-2. Infant Mortality Rates By Province, 1990.

IMR per 1,000	Province
Under 20	Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Shandong.
20 to 60	Shanxi, Inner Mongolia, Jilin, Heilongjiang, Zhejiang, Anhui, Fujian, Henan, Hubei, Hunan, Guangdong, Hainan, Sichuan, Shaanxi, Gansu, Ningxia.
Over 60	Jiangxi, Guangxi, Guizhou, Yunnan, Tibet, Qinghai, Xinjiang.

Source: National and Provincial Tabulations of the 1990 Population Census.

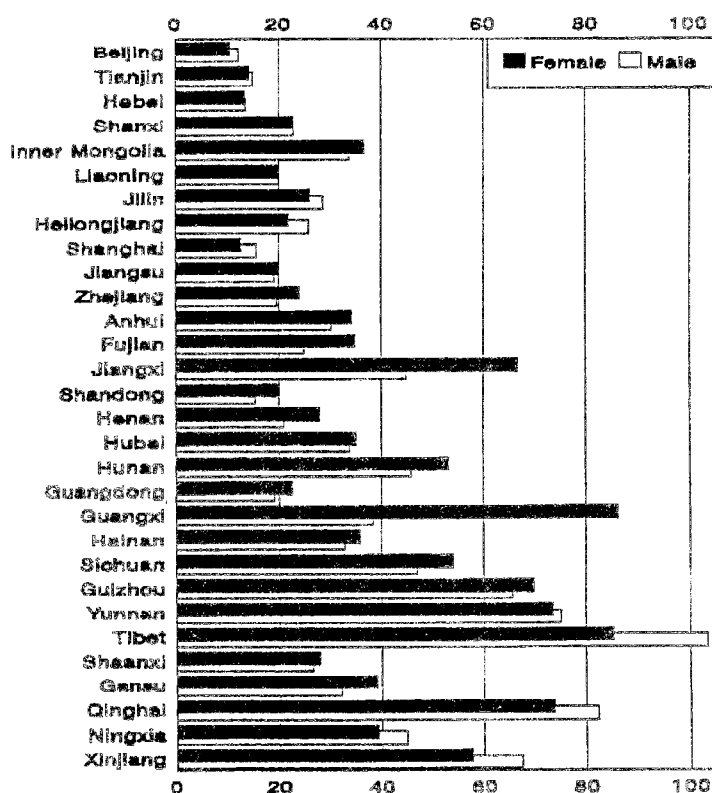
By Gender. In the absence of differential treatment, boy infants are expected to have a somewhat higher mortality than girl infants because of their biological vulnerability. On average, the IMR for girls is expected to be 10 to 30 per cent lower than that for boys, the gap being largest during the neonatal period, less strong by the post neonatal period, and mostly disappears by early childhood.

In China, as a whole, there are some indications that the mortality rates of girls are higher than that of boys during infancy. For instance, the 1990 Census shows that the average IMR for boys was 32 per 1,000 live births and that for girls was higher at 37 per 1,000 live births. The disadvantage for girls is fairly high in several provinces including

Guangxi, Jiangxi, and to a lesser extent, Fujian and Gansu (see Figure 2-2). In other provinces, such as Tibet, Qinghai and Xinjiang, the IMRs for boys are higher than those for girls.

The higher infant mortality of girls has been attributed to relative neglect of girl infants leading to death. Because of the traditional preference for sons to continue the family heritage and to support the aging parents, male child preference is rooted in the Chinese culture. Since liberation, both boys and girls have equal legal rights to inheritance and responsibilities for the family, and the practice of female infanticide has mostly disappeared in the 1970s. There are concerns that the recent population policy of one child per family may have prompted the desire for a son and the reemergence of severe neglect of girl infants leading to a higher rate of death than would have been expected under nondiscriminatory conditions.

Figure 2-2. Infant Mortality Rate By Gender and By Province, 1990.



Source: National and Provincial Tabulations of the 1990 Population Census.

Note: National average IMR for male children is 32 and that for female children is 37.

By National Minority Status. Between the Han Chinese and the national minority groups, the gap in the mortality rates of infants and children appears to have widened. The number of deaths among infants and children of the national minority groups per 100 deaths of the Han infants and children was about 115 in early 1950s, 168 in the 1970s, and almost doubled at 197 by the mid-1980s. Some minority groups, such as the Koreans and Manchus,

did not show a disadvantage relative to the Hans. The IMRs for these ethnic groups were in fact estimated to be lower than the IMRs for the Han Chinese. If these groups had been left out of the comparison, the disadvantage for the national minority relative to the Han Chinese would have been bigger. One reason that has been used to explain the widening gap is that reductions in infant and child mortality have been slower among the national minorities groups than among the Han Chinese.

By Maternal Age and Literacy. Children and infants of teenaged mothers and illiterate mothers are at a higher risk of early mortality than children of mature and educated mothers. Preliminary analyses of the 1988 National Fertility Survey of Women aged 15 to 57 Years have found that the IMR was more than two times higher for children of teenaged mothers (aged 15 to 19 years) than for infants of more mature mothers (aged 25 to 29 years); and it was about five times higher for children of illiterate mother than for children of mothers with some post-secondary education. These estimates, may have overstated the differences because more births from illiterate mothers and teenaged mothers took place in the distant past, when the mortality rates were high. Nonetheless, the possibility that children of teenaged mothers and children of illiterate mothers are at a higher risk of early mortality should not be overlooked.

By Birth Order and Birth Interval. Studies looking at the effects of birth order and birth interval in the 1980s have found that in China, first births do not show higher mortality than births of higher order. Chinese researchers have reported a J-curve of increase in IMRs as birth order increases. This pattern is different from the classic U-curve relationship where first born and higher order births are more vulnerable. In China during the 1980s, the first birth is likely to be the "only birth" in a family, and therefore, first born children receive special attention from parents. Higher order births are more prevalent in poor rural and minority areas where the IMRs are typically high. For parents who choose to have more than one child, a study in Shaanxi showed that a longer interval between births generally improves children's chance of survival, especially for higher order children.

By Breastfeeding Status. A study in Shaanxi province found that breastfeeding has a significant effect on improving child survival during the first two years. This study found advantage of breastfeeding after controlling for potential confounding factors and reverse causality. Survival increases with the length of breastfeeding, although exclusive breastfeeding for too long is harmful. The advantage of breastfeeding, however, was not found in large cities, probably because other economic advantages have outweighed the benefits of breastfeeding. For instance, in Shanghai, the rate of breastfeeding was much lower and breastfeeding had a non-significant (and small) effect on mortality. It is mainly in poor areas that non-breastfed infants are at a very high risk, and the practice of introducing supplementary foods too early (or too late) increases their mortality. The association between breastfeeding practices and malnutrition in rural areas is discussed in Chapter 4 under nutrition.

By Gestational Period and Birth Weight. There is relatively little information on the relationship between gestational period and mortality. A study in 1986 found that the IMR of babies born at less than 36 weeks gestation was quite high, at 300 per 1,000 live births. This rate is universally found in well-off areas, rural, and urban areas. In terms of

birth weight, mortality is high among lower birth weight (LBW) babies and very heavy babies are also at an increased risk. This classic U-curve relation between birth weight and IMR is found in most countries. As discussed later under cause of morbidity, the prevalence of LBW babies is low in China relative to other developing countries.

By Seasonal Variations. Overall, the seasonality in the number of infant deaths follows the seasonality in the number of infant births. The IMR is lowest for infants born in June, and highest for those born in October-November, probably because the leading infantile diseases such as acute respiratory infections and neonatal cold injury are more prevalent in the fall when the weather changes. Seasonal mortality patterns may vary somewhat from region to region depending on the climatic patterns.

Causes of Mortality

The leading causes of death among the under-five child population in China are pneumonia, diarrhoea, immunizable diseases, and neonatal complications. However, relative to other developing countries, the number of deaths due to these diseases is considered small in China. Table 2-3 shows the incidence in China relative to the developing world in 1989. The under-five child population in China constitutes about 20 per cent of the developing world child population at the same age range; however, its share in the number of deaths is only about 10 per cent. Pneumonia, one of the leading cause of death, caused approximately 340,000 deaths in China. However, among all pneumonia related deaths in the developing world child population, only 11 per cent of the cases has occurred in China. Similarly, deaths due to diarrhoea, immunizable diseases, and neonatal complications in China contribute to a small percentage of mortalities in the developing world.

Table 2-3. Number (Thousand) Of Deaths By Cause of Death of Children Under-five Years: China Relative to Developing Countries, 1989.

Population Size and Causes of Death	Number of Cases in:		Percentage of Cases that Occurred in China
	All Developing Countries	China	
Total Number of Deaths	14,000	1,400	10%
Size of Under-Five Population	350,000	110,000	31%
Pneumonia	3,000	340	11%
Diarrhoea	3,000	140	5%
Immunizable Diseases	2,000	100	5%
Other Complications	6,000	820	14%
Neonatal**	n.a.	340	--
Accidents/Injuries	n.a.	150	--
Others	n.a.	330	--

Source: Population, Total Deaths and Causes of Death in the Developing World and the MOH Tables 2.6, 2.7 and 2.8 in 1989.

* All developing countries including China.

** Neonatal complications include prematurity, low birth weight, birth trauma, asphyxia, and cold injury.

n.a. not available.

The cause of death are somewhat different for infants under one year, and children from one to four years. Table 2-4 shows percentage of death by cause for the two age groups, taken from a study of 300 poor and remote counties. This study was sponsored by UNICEF to provide more information about the health status of children in special areas of China with high IMRs, high birth rates, and low per capita income. Approximately a quarter of all child deaths in China occurs in these areas, although the number of the children constitutes about 10 to 15 per cent of the child population in China.

Table 2-4. Percentage of Death By Cause Among Infants Under One Years and Among Children Between One and Four Years of Age, 1989.

Causes of Death	Infants Under one Year	Children One to Five Years Old
Pneumonia	25	25
Diarrhoea	9	22
Accidents/Injuries	6	22
Other Complications	12	14
Other Infections	n.a.	12
Neonatal Complications	33	n.a.
Congenital Defects	7	n.a.
Neonatal Tetanus	9	n.a.

Source: A study of 300 Remote and Poor Counties, 1989.

n.a. not applicable

The main immunizable disease causing deaths among infants is neonatal tetanus. It has been estimated that this condition causes over 98,000 deaths among children in China each year and the number has remained the same since the mid-1980s. Another, immunizable disease leading to death among children is tuberculosis, contributing over 2,000 deaths each year. Together, neonatal tetanus and tuberculosis are responsible for over 100,000 deaths each year. Deaths due to EPI reportable diseases, such as measles, pertussis, diphtheria, and poliomyelitis are very small in comparisons to these two conditions. Table 2-5 shows the total number of reported deaths due to these diseases in China between 1985 and 1993¹⁷. The outbreak of measles in 1985 and of poliomyelitis in 1989 are aptly put under control.

¹⁷ There are some indications that, because of under-reporting, the true number of deaths due to measles, pertussis, diphtheria, and polio may be twice the reported numbers.

Table 2-5. Total Reported Deaths from Four Expanded Programme Immunization (EPI) Related Diseases, 1985 to 1993.

EPI Related Diseases	1985	1987	1989	1992	1993
Measles	2,654	217	355	399	372
Pertussis	237	107	49	18	11
Diphtheria	184	74	58	20	24
Polio	95	41	122	24	26
Total Deaths	3,170	439	584	461	433

Source: Data from the Surveillance System of the Ministry of Health.

Strategies to Reduce Mortality

China's goal for the year 2000, as stated in the World Summit for Children and the National Plan of Action (NPA) is to reduce the mortality rates of infants and children under-five by one third of the rates in 1990. That is, the IMR has to drop from 50 to about 34 per 1,000 live births and the USMR has to drop from 65 to about 43 per 1,000. This level of reduction is not impossible as exemplified by Japan in the late 1950s and early 1960s; however, most developing countries have taken over a decade to achieve this level of decline. There are many ways to attain the goals that China has set for year 2000. This section explores several options that may be cost efficient and practical.

One option would be to focus on the reduction of certain leading causes of death, such as pneumonia and diarrhoeal problems, which are easy to avoid given proper management of the condition and early detection (see the following section on management of morbidity). Table 2-6 presents a scenario in which the overall IMR is reduced by a third when the IMRs associated with different causes of death are reduced by different amounts.

Table 2-6. Option 1: Reduce IMR By Applying Different Rates of Change To Different Cause of Death.

Causes of Death	IMR in Early 1990s	Projected IMR for 2000	Percentage Change
Diarrhoea	5	2	60%
Pneumonia	13	7	46%
Newborn	20	15	25%
Injury and Other	8	6	25%
Congenital	4	4	0%
Total	50	34	33%

Another option is to target population at risk of higher IMR for reduction, thereby reducing the overall IMR in the country and the disparities between different segments of the population. Table 2-7 illustrates a scenario for applying to population subgroups with high,

median, and low IMRs. This example assumes that the high, median and low IMR subgroups represent about 30, 50 and 20 per cent of the population respectively. Under this scenario, both the high and the median IMR groups need to improve to attain the level of reduction required.

Table 2-7. Option 2: Reduce IMR By Targeting At-risk Population.

Population Group	Percentage Population	IMR in Early 1990s	Proposed IMR for 2000	Percentage Change
High IMR	30	70	35	50%
Median IMR	50	50	35	30%
Low IMR	20	20	20	0
Total Deaths	100	50	32	34%

A third option is to combine both options 1 and 2 above and aim at preventing deaths through better managements of diseases and at the same time judiciously balance efforts to reduce mortality among the high risk population and the remainder of the population. There are, of course, many alternatives. The strategies proposed here are intended to stimulate further discussions and explorations.

Causes of Morbidity and Management

This section discusses the causes of morbidity in infants and children in China and proper management of these problems to prevent mortality. The common causes of morbidity discussed include acute respiratory infections (ARI), diarrhoeal disease, immunizable diseases, and low birth weight complications.

Acute Respiratory Infections and Pneumonia

Acute respiratory infections (ARI) are probably the most common childhood illnesses. The main concern with ARI is the development of pneumonia which is responsible for about 1 out of every 4 deaths in the under-five population. The case-fatality rate of pneumonia in China is estimated to be about 3 per cent, almost 10 times higher than that in the United States of American. Although there is no historic data on ARI and pneumonia, there are indications that the incidence of these problems has remained high for at least the past two decades.

Table 2-8 shows the incidence of pneumonia by age in China. In particular, pneumonia is highly prevalent in the neonatal first month of life. The incidence in this one month (146 episodes per 1,000 child per year) is almost equivalent to the incidence in the subsequent eleven months of life in the postneonatal period. Furthermore, 40 per cent or more pneumonia related deaths in the under-five population occur in the neonatal month. Because of the difficulty of diagnosis and treatment during the neonatal period, a concerted effort is needed to identify the factors leading to pneumonia in newborn infants and to develop interventions to prevent its occurrence. Currently, it is felt that practices related to

the care of the newborn such as temperature control, position, swaddling and breastfeeding may be key factors to reducing pneumonia during the first month of life.

Table 2-8. Incidence of Pneumonia in China (Episodes per 1,000 child-year), 1986.

Under 1 Month	Under 1 Year	12-35 Months	All Under 3 Years	All Under 5 Years
146	159	102	123	95

Source: Model Counties Pneumonia Research Project (1986).

Control of ARI. China's main strategy to control ARI and to prevent pneumonia is to train health workers in standard-case management of the problem. Between 1986 and 1988, the feasibility of ARI standard-case management was tested in several counties under the technical supervision of the Capital Institute of Paediatrics. Based on the test results, the first National ARI Control Programme Plan was developed for 1990 to 1992 and ARI standard-case management was introduced on a widespread basis. Currently, ARI control activities are being implemented in over 350 counties with support from UNICEF and United Nations Population Fund, World Health Organization and the World Bank. However, tentative estimates from the Ministry of Health (MOH) is that only about 20 to 25 per cent of children in the under-five population have access to ARI standard-case management. There is still a long way from China's national goal of providing access to 90 per cent of the population by the year 2000. The weaknesses of current management system are discussed below.

1. Need For Early Detection. There is evidence that a significant proportion of pneumonia related deaths in infants and children occurred at home without seeing a health care worker within 24 hours. This indicates that caretakers do not recognize danger signs of pneumonia, nor do they know when to take the child to a health facility. To prevent pneumonia related deaths, there is a real need for developing educational programmes to inform home caretakers and train township hospital staff of the danger signs of pneumonia.

2. Improve management at township hospitals. Currently most township hospitals in remote areas are inadequately equipped to immediately treat pneumonia cases while making a referral to larger hospitals. The MOH estimates that about half of the township hospitals are not well equipped with the appropriate antibiotics and oxygen supply. The supplies of township hospitals need to be reviewed to ensure that they can function as a referral center for severe cases of pneumonia.

Diarrhoeal Diseases

Table 2-9 shows the incidence of diarrhoea in the under-five population in China. The incidence of diarrhoea for the whole under-five population is about two episodes per year. This rate compares favourably with most other countries in East Asia and Pacific region (at about 5 episodes per child per year). Deaths due to diarrhoea are also rare in China, the case fatality rate is estimated to be very low, at 0.02 per 1,000 children per year. The low incidence and fatalities of diarrhoea for children in China can be attributed to improved nutrition in recent years, cultural practices that encourage giving starchy gruels to

children with diarrhoea, the use of oral fluids with some sugar and salt by primary care workers since the 1960s, and the widespread health care network that supported the home case management of diarrhoea. Although diarrhoea is not a prevalent problem in China, it remains a concern in poor and remote areas. As shown earlier, diarrhoea accounted for almost 1 in 4 deaths among young children between one and four years of age in poor remote areas. Therefore these areas should be targeted for improvement and prevention of diarrhoeal problems.

Table 2-9. Incidence of Diarrhoea (Episodes Per Child Per Year) For Children Under-Five Years, 1986.

Under 1 Year	12-23 Months	24-35 Months	36-59 Months	Under 5 years
4.1	3.1	1.5	0.7	2.0

Source: Model Counties Diarrhoea Research Project (1986).

Control of Diarrhoeal Disease (CDD). The national programme for the control of diarrhoeal diseases (CDD) in China is led by the Department of Disease Control under the MOH. The department receives technical support and guidance from the National Diarrhoeal Disease Control Expert Committee and the Chinese Academy of Preventive Medicine (CAPM). A coordination group for CDD was formed to coordinate the involvement of other sectors within the health service system. This group includes the Departments of Disease Control, Hygiene Inspection and Supervision, Medical Administration, Maternal and Child Health (MCH), Drug Administration, Medical Education and the Office of the National Patriotic Health Campaign Committee. The Epidemic Prevention Stations that have been established throughout the country are responsible for leading the local efforts in CDD programme activities.

The main strategy of the national CDD programme is to change the attitudes and practices of communities and families in feeding and hygiene practices including breastfeeding, proper weaning practices, sterilization of infant bottles, use of clean water, use of latrines, hand-washing, proper disposal of babies' stools, and measles immunization. At the same time, efforts are devoted to improve facilities in health care institutions and in promoting effective case management at home.

Home case management of diarrhoeal disease delivers three main messages to the caretakers of children and infants to continue breastfeeding, to continue feeding, and to encourage more fluid intake. People's acceptance of these messages has been studied in a number of small surveys, the results of which are shown in Table 2-10. The message best observed in to continue breastfeeding, however, very few caretakers said they encourage fluid. However, in the surveys, it is not clear whether the thin rice gruel often given to children with diarrhoea is counted as fluid. The results from the study in 12 counties are quite different from the study of provinces, suggesting that the messages of case management may not have reached some segment of the population, or that compliance is lower in some areas.

Table 2-10. Diarrhoea Home Case Management: Percentage Who Followed the Messages.

Location	Continued Breast Feeding	Continued Feeding	More Fluid
Shandong	99	67	24
Fujian	96	93	31
Hunan	97	72	17
Beijing	98	58	14
12 Selected Counties	35	22	41

Source: WHO CDD household surveys by MOH. Data for Shandong and Fujian were taken in 1989. Data for Hunan and Beijing were taken in 1991. Data for 12 county/12 province were taken from the Knowledge, Attitudes and Practices (KAP) survey conducted by the Provincial Health Education Institutes.

There are several weaknesses with the national CDD programme which needs to be addressed before the country can meet the National Plan of Action goal of reducing the incidence of diarrhoea by 25 per cent of the rate in the 1990s.

1. **No CDD programmes in some provinces.** By the end of 1993, the national CDD programme have been adopted by 17 provinces which have developed provincial plans of action. The 17 provinces are: Beijing, Fujian, Gansu, Guangdong, Henan, Hunan, Heilongjiang, Hubei, Jiangsu, Shandong, Yunnan, Sichuan, Xinjiang, Guangxi, Liaoning, Ningxia and Qinghai. The CDD programmes have yet to be established in the remaining 13 provinces of China.

2. **Limited coordination of activities.** At the national level, there is limited coordination among the health service sectors on organizing CDD control activities. This limitation has made it difficult to obtain consistent policy decisions by different line departments, and resulted in duplication of training activities. For example, the MCH system is commissioned to train approximately 320,000 grassroots-level health workers in proper case management of diarrhoeal disease, promotion of oral rehydration therapy and promotion of breastfeeding. At the same time, the Medical Administration system also promotes correct case management through training of personnel in county hospitals and below. The health education institutes mass organizations such as All China Women's Federation and China Association for Science and Technology are all involved in promoting similar preventive measures. While the efforts from the various sources reinforce the messages, there are some redundancy and inefficiencies in their efforts.

3. **Problems with case management.** Current management of diarrhoeal diseases tend to rely heavily on the use of antibiotic and limited use of oral rehydration salt (ORS). One reason for this trend is that although various training activities have taken place, it is still very difficult to change the practices of health care providers, especially when there are economic incentives favouring polypharmacy and the use of intravenous solutions. Another reason is that there is ineffective promotion of ORS as an alternative to antibiotics. There

are some indications that the production of ORS has declined in 1990 as compared to the year before even though the volume of supply is below the potential demand in China. A survey of 65 ORS producers conducted by the MOH in 1992 has indicated that the production of ORS has declined due to a lack of demand. The packaging of ORS has been criticized as inferior because instructions on the ORS packages is inadequate; and sometimes the claims about its effectiveness is wrong. The package sizes of ORS also vary, in spite of the National CDD Programme's recommendation that all packages should be of a standard size.

Immunizable Diseases

China has been successful in providing vaccination coverage for most immunizable diseases. For instance, smallpox was eliminated in China in the early 1960s, almost two decades ahead of the worldwide eradication of this disease. This early success with smallpox has inspired major efforts to bring under control other diseases preventable by vaccination. Currently, the expanded programme of immunization (EPI) covers: measles, pertussis, diphtheria, poliomyelitis, and tuberculosis.

Recently, China has decided to include hepatitis B immunizations in the EPI programme because of a high prevalence of hepatitis B carriers (9.8 per cent) in the population. It has set a target to reach 85 per cent coverage of hepatitis B vaccination in urban areas by 1995 and to gradually expand to rural areas. Unlike the other vaccines which are supplied free from the government¹⁸, families are charged the full cost of the hepatitis B vaccine. Since this programme is relatively new, there is limited data about its availability to the child population.

Control of immunizable diseases. In China, immunization efforts can be considered in two phases (see Table 2-11). An initial phase between 1950 to 1978 during which EPI related diseases underwent dramatic reductions of about 50 to 90 per cent from the rate at the peak outbreak of the disease. After 1978, immunization efforts were intensified through the "planned immunization" programme, China's version of the global EPI initiated by the WHO.

¹⁸ Although the vaccines are free, the cost of the services including needles, the fees for the health care worker administering the vaccine and the cost of the cold chain maintenance are charged to the people.

Table 2-11. Total Incidence of Four Expanded Programme Immunization (EPI) Related Diseases, 1985 to 1993.

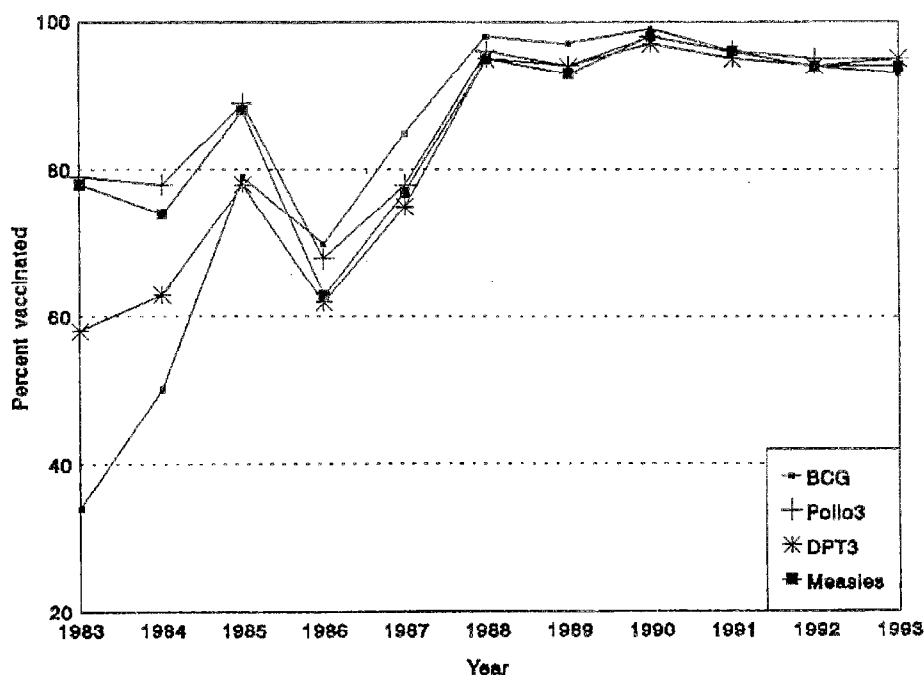
Diseases	Initial Efforts		Efforts Since "Planned Immunization" Programme			
	Peak Year*	1978	1985	1990	1992	1993
Measles	9,444,700	2,372,800	418,200	85,000	139,660	117,851
Pertussis	2,203,300	1,202,900	147,300	19,200	11,096	9,190
Diphtheria	152,100	20,000	1,400	400	143	124
Polio	43,200	10,400	1,500	5,100	1,200	538

Source: Data from the Ministry of Health.

* The peak year for measles, pertussis, diphtheria, and polio were 1959, 1973, 1960 and 1964 respectively.

Vaccination. According to the MOH, vaccination coverage of EPI diseases have increased steadily in the last decade. Figure 2-3 shows the increase in national coverage rate of BCG, DPT3, Polio, and measles from 1983 to 1993. By 1990, over 90 per cent of children under one year of age were reported to have been fully vaccinated. In 1988, every province reached the provincial goal of at least 85 per cent coverage for each vaccine. In 1990, almost all counties reached the county target of providing 85 per cent immunization coverage for children.

Figure 2-3. Vaccination Coverage for Children in China, 1983 to 1993.



Source: Ministry of Health Data on 1983 to 1988, and National Cluster Sample Surveys, data for 1989 to 1993.

Other sources, however, have estimated somewhat lower vaccination coverage than the statistics reported by the MOH. Table 2-12 compares the MOH estimates with preliminary estimates from the 1992 National Survey on the Situation of Children. The estimates from the 1992 Survey showed a substantially lower coverage for the under-one year population. However, when vaccination after the first year is included, the coverage rate for children in urban areas approached the MOH estimates. Currently, careful reviews and comparisons are being conducted to reconcile the difference between the MOH statistics and data from the 1992 survey.

Table 2-12. Percentage of Children Vaccinated in 1991, Data from the Ministry of Health and 1992 National Sample Survey of the Situation of Children.

Vaccines	MOH	1992 Survey of Children					
	Under 1 Year	Under 1 Year			Under 2 years		
	MOH	All	Rural	Urban	All	Rural	Urban
BCG	96	83	81	95	87	85	96
DPT3	95	64	59	87	85	83	96
Polio	96	67	63	88	89	87	96
Measles	96	68	65	86	81	79	93

Source: The Ministry of Health and Preliminary Data from the 1992 National Sample Survey of the Situation of Children.

1. **By urban and rural areas.** In China, vaccination rates are consistently lower in rural areas than in urban areas. Table 2-12 above shows that the rural-urban gap was particularly large among children under 1 year of age, ranging between 14 to 28 per cent. This problem is probably related to the less frequent immunization sessions available in rural areas, such that rural children tend to receive their immunization later. By two years of age, the rural-urban gap is smaller, ranging between 9 and 14 per cent.

2. **By urban and rural areas within provinces.** Table B1 in Annex B shows the vaccination rates by province as reported by the MOH, and Table B2 shows the rates by rural and urban areas within provinces from the 1992 Survey. Provinces with large urban and rural differences include Hebei, Hainan, Guizhou, Shaanxi, and Xinjiang. In these provinces the vaccination rates in the rural areas are much lower than the targeted rate of 85 per cent coverage. However, in other lesser developed areas such as rural Yunnan, Gansu, Qinghai and Ningxia, the vaccination rates approaches the target. This indicates that a moderately high rate of vaccination had been attained in some lesser developed areas in China. The MOH is concerned that there are increasing number of areas with problems of coverage. Factors contributing to poor vaccination in some rural areas include weakening of the rural health care network, especially preventive care at villages, and the increasing mobility of the population. The MOH is raising the problem of the weakening EPI performance with central and provincial governments which is expected to raise the level of government concern and commitment to reach the targeted national goals of coverage.

3. **By unregistered children.** Several studies have found disadvantages for unregistered children most of whom are from parents of the "floating population"¹⁹ and some are higher order births that were not registered. The lack of immunization for these children poses a risk for potential outbreaks of the EPI related diseases that are thought to be under control. Studies about unregistered children is often difficult because of difficulties in locating these people and gaining cooperation. Several small regional studies provide some indications about the magnitude of the under coverage for these children. For example, a study in a county in Shanghai reported substantially lower vaccination rates for a sample of unregistered children as compared to their registered counterpart (see Table 2-13). Another study in a district in Wuhan City found differences in both vaccination rates and parents' willingness for their children to receive the vaccines (see Table 2-14).

Table 2-13. Percentage Vaccinated: A Comparison Between Registered and Unregistered Children.

Population	Sample Size	Measles	DPT3	Polio	BCG
Registered	301	85%	86%	90%	96%
Unregistered	90	52%	54%	58%	72%

Source: Data from Shanghai county in 1988.

Table 2-14. Percentage of Children with Characteristics: A Comparison Between Registered and Unregistered Children.

Characteristics	Registered	Unregistered
Had a Health Booklet with Vaccination Records	100	75
Fully Vaccinated	60	33
Parents Refused Vaccination for Child	7	23

Source: Data from a district in Wuhan City, 1991-1992.

4. **By gender.** There have been some concerns about the differential rate of coverage for boys and girls in China, however the evidence is rather inconclusive. For the country as a whole, no significant gender difference is found. At some provinces such as Guangdong, Jiangxi or Shaanxi, there are some indication that the vaccination rates for girls are lower.

Immunization Services in China. Since the "planned immunization" programme in 1978, certain provinces, cities and autonomous regions have developed immunization services by establishing an immunization card system and simple facilities for cold storage and transportation of vaccine. Currently, immunizations are provided routinely in most areas on

¹⁹ As discussed in Chapter 1, the "floating population" are mainly migrants from poor rural areas seeking employment in the more rapidly developing areas.

a monthly, bi-monthly or quarterly basis. Weekly sessions are offered in cities and large urban areas. Many provinces provide immunization from fixed facilities at villages. Some provinces provide immunization only by township staff, either at the township hospital or village facilities. Mobile immunization teams are organized two to three times a year for remote, sparsely populated areas where transportation is difficult. In 1988, about 10 per cent of the population was covered by mobile teams.

China produces all EPI vaccines and is self-sufficient in terms of routine immunization needs. Some oral polio vaccine (OPV) is imported for supplementary immunization activities in relation to polio eradication efforts. By the end of 1990, most counties and urban districts (almost 90 per cent) in China were equipped with a cold chain infrastructure, including refrigerators and freezers for storage of vaccines; and many (about 70 per cent) were equipped with facilities for vaccine transportation, such as cold boxes and vaccine carriers.

Although China has been successful in providing immunization to the child population, several challenges remain. Of particular concern is that there has been substantial changes in the administration and financing of the immunization services in recent years, which may have occurred as a side effect of the current process of economic reforms.

1. Decentralization. Since the 1980s, EPI activities have been initiated by the Ministry of Health (MOH). In 1982, the MOH established the "Rules and Regulations of the National Programme of Immunization". They developed a "Workplan of Action for the National Programme on Immunization, 1982-1990" and "Rules governing the evaluation and assessment of the National Programme on Immunization". These documents, which were modified in 1985, specified EPI goals and established its structure, contents, methods of health education, and procedures for immunization, supervision, monitoring and evaluation. Based on the national and provincial guidelines, each local area at the township level is responsible to prepare an annual plan of action to achieve EPI targets. This decentralized planning and management system places responsibility for achieving targets on lower and smaller administrative units. While this system allows flexibility in modifying policy guidelines to fit local conditions, it also necessitates supportive management at upper levels to ensure that minimum standards are maintained throughout the programme.

2. Financial Problems. The financing of immunization services is also a problem in some areas because the proportions of EPI funds provided by the government and funds from cost-sharing mechanisms vary with the relative wealth of an area. In general, the provincial governments allocate the funds necessary for the purchase of vaccine and for the distribution of vaccine to the prefecture and county levels. Usually the county governments are responsible for distributing vaccine to the lower administrative units. Both county and township governments provide funds for supplies such as syringes and needles as well as other operational costs. In most areas the families are charged to cover the cost of immunization.

The "EPI insurance" system is a common way of financing immunization services in some areas. In this system, the families pay a lump sum at the time of birth and are guaranteed immunization services, often up to seven years of age. If the child contracts one of the EPI target diseases some kind of compensation is given to the family. This system co-exists with the fee-for-service system. The main use of the income is to compensate

village doctors and township health workers for their EPI work, although some of the funds may be used to cover part of the operational cost of the services.

Areas that are economically underdeveloped are less able to share the cost of immunization with the local population. As a result, these areas have fewer resources available for EPI services. As a general rule, EPI services are available to families too poor to pay through a system of "community financing". In some instances, however, "community financing" may also be a financial barrier to EPI services. The barrier is often not in the refusal of services but in less active notification of services to those not able, or willing, to pay.

The financing of immunization services needs careful review as the country progresses along the current process of economic reform. The current system of cost-sharing have created disparities in the availability of the EPI services.

3. Improper practices. In many areas of the country, the same syringe was used on several children, without boiling or sterilizing between use. This situation, which is occurring in spite of the MOH's one-needle-one-syringe policy, is mainly due to the financial constraints faced by the local governments. To solve this problem, there should be stricter reinforcement of the MOH policy and financial assistance to the local government.

4. Cold chain system needs updating. A concern of the EPI programme in China is the aging of the cold chain system for vaccine storage. Most of the cold chain in China was established in the mid-1980s. Currently, the repair network has been expanded to every province and training courses are offered to repair technicians. There is, however, a real need to replace some of the equipment in the near future. The government is currently negotiating a World Bank loan which would replace the cold chain in 8 to 10 poor provinces between 1996 and 2000. Other provinces, however, have yet to make concrete plans to finance the updating of the cold chain.

Poliomyelitis eradication. Poliomyelitis has received special attention recently because it is a disease targeted for eradication in China and in the Western Pacific area by 1995, and yet there was an recent outbreak of poliomyelitis in China in 1989 and 1990 during which about 4,000 to 5,000 incidence were reported per year. It was speculated that a contributing factor to the recent outbreak was the presence of pockets of unimmunized children, mainly among the unregistered children in the population. Rigorous measures has been taken to ensure total eradication since the outbreak. By 1993, the number of reported cases of poliomyelitis has dropped to 538 cases, the lowest number on record.

China's strategy in eradicating poliomyelitis in children is to provide routine EPI services, supplementary oral polio vaccines (OPV) especially during special immunization campaigns in the winter, and active surveillance of acute flaccid paralysis (AFP). In 1991, one million children were vaccinated during provincial vaccination days in six provinces. In 1992, 25 provinces had provincial vaccination days and a total of 186 million children were reported to have received OPV. In 1993, the State Council announced National Immunization Days for OPV to be held in the winters of the following two years. In the winter of 1993-1994, it was estimated that over 80 million children under 4 years of age received a supplementary dose of OPV. In the following winter, the number was report to

be 100 million. During this campaign, the inoculation were free and vaccine-takers were registered by number rather than name to ensure that all children are brought in for vaccination irrespective of their registration status²⁰.

For careful surveillance, all cases of acute flaccid paralysis (AFP), a syndrome including poliomyelitis, are to be reported and investigated. The AFP reporting system has been refined, and a recent report showed improved level of reporting and detecting of poliomyelitis. According to a MOH report²¹, the AFP rate for children under-five years has increased from 0.8 non-polio AFP per 100,000 children in 1993 to 0.93 AFP per 100,000 in the first nine months of 1994 and has been 2.1 in the 4 months after the high-level national surveillance meeting.

A weakness in the current surveillance system is that the percentage of AFP cases with at least one stool sample from patients was still low at 64 per cent in mid-1994. As China approaches eradication of poliomyelitis among children, it needs to establish laboratory networks that can isolate polio virus and analyze stool samples for the positive identification of the disease.

Neonatal Tetanus: Leading cause of immunizable disease. Neonatal tetanus is an immunizable disease that can be prevented through immunization of pregnant women and clean delivery methods. However, it is not an EPI reportable disease. Instead, it is reported through the infectious disease system only in selected surveillance points. The Maternal and Children Health Department also reports neonatal tetanus, although this system picks up only a fraction of the actual cases. Currently, reliable data on the incidence of neonatal tetanus comes primarily from sample surveys. As mentioned before, neonatal tetanus accounts for about 98 per cent of deaths from immunizable diseases nationally. The annual number of deaths due to this problem is estimated to be over 98,000 cases. In recent years several national surveys have found that the mortality rate due to neonatal tetanus deaths may range from 1 to over 4 per 1,000 live births. Because of the high case fatality rate of this disease, the actual incidence rate is probably very close to the mortality rate.

Some studies have reported higher mortality due to neonatal tetanus in poor and remote areas of the country than other areas. Data from a survey in 300 remote counties in 1989 found that neonatal tetanus accounted for 6 deaths per 1,000 live births. Poor counties in Hainan and Guizhou had an average mortality rate higher than 17 per 1,000 live births. These rates are much higher than expected.

Several reasons may account for the high incidence of neonatal tetanus reported in recent surveys. Neonatal tetanus is known to be under-reported around the world, thus only when specifically asked for (as in the recent surveys) is the actual extent of the problem identified. On the other hand, there may actually have been an increase in the number of neonatal tetanus in the past 5 to 10 years. Incidence of neonatal tetanus may have increased due to the disruption in village primary health care services brought about by economic

²⁰ South China Morning Post, January 6, 1995.

²¹ MOH Presentation at WHO, Western Pacific Region, Technical Activities Group Meeting, October 1994, Beijing.

reforms, especially in the high risk poor and remote areas. The increase may have been the result of a lack of clean delivery services for the increasingly large migrant ("floating") and unregistered population. This factor may also explain about the very low levels of neonatal tetanus mortality among the population covered by disease surveillance points.

The two approaches used to counter neonatal tetanus are the use of clean delivery methods, and tetanus toxoid (TT) vaccination of the mother. Many experts in the field of obstetrics, mother-child health, and epidemic prevention in China, still believe that increasing the rate of clean deliveries is sufficient for the elimination of neonatal tetanus. However, a more certain approach is vaccinations using tetanus toxoid. TT Vaccination has been included in the national plan of action to eliminate neonatal tetanus. However, the immunization of childbearing age women has been introduced only on a pilot basis, primarily in the UNICEF/UNFPA supported Maternal and Child Health project counties. The immunization has not been widely accepted because health workers, the target women, and their families have yet to understand the need for vaccination. TT coverage is low even in the pilot areas. In 1993, the MOH drafted a national plan of action in China for the elimination of neonatal tetanus which included provisions of TT vaccination for childbearing age women, starting in high risk areas. The implementation of this plan still requires concerted efforts.

Low Birth Weight Complications

Infants with a low birth weight (LBW) at birth is a major contributing factor to early childhood mortality, morbidity, and disability. LBW infants, by definition, are infants whose body weight are lower than 2,500 grams at birth. Some LBW infants are premature but others are born at full term and are small for their gestational age (SGA). The estimated incidence of LBW from the MOH is about 9 per cent in early 1990s. This estimate compare favourably with the rate for developed countries at 6 percent, and most developing countries in Asia at 20 per cent. The relative low incidence of LBW infants in China, as a whole, may be attributed to the following factors: fewer teenage pregnancies, fewer multiple pregnancies, pregnant women rarely smoking, less hypertensive disorders among women, improved diets in recent years, and possibly lower rates of congenital defects.

By provinces. There are large variations in LBW prevalence between provinces. In a Birth Defect Surveillance Study in the early 1990s, the prevalence of LBW was lowest in Beijing (5 per cent) and highest in Qinghai (10 per cent) and Tibet (13 per cent). These higher rates are possibly due to the effect of high-altitudes, as well as the poorer nutritional and health status of mothers in these provinces. Hospital and county-level data from Shanghai around 1980 showed that between 3 and 6 per cent of newborns in the municipality were LBW infants. This rate is lower than that found in developed countries.

By rural and urban areas. There are some indications that the incidence of LBW infants are higher in rural areas than in urban areas. However, the magnitude of the difference may be underestimated by most surveys because of the problem of nonresponse. According to preliminary data from the 1992 National Sample Survey of the Situation of Children, the rates of LBW, among infants with known birth weight, are 6 per cent in urban areas, and 13 per cent in rural areas. However, over half of the newborns sampled in the survey did not have known body weights at birth. These newborns tend to be home

deliveries and may be at a higher risk of LBW than infants delivered at hospitals. According to this survey, over 70 per cent of births in the rural areas occurred at home; in urban areas the percentage is 7 per cent. In view of these data problems, one can only speculate that the incidence of LBW infants in rural areas is at least twice that of the urban rate.

By infant maturity. The incidence of LBW is much higher among premature infants than full-term infants. A Birth Defect Surveillance Study have found that about 5 per cent of the newborn infants in China are premature (i.e. less than 37 weeks of gestation), of whom, about 55 per cent is LBW. A study on hospital births in cities of Northern China also found that about 3 per cent of the hospital births is premature, of whom, 73 per cent of the is LBW.

By maternal characteristics. Maternal characteristics, such as education, age, health and nutritional status, and smoking habits, are expected to influence the birth weights of infants. For instance, the Birth Defect Surveillance Study have found that the incidence of LBW births is 11 per cent for infants of illiterate mothers, 9 per cent for infants of mothers with primary schooling, 6 per cent for infants of mothers with secondary schooling, and 4 per cent for infants of mothers with college level education.

A study in eight cities in Northern China have found that LBW complications in infants are associated with a number of maternal characteristics. There is a classic U-shape relationship between maternal age and birth weight, that newborns of the very young and the very old mothers are more prompt to LBW complications. Maternal characteristic associated with LBW complications in infants include: mother's height, nutrition problems, involvement in heavy manual work, exposure to radiations or fluorescent screens, external injury and sexual activities during the third trimester. SGA complications among full-term infants are more frequent in women with uterine malformation, placenta previa, heart disease, pregnancy induced hypertension, and women who had poor appetite for fat or protein food during pregnancy. Good antenatal care is negatively associated with LBW, that the earlier the first antenatal check-up, the greater the birth weight.

Although smoking among pregnant women is relatively uncommon in China, a prospective study of 3,069 pregnant women has shown that smoking may induce prematurity, low birth weight and small for size babies. One estimate suggests that the number of premature deaths in China attributable to smoking is currently about 100,000 per year²². It has been speculated that, unless advertisement for cigarettes is curbed and a vigorous anti-smoking campaign is launched, the number of smoking related infant deaths will increase to some 2 million by the year 2025. As of January 1 of 1995, the Government has curbed cigarette smoking in China.

In summary, the health of children and infants has improved in China since liberation in 1949. There have been major achievements in reducing mortality, curtailing immunizable diseases, and controlling morbidity. China's accomplishments in the issue of health have been viewed by the rest of the world as important examples of what can be done in countries with limited resources. However, recent changes in the economy (see Chapter 1) and health

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New China News Agency, 27 April 1993.

care financing have resulted in disparities in the availability of health care services in different parts of the country. There are also the concern of a re-emergence of some health problems that were thought to be under control. As the country looks forward to the year 2000, China recognizes that it still has many problems to solve in order to improve the health status of children and infants.