



## Child Health and Nutrition: Getting better and facing new challenges in China

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### VIEW POINT

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### Abstract

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#### Background

Child healthcare practices in China over the last 60 years have extensively improved children's health and growth, yet new challenges lie ahead. This review aims to summarise the successful experiences and the newly identified problems in child healthcare in China.

#### Method

Information, available to the public, was obtained from Chinese databases and Chinese Government websites, chiefly the Chinese National Knowledge Infrastructure database, the Chinese Biomedical Literature database, the Ministry of Health website and the National Working Committee on Children and Women website.

#### Results

During its poverty-stricken 1950s–1970s, China protected children's health mainly through prevention and control of common infectious diseases and severe malnutrition within a comprehensive healthcare system. After the subsequent 30 years of rapid socio-economic development, China has achieved great success in reducing childhood mortality rates and promoting child growth, meeting the Millennium

Development Goal 4 targets and the WHO child growth standards. Meanwhile, new challenges for children's healthcare emerged, including: large disparities in the health, growth and nutritional status of children, and in the accessibility and quality of child healthcare, between urban and rural areas and across different regions of China; the nutritional and healthcare concerns of the fast-expanding population of migrant children and rural left-behind children; the burgeoning epidemic of childhood obesity in urban and economically developed areas; micronutrient deficiencies such as calcium, iron, zinc and vitamin A; and increasing prevalence of mental and behavioural disorders.

#### Conclusion

Under poor economic conditions, healthcare plays a key role in protecting children against diseases. With the development of social economy, new challenges present to healthcare services, specifically, to comprehensively promote and optimise children's health and nutrition.

#### Key Words

Child Health, nutrition, China, health inequality, micronutrient deficiency, childhood obesity, migrant workers

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#### Introduction

Children represent the hope and future of the world. Nutrition to a child means not only health, but also growth and development. A main purpose for child healthcare is the promotion of child nutrition and health protection/promotion. China's economic development and child healthcare practices during and beyond the second half of the 20th century illustrate that both economic condition and healthcare service contribute a great deal to



ensuring children's health and nutrition. In this review, some of the successful experiences are generalized, newly emerged problems and their causes are analyzed and some suggestions for solutions are given.

### **Successful experiences in child healthcare**

It is generally recognized that the development of child healthcare is inseparable from political, economic, and cultural development. China went through two distinct development phases since the founding of the People's Republic of China in 1949: the era of planned economy society (1950s–1970s) and the era of reform and opening-up commercial society (1980s–present). Although great differences exist between the two eras with regards to socioeconomic conditions and healthcare service competency, excellent works were done at both times.

### **Prioritisation of protection of children from infectious diseases and deficiency diseases**

In the first era, minimally trained health personnel (village medical practitioners or 'barefoot doctors') were used to provide basic health services at the grass-roots level.<sup>1</sup> Professional child healthcare services were only provided in dedicated maternal and child healthcare centres, children's hospitals, and women and children's hospitals were established at or above the county level.<sup>2</sup> Then national health policies emphasized prevention and public health, widened entitlement and access to medical care<sup>2</sup>. To "serve the workers, peasants and soldiers; put prevention first; combine traditional Chinese medicine with Western medicine; integrate health work with the mass movement" were the fundamental principles of healthcare. Fighting against common infectious diseases and deficiency diseases, two important threats to Chinese children's health in the first era, was top priority for child healthcare and remarkable achievements were made. Take infectious disease prevention and control as example, smallpox was wiped out throughout China in 1961, 19 years earlier than the World Health Organization (WHO) announced that smallpox had been eradicated globally.<sup>3</sup> The Chinese government promoted childhood immunization campaigns against measles, poliomyelitis, tuberculosis, pertussis,

diphtheria and tetanus from 1965, and all the six diseases had been brought under effective control and morbidity rates were decreased by more than half. The average annual incidence of measles dropped from 590.6/100,000 during 1950-1965 to 249.0/100,000 in 1978, the annual number of polio victims reduced from 20,000-43,000 in the early 1960s to below 10,000 in the late 1970s.<sup>4</sup> The Patriotic Health Campaign, a particular feature of China's health work, mobilizing the people to improve environmental sanitation and to increase the health knowledge and self-care ability, has contributed tremendously to the prevention and control of infectious diseases<sup>5</sup>. In combating deficiency diseases (protein-energy malnutrition, anaemia, goitre, xerophthalmia, rickets, beriberi, scurvy), socio-economic measures such as state monopoly for purchasing and marketing grain, moderate refining of grain and quota-based food rationing system<sup>6</sup> implemented nationally during food shortages throughout the first era, played more important roles than individual nutrient supplement interventions.

### **To control childhood illness by programme-driven high quality healthcare services**

In the second era, China has kept one of the world's fastest growing economies and has established a sound legal regime to protect and promote the health of children.<sup>7</sup> These enabled China to increase input to, and expand the coverage of, healthcare services for children. The distribution of child healthcare service departments has been expanded from counties to townships and villages in rural areas and from city districts to communities in urban areas. The healthcare coverage of children below 3 years old increased from 46.3% in 1990 to 73.8% in 2000 and 77.2% in 2009.<sup>8,9</sup> The Ministry of Health of the People's Republic of China and the maternal and child healthcare institutions at the provincial and the municipal level regularly provide professional training and strive to promote vertical and horizontal technology transfer to raise the professional competence of child healthcare workers. More and more specialized doctors and general practitioners have been encouraged to specialise in child healthcare to alleviate the shortage of highly qualified child



healthcare personnel. A series of national and international cooperation programmes, aiming at controlling the morbidity and mortality of children from common or frequently-occurring childhood illnesses, have also been implemented. For example, the Chinese government has conducted neonatal disease screening nationwide<sup>10</sup> and rolled out neonatal resuscitation programmes in middle and western regions, in cooperation with the Johnson & Johnson Paediatric Institute.<sup>11</sup> This has implemented the integrated management of childhood illness programme advocated by the WHO<sup>12</sup>, resulted in extensive prenatal screening and early intervention for congenital disorders in the economically developed provinces and municipalities. The resultant effect has been to reduce the number of children born with serious malformations and genetic diseases<sup>13</sup>. Thanks to all these efforts, the mortality rate of children below 5 years old, which is an important internationally recognized quality indicator for assessing a country's child healthcare system, dropped from 300‰ in 1950 to 39.7‰ in 2000 and further to 17.2‰ in 2009.<sup>2,9</sup>

#### **To eliminate malnutrition and promote children's growth and development with the progress of social economy**

According to the WHO, malnutrition contributes to more than half of the mortality rate in children under five years old throughout the developing world.<sup>14</sup> The associated effects of poverty, inadequate household access to food, inadequate breastfeeding and poor complementary feeding practices often lead to illness, faltering growth, delayed development, and death, particularly during the first two years of life. The successful agricultural and economic reforms in China since the late 1970s have led to a significant reduction in the number of people living under the poverty line (the poverty rate fell from 53% in 1981 to 2.5% in 2005).<sup>15</sup> The sustainable food security system provided stable food pricing and food provisions to allow the nation's 1.3 billion population access to the food items essential for health. Increased average family income enables parents to provide a variety of supplementary food for their infants. In such conditions, various programmes and activities for improving children's growth and health

status have been implemented by the Chinese government. To cite a few examples, by promoting breast-feeding in the whole country in response to the proposals of the WHO and the United Nations Children's Fund (UNICEF), the breast-feeding rate in rural and urban areas of China in 2002 reached to 74.6% and 66.4%, respectively.<sup>16</sup> The National School Milk Program (2000), the National School Lunch Program (2001), Chinese Food and Nutrition Development Outline (2001), and the National Plan of Action for Nutrition in China (1997) were all developed and put into effect one after the other.<sup>17</sup> Investigations show that the nutritional status of Chinese children has gradually improved significantly over the last 30 years, i.e. during the second era. On one hand, the prevalence of moderate and severe malnutrition in children below 5 years old was decreased by about 70% between 1990 and 2006. Meanwhile, the improvements in nutritional status resulted in a general acceleration of growth and development of children. Survey data on children under 5 years shows a steady increase of body weight and height over a period of 20 years between 1985 and 2005. The average body weight and body height, the two important markers of physical development, had reached or exceeded the standards set by the WHO. In the urban population, for instance, average body weight reached 19.9kg for boys and 18.9kg for girls at the age of 5 years, and body height rose to 113.1cm for boys and 111.7cm for girls. Peers from rural areas showed an average increase of body weight of 2.5kg for boys and 2.4kg for girls, while body height increased by 7.6cm in boys and 7.5cm in girls over the respective period of time.

#### **Newly emerged problems, the causes and solution suggestions**

In spite of the remarkable achievements in improving child nutrition and health, the development of healthcare for children in China, a populous developing country, is far from satisfactory, many difficult issues and new challenges lie ahead.

#### **Inequalities in health and access to healthcare**

Although China has made great progress in improving child health and nutrition since the economic reforms in 1978,



the improvement has not been evenly distributed, that is, the benefits of reform in rural areas lag behind urban counterparts. Rural children have always been nourished and grown less well than urban children.<sup>18</sup> Considerable gaps between urban and rural areas, and between different regions, remain with respect to accessibility and quality of child healthcare. Some gaps even appear to have broadened over time. For example, while the overall prevalence of children being stunted and underweight decreased to 9.9% and 5.9%, respectively, in 2006, the prevalence of stunting of rural children is 5.3 times higher than that of urban children and the prevalence of underweight children in rural areas is 4.6 times higher than that in urban areas. Simultaneously, the prevalence of malnutrition in the underdeveloped middle and western areas of China is significantly higher than the prevalence in the developed eastern area.<sup>19</sup> Although malnutrition occurs primarily due to inadequate dietary intake, which is rooted in low socioeconomic status and poverty, new surveys suggest that in some rural and underdeveloped regions, the high rates of malnutrition among children mainly originate from a lack of knowledge regarding a healthy diet rather than from an actual shortage of food, in peasant families escaping poverty.<sup>20</sup> Clearly, culturally specific programmes should be implemented to address the constellation of socioeconomic, agricultural, and environmental factors that account for the regional difference in child growth.

Research shows that the growth faltering of rural infants and children usually takes place after 4 months of age owing to poor complementary feeding practices.<sup>21</sup> The problematic feeding practices identified were the late introduction and the poor quality of complementary foods, with thin rice porridge being the main complementary food.<sup>22-24</sup> Thus alongside health services needing development in the rural areas, improved complementary feeding interventions after 4–6 months are needed to close the growth and health gaps.

Other nutritional factors to blame for the growth retardation in rural Chinese children are vitamin A, vitamin D, iron, zinc and calcium deficiency. Mild clinical cases of rickets are still common in the northern regions of China,

particularly in infants during the first 12 months of life, due to lack of sunshine.<sup>18</sup> Eleven percent of rural preschool children still suffer from vitamin A deficiency and 49.6% subclinical vitamin A deficiency, while only 3.0% and 29.0% of their urban counterparts are affected, respectively<sup>25</sup>. The incidence of iron-deficiency anaemia, ignoring marginal iron deficiency, in rural children between 7 months and 7 years is 12.3% according to a survey data from 16 provinces and autonomous regions, much higher than the incidence of 5.6% in urban children.<sup>26</sup> Promoting iron-fortified foods and vitamin A supplementation along with other measures such as health education in remote underdeveloped regions could be effective in reducing the incidences of iron and vitamin A deficiency and, as a result of this, contribute to fighting infectious diseases among children.

Calcium deficiency is a common problem in Chinese citizens. The 4th National Nutrition and Health Survey in 2002 revealed a low average intake of calcium among the Chinese population, who only achieve 20-60% of the recommended adequate intake (AI).<sup>18</sup> Although the calcium intake of urban residents was higher than those of rural residents, less than 5% of the population reached an AI. In particular the adolescents had a low intake, only 1.1-1.7% adolescents aged 11-13 years reached an AI for calcium. Worse still, the main sources of calcium were vegetables, beans and bean products, wheat and rice, which provided 35.2%, 13.9%, 11.2% and 9.1% calcium respectively. Only 4.3% calcium came from dairy products.<sup>27</sup> Although frank calcium deficiency is uncommon, dietary intakes of the nutrient below recommended levels may have health consequences in the long term. So, calcium deficiency has grown as a general concern among Chinese residents, who spend several billions Renminbi Yuan per year on calcium supplements. Increasing the consumption of milk and dairy products, the best sources of dietary calcium, would be a cheaper and healthier alternative for Chinese population, especially for the children, to increase their calcium intake. In recent years, zinc deficiency as part of a micronutrient deficiency has been suspected in a wide range of clinical situations, reflecting an oversight in child healthcare. A wide range of studies reported the effect of zinc on the physical,



mental, behavioural and immunological development of children, including the influences on cerebral development.<sup>28</sup> From the National Nutrition and Health Survey in 2002 it has been estimated that 14.0% of rural children aged 7-10 years were at risk of inadequate zinc intake. Some other studies using serum zinc as the biomarker found that 0-6 year-old rural toddlers were the most vulnerable group for zinc deficiency with prevalence of over 40%.<sup>29,30</sup> Rice is a staple food in the traditional Chinese diet and is usually consumed with vegetables and a small amount of animal-derived food. Although the dietary pattern has changed for urban inhabitants, who consume more and more animal-source food in their daily diet, the change was not obvious in some rural areas.<sup>24, 31</sup> Low consumption of animal-source food and the poor quality of complementary foods for children in some rural areas in China has made zinc deficiency a problem and its role cannot be overlooked in child healthcare.

The nutrition of a child is based on daily family life, thus effect of the parents' education dominates the impact of the quality of healthcare services. Several studies indicate that various nutrition improvement measures for children are less effective in rural than in urban areas.<sup>21, 24, 32</sup> Even when farmers have easy access to high-quality healthcare services for their children, it remains a challenging task to popularize such notions as "scientific infant feeding" and "rational diet" among farmers and to implement them daily family life, to ensure healthy growth and development of their children. Combining health education with the Patriotic Health Campaign which emphasizes the integration of public education and social participation may help improve farmers' scientific awareness.

Another unsolved issue of inequality is access to high-quality child healthcare services for rural children.<sup>33</sup> Encouragingly, China has taken measures to improve the quality of rural health services under the philosophy of urban-rural harmonious development. Investment in rural health has increased, mainly spent in rural medical service infrastructure construction and rural health practitioner training. Since 2005, a "Ten thousand city doctors going to the countryside to support rural health services"

programme has been carried out in the middle and western regions, urging doctors from second-tier hospitals to all the county and township hospitals of the 43 poorest counties to help improve health services.<sup>34</sup> The new medical reform plan issued by the Chinese Ministry of Public Health in 2009 stipulates that each third-tier hospital in urban areas must aid three county-level hospitals in rural areas.<sup>7</sup>

#### **Inadequate iodine intake**

Iodine deficiency in China has been controlled by the mandatory nationwide use of iodized salt in late 1994. The prevalence of goitre in children aged 8–10 years decreased from 20.4% in 1995 to 5.0% in 2005<sup>35</sup>. The current problem is that children in some regions have high concentrations of urinary iodine. Data from the first three nationwide surveys of Iodine Deficiency Disorders (IDD) indicated that the median urinary iodine excretion — a surrogate measure for iodine intake — increased from 165µg/l in 1995 to 330µg/l in 1997 and 306µg/l in 1999 amongst 8-10 years old children.<sup>35</sup> According to WHO and UNICEF guidelines, average levels of iodine intake are deemed excessive when median urinary iodine excretion >300µg/l. In 2000, The Ministry of Health of the People's Republic of China changed the quality standards of the iodized salt from no more than 60 (40±20)mg iodine/kg salt to no more than 50 (35±15)mg/kg.<sup>35</sup> The subsequent two national surveys of IDD showed that the median urinary iodine excretion in children of 8-10 years old stabilized at 241µg/l in 2002 and 246µg/l in 2005,<sup>35</sup> but still indicate a more than adequate iodine intake (median urinary iodine excretion, 200-299µg/l). More-than-adequate and excessive levels of iodine intake are not beneficial and can produce other thyroid diseases.<sup>36</sup> Salt consumption among Chinese residents is higher (10.7g per day) than WHO and Chinese Nutrition Society recommendations (6g per day).<sup>37</sup> Therefore, the present national quality specifications of iodine-fortified salt, 35(±15)mg/kg, should be further revised to ensure adequate, but not excessive, iodine intake (median urinary iodine excretion, 100-199 µg/l) and optimal iodine nutrition for children. It may be necessary to formulate specific iodized salt standards for different provinces, autonomous



regions, municipalities and/or different zones to tailor iodine supplementation to the particular region.

#### **Mental and behavioural disorder**

During the past decade, children's mental health became a major concern of the Chinese healthcare service. According to a news release by Chinese Medical Association in 2010,<sup>38</sup> at least 30 million Chinese children under 17 years of age (340 million in total) are suffering from mental and behavioural disorders such as generalized anxiety disorder, attention-deficit/ hyperactivity disorder, autistic disorder, conduct disorder and obsessive-compulsive disorder. These mental and behavioural disorders are detrimental to the growth and development of children. However, few Chinese schools have established psychology courses to help affected children, and there are currently only 120,000 qualified psychiatrists and a further 19,130 psychiatric doctors throughout the country who can offer psychiatric care and counselling. It is estimated that more than 600,000 additional psychiatrists are needed to build a skilled professional workforce that is adequate for all of the 1.3 billion Chinese people.<sup>39</sup>

Several nutritional factors can influence mental health, including: total energy intake, alcohol intake, nutritional status of vitamins, minerals and the energy-containing nutrients (proteins, carbohydrates, and fats). Usually, deficiencies of multiple nutrients rather than a single nutrient are responsible for changes in brain function. Ignorance, poor dietary habits, irrational feeding habits, imbalanced diet and poverty contribute to multiple nutritional deficiencies. On the basis of accumulating scientific evidence, nutritional supplementation may be an effective intervention for controlling and, to some extent, preventing mental disorders. This would be an appealing practical measure for Chinese children and their parents who were unaccustomed to or unable to access psychological counselling or interventions.

#### **Childhood obesity**

Childhood obesity has evolved into a major public health problem in China over the past 20 years, the prevalence of obesity among children of 0-7 years steadily increased from

0.9% in 1986 to 2.0% in 1996 and 7.2% in 2006.<sup>40,41</sup> In addition, the prevalence of overweight children increased from 4.2% in 1996 to 19.8% in 2006. The same is true for children in other age ranges. According to the 2009 Chinese Child Nutrition and Health Report conducted by the Chinese Association for Student Nutrition and Health Promotion, 12 million Chinese children within the 7-17 age bracket are either overweight or obese, accounting for one-thirteenth of the world's overweight and obese children.<sup>42</sup> The increased rate of childhood obesity is related in part to the rapid economic growth in China, as it has happened predominately in the urban and economically developed metropolitan areas. Improper diet is the major cause. Intake of energy from animal sources among Chinese people living in urban areas has increased from 8% to 25% between 1982 and 2002, and the average intake of dietary fat has risen from 25% to 35% of total energy<sup>18</sup> (above the recommended 30%). Lack of knowledge about health and nutrition contributes to the problem. Many parents serve their only child whatever he or she wants to eat and rampant snacking worsens the situation. Increased energy intake is compounded by decreasing physical activity, especially among children who spend vast amounts of time in front of a computer or TV set after spending long hours completing their homework. The 2009 Chinese Child Nutrition and Health Report highlights that 64% of primary- and middle-school students do not get enough exercise. Taking control of childhood obesity becomes an important long-term task and challenge for Chinese child healthcare. Without proper and timely intervention, the rate of obesity for Chinese children may quickly catch up with the rates for Europe and America. Treating childhood obesity is extremely difficult, the control strategy lies in prevention and the key to this is education and lifestyle intervention. The Chinese government has taken concrete actions to address the epidemic of childhood obesity. For example, the Ministry of Education stipulated that schools should ensure at least one hour of physical exercise per day, and the Chinese Centre for Disease Control and Prevention released a guide to healthy eating for children and their parents in early 2008. Ultimately though, responsibility must lie with



individual families. Encouraging proper balanced meals at home and discouraging sedentary lifestyles will set a good example to children who lack self control.

### **Lack of healthcare for migrant children and left-behind children**

China's development offers tremendous opportunities to labourers from its countryside. Massive rural-to-urban migration is currently taking place in China. According to the information from the State Population and Family Planning Commission, there were 201 million and 211 million migrants in the country in 2008 and 2009, respectively.<sup>43</sup> Rural migrant workers lead to the emergence of two special groups of children: migrant children and left-behind children. The number of migrant children is about 14 million and half of them are aged 6-14,<sup>44, 45</sup> the age for compulsory education. Migrant children are vulnerable to health-related risks because they lack access to quality education and healthcare compared to local children in cities. They often live in poverty-stricken communities that are unsanitary and overcrowded, their nutrition and growth status are not as good as the local urban children, even after they have resided in the city for several years. Situations were even worse for the rural left-behind children. A report released by the All-China Women's Federation in 2009 reveals that China now has more than 58 million rural left-behind children aged 14 or below, almost triple the figure of 22.9 million in 2006.<sup>46</sup> Left-behind children are more likely to be infants or younger children, concentrated in the 0-5 age group, especially those who are left by both parents.<sup>47</sup> It has been found that left-behind children have an inferior health status compared to peers who enjoy full family care. The left-behind children have a lower dietary diversity and have a higher prevalence of growth-stunting and anaemia than control peers.<sup>48</sup> Besides poor nutrition, unhealthy personality developments, poor school performances, moral crises and behavioural problems are reported in left-behind children.<sup>49</sup> The left-behind children issue has aroused the attention of the Chinese government. Laws and regulations aimed at protecting the legitimate rights and interests of left-behind

children are being developed, some local governments have provided a left-behind children allowance for their living expenses and medical care. Both the family and school, as the main caregivers, have a key role in tackling this problem. Parental supervision and emotional support has an irreplaceable role in ensuring the healthy growth and development of children, the childcare obligations of parents should be fulfilled to the maximum extent possible, while psychology courses and psychological teachers should be introduced in schools.

With the progress of society and economy, new threats to children's health and nutrition continuously arise in China, such as environmental pollution, food contamination, vaccine safety and new infectious diseases. Therefore, new research to identify such problems and to search for solutions is necessary to ensure a steady, continuous development of child healthcare.

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