

Surveillance and Improvement of Children's Nutritional Status in China (1990 - 1995)

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ABSTRACT

The paper presented the effect of Surveillance and Improvement of Children's Nutritional Status in China. The survey was conducted in 101 relatively poor counties in 27 provinces in 1990, 1993, and 1995 respectively. Physical measurement and blood biochemistry was taken for 86,397 children aged under five years. The intervention activities were carried out for 5 years in those 101 counties, e.g., nutrition education, promotion of food production, family poultry and livestock raising, soybean production and utilization, home gardening, nutrition food development for children. Having taken the above mentioned measures, the prevalence of stunting dropped by 21%, wasting decreased by 25%, and anemia lowered by 49% during 5 years. It is suggested that it should be carried out continuously, and promotion efforts should be intensified, so as to reach the goal of improving children's nutritional status. (*J Community Nutrition* 3(1) : 3-7, 2001)

KEY WORDS : nutritional status · children · nutrition surveillance · nutrition improvement.

Introduction

The project of "Surveillance and Improvement of Children's Nutrition" was implemented in 1985 among 7 provinces in China, 1990 - 1995 period was the fourth round of the project in which the project counties was expanded to 101 counties in 27 provinces which covered a whole province in the mainland. At the beginning of implementation in 1990, the baseline survey was carried out aiming to identify the nutrition problems among rural children. A series of activities were carried out targeting the problems found in the survey, e.g. training of grass-root health workers, nutrition education and nutrition intervention. In 1993, a mid-term evaluation survey was conducted, while the final evaluation survey was conducted in 1995. After three rounds of surveys in 5 years, the intervention activities could be evaluated correctly : a foundation had been established for future improvement of children's nutrition.

Sampling and Methods

The cut-off point for selecting survey sites were made along with the project baseline survey in 1990. The cut off points are as follows : the average per capita annual income below 300 yuan, infant mortality rate was higher than 50%, two to five counties had been chosen in each province, amount to 101 counties. Two to four townships had been chosen randomly in each county, based on natural, geographical conditions, and one or several villages had been chosen in each township. More than 90% of these under five years old children had been surveyed in the villages : the number of children surveyed are about eight hundred in each county. Eighty children aged from three to five years had taken the dietary survey and household survey, and the community survey were conducted in the village.

Three surveys were conducted in 1990, 1993 and 1995, respectively, seven hundred and fourteen villages in 101 counties were chosen in 1990, and 85, 770 children were surveyed.

1. Each survey included four parts

Children's health survey, dietary survey, household

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Table 1. Changes of nutritional status of preschool children from 1990 to 1995

	Z score(Mean ± SD)		% of Z score < -2		% of Z score < -3	
	1990	1995	1990	1995	1990	1995
Height/Age	1.58 ± 1.28	1.31 ± 1.31*	36.2	28.7*	11.7	8.6*
Weight/Age	1.24 ± 1.08	-1.06 ± 1.07*	23.7	17.7*	3.7	2.3*
Weight/Height	-0.34 ± 1.00	-0.30 ± 1.07*	3.6	3.7*	0.5	0.6*

* : The difference between 1990 and 1995 is significant($p < 0.01$)

survey and community survey. Children's health survey includes children's general status and feeding pattern. Dietary survey includes the food intake of children aged from three to five years in three consecutive days. Household survey includes family housing, financial and health status, etc. Community survey includes agricultural products, geographic location, health facilities, infrastructure facilities and personal annual income.

2. Anthropometric assessment

Height, weight, upper arm circumference will be measured by fixed persons according to standard method(Wang 1985), Z-score of each child will be calculated based on the WHO standard(WHO 1986). Hemoglobin levels were determined by the cyanoferric hemoglobin method. Nutrients intake were calculated according to Chinese food components table (INFH 1991), and were assessed in comparison with Chinese Dietary Recommendation(INFH 1991).

Results and Discussion

1. Height for age

HT/A(height for age) reflects children's long term nutritional status. Stunting is the result of chronic malnutrition. HT/A increased gradually from 1990 to 1995. The moderate to severe malnutrition(Z score < -2) rate decreased from 36.2% to 28.7%. In 1995's result, among 27 provinces, the highest prevalence rate of malnutrition is 48.5%(Tibet), the lowest is 9.5%(Shandong). From this point of view, the difference between two provinces is quite great, it is lower in north China compared with that in south China. From 1990 to 1995, the incidence of stunting children dropped more than 13 percentage points in five provinces(Shandong, Guangdong, Guangxi, Guizhou, Xinjiang). The stunting prevalence is different in different age groups, as the age increases, the prevalence

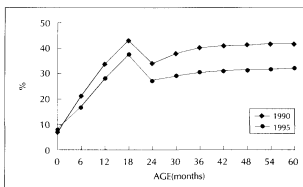


Fig. 1. The prevalence of stunting by age.

of stunting increases, and the prevalence reaches peak at age of 12-24 months. After 24 months, the curve became stabilized. The two years' trend is almost the same, which means six to twenty-four months is the critical period for children's growth(Table 1, Fig. 1).

2. Weight for age

Children's weight is another index reflecting children's nutritional status. Prevalence of underweight children(Zscore < -2) was 23.7% in 1990, and it was 17.7% in 1995. The weight of children changed greatly. The difference from highest to lowest prevalence was 36.4 percent point among the 27 provinces. General prevalence in the south areas was higher than in the north areas. From 1990 to 1995, there were five provinces in those prevalence dropped more than 10 percent age points. This showed that nutrition improvement work was very effective. A two-year trend was almost the same by different age groups. Twelve months had the highest prevalence. Before 18 months, the prevalence increased, while the age increases then becomes stabilized. Generally, prevalence in 1995 was lower than in 1990(Fig. 2).

3. Weight for height

W/H is the sensitive index of children's nutritional status, representing acute malnutrition and the results

are different from W/A and H/A. The prevalence of wasting children did not change much for five years. These results showed currently that there are gaps between children's heights and weights of the rural area and WHO standard (WHO 1986). The general trend showed that the north is better than the south. The main nutritional problem in rural areas was chronic malnutrition, although the acute malnutrition still exists. The chronic malnutrition had been improved through five years' improvement work (Fig. 3).

4. Anemia

The mean value of Hb from 1990 to 1995 was increased from 114.2g/L to 121.0g/L. Hb below 110g/L as the diagnostic standard of children's anemia. The prevalence of anemia is decreasing, from 38.1% in 1990 to 19.4% in 1995. Anemia prevalence is different from each other among the provinces, it was 13.5 - 67.1% in 1990 and it was 5.9 - 44.5% in 1995. There are 10 provinces in those anemia prevalence was more than 40% in 1990. In 1995, only in one province, the anemia prevalence was more than

40%, there were 4 provinces below 10%.

The three-year trend was the same by different age groups. The anemia prevalence in each age group is dropping yearly. The six to twelve month group had the highest prevalence that was 54.5 - 50.9% in 1990 and 34.6 - 31.6% in 1995. Then it decreased gradually while the age increases and reached the lowest point at 66 months old. It was 26.6% in 1990 and 10.1% in 1995. The distribution of mean Hb by age group is, on the contrary, the lowest point in six to twelve months age group, then it rose again. What should be paid attention to is that anemia prevalence of rural children under six months is also very high. The reasons may be inadequate iron intake in rural areas and insufficient iron storage after birth.

So, children's anemia prevention measures should start with pregnant women, six to eighteen months children should have the greatest care. Results showed that the improvement measures implemented by the project is very effective.

5. Children's dietary status

Three surveys were conducted on the dietary intake survey of parts of 3 - 5 year old children. Malnutrition was mainly due to the poor nutritional status of the children, in addition to disease. Findings from the survey showed that rural children's diets mainly consist of cereals, and it did not change much during 5 years. Their average cereal intake is about 261 - 272g per capita per day. Some had tuber intake of 2.0g per day. Bean product intake changed a little, the average is about 9g per day. But their vegetable and fruit intake increased from 152g per day in 1990 to 187g per day in 1995. Meat, egg and fish intake increased from 25g per day in 1990 to 40g per day in 1995. Dairy products intake did not change much, it was about 7 - 10g per day. During 5 years, their energy and protein intake and their percent of RDA increased, showing 1002Kcal per day in 1990, about RDA's 65.0%, 1077Kcal per day in 1995, about RDA's 74.4%. Protein intake was 28.5g per day in 1990, about RDA's 55.1%. It was about 32.0g per day in 1995, reached 65.4% of RDA, showing that the energy, protein intake level was increased among rural children, but still not adequate. Their dietary sources were

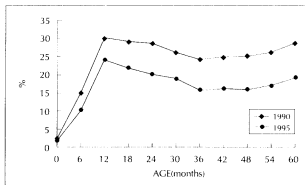


Fig. 2. The prevalence of underweight by age.

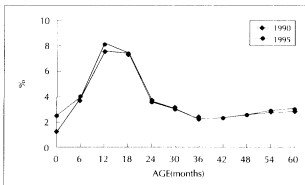


Fig. 3. The prevalence of wasting by age.

Table 2. The average per child daily main foods intakes

Food groups	1990	1995
Rice and products(g)	113	125*
Wheat and products(g)	129	120
Other cereals(g)	30	19*
Starchy tubers(g)	22	22
Dry legume(g)	6	5
Legume products(g)	2	4*
Light color vegetables(g)	43	57*
Dark color vegetables(g)	38	49*
Salted vegetables(g)	4	6*
Fruits(g)	71	81*
Nuts(g)	2	2
Milk and products(g)	7	10*
Egg and products(g)	11	16*
Meats(g)	11	20*
Fish and shrimps(g)	3	4*
Animal fat(g)	4	7*
Vegetable oil(g)	3	7*

* : The difference between 1990 and 1995 is significant($p < 0.01$)

mainly cereals and the portion of animal food increased yearly. In 1995, energy and protein provided by animal food reached 8.8% and 21.0% respectively, showing that children's dietary quality is increasing gradually. The increment of fat intake was obvious (from 18g to 26g), but they were mainly from plant food. Due to increased intake of vegetable and fruit, the intake of iron, Vit. A and Vit. C increased differently. In 1995, iron intake was 94.1% of RDA. Vit. A was 41.6% of RDA. Vit. C intake was 79.3% of RDA. Vit. A intake was still insufficient. So, intake of meat, egg and food containing rich Vit. A, Vit. C should be increased. Calcium intake was still inadequate, although it was increased during five years. It was only 164mg in 1995, being only 20.0% of RDA. It was related with insufficient intake of dairy products(Table 2, 3).

Generally, the economic status in these areas was poor, so the baseline of their dietary nutritional status was lower. After 5 years improvement work, dietary qualities had been improved. All kinds of nutrients were increased, but still unsatisfactory. Vit. A and Calcium deficiency should receive much more attention.

Conclusion

Implementing of surveillance and improvement of

Table 3. Average per child daily nutrient intakes

Nutrients	1990		1995	
	Mean	% of Chinese RDA	Mean	% of Chinese RDA
Energy(Kcal)	1002	65.0	1077*	74.4
Protein(g)	28.5	55.1	32.0*	65.4
Fat(g)	18		26*	
Carbohydrate(g)	182		179*	
Dietary fiber insoluable(g)	5.7		6.0*	
Retinol EQ(μg)	169	29.8	228*	41.6
Thiamin(mg)	0.5	51.1	0.5*	59.9
Riboflavin(mg)	0.3	36.2	0.4*	44.2
Niacin(mg)	6.5	74.9	7.2*	85.8
Ascorbic acid(mg)	27	66.8	32*	79.3
Calcium(mg)	139	16.1	164*	20.0
Phosphorus(mg)	471		496*	
Iron(mg)	9	85.6	10*	94.1

* : The difference between 1990 and 1995 is significant($p < 0.01$)

children's nutrition for poor pre-school children, we found that the rural children's nutritional status was poor. There were problems such as improper feeding practice, monotonous kinds of foods, and poor quality of foods, etc. These factors will influence the children's growth status, especially those before 24 months old. If malnutrition appears in this period, it is hard to improve it later on(Li et al. 1996). During the five years, we also adopted a series of targeted effective improvement measures, were achieved. Stunting dropped by 4.0 percentage points each year from 1990–1995. Underweight prevalence dropped by 5 percent each year, approaching to the 2000 Global Goal(UNICEF 1990). The children's growth status had been improved, dietary patterns had been enhanced, anemia preventive measures had achieved the goal of project, anemia prevalence dropped by 49% for 5 years. These works should be implemented extensively. But improvement effects targeted at some problems were not evident, e.g. feeding practice of children under 2 years. The influencing factors include some social factors. Along with the economic growth, the chances of mothers working outside increased, and relevant-policies were not carried out timely, and children's feeding and care will surely be affected. Because nearly 49% of the infants received breast milk after 2 days of delivery, it is shown that the concept of receiving breast feeding as early as possible was not fully accepted. And early

breastfeeding had great significance on the higher breastfed rate and will enhance children's health. But in order to carry out these works, those grass-root health workers(including midwives) should be trained at first(Chang & Zhai 1996). Better results would be achieved if they could have trained the mothers. In order to improve the traditional feeding pattern, more effort and time should be paid. Because culture, custom and education level will affect the reception of nutrition knowledge, nutrition education materials and methods should be adapted to local culture and customs. Generally, the effects of nutrition improvement were significant and should be carried out continuously; promoting efforts should be intensified to reach the goal of improving children's nutritional status.

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