

Ying Yang Bao: Improving complementary feeding for China's children



CHILDREN, FOOD SECURITY
AND NUTRITION

CASE STUDY:
CHINA

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**Children, Food Security and Nutrition Thematic Area
Millennium Development Goals Achievement Fund**

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Case Report on Application of Micronutrient Sachets (Ying Yang Bao) in China

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Abstract

The Chinese children have experienced substantial improvements in their health and nutrition status in the recent 30 years. However, disparities have remained between urban and rural areas, and cross various regions and age brackets. In particular, the nutrition of children below two years old in rural poor areas merits close attention. The stunting incidence of the children below five years old in poor rural China was still as high as 20% in 2010. Malnutrition of the children mainly occurs from six to 23 months when they receive complementary feeding, which also coincides with high incidence of anaemia at 20% of the children. Contributors to such issues include inadequate quality and quantity of the complementary foods, as the majority of such grains-based foods often fail to meet the required energy and nutrients of the children. Plus, parents and care-takers lack knowledge and practices of adequate feeding. Therefore, in-home food fortification remains one of the vital solutions to address such nutrition challenges when it is a long haul to change the feeding practices.

Micronutrient sachets "Ying Yang Bao (YYB)" developed by the Chinese scientists are an in-home complementary food supplement fortified with iron, zinc, calcium, VA, VD and other nutrients in soy bean powder base. Results of intervention trials with YYB and the project evaluation continued to indicate that YYBs can significantly reduce the anaemia incidence, and improve stunting and intellectual development. The YYB programme in China has undergone three phases, where YYB was first applied in pilot projects based on the research findings. During this phase, "Study Project on the Effects of YYB in Poor Rural Area of Gansu", and "Nutrition Intervention Project in Areas Affected by Wenchuan Earthquake" contributed to the development of the *General Standards on Complementary Food Supplements*, which paved the way for the production and promotion of YYB; In the second phase, one single pilot project was followed by many others. 2009 to 2010 witnessed implementation of "YYB Pilot Project in Ledu County of Qinghai Province", "Nutrition Intervention Project in Eight Counties of Three Provinces Affected by Wenchuan Earthquake", and "Nutrition Improvement Project for Infants and Young Children" (a MoH funded project). Eventually, the pilot projects were scaled up to the communities, where "2012 Early Child Development Project" in 15 poor counties of Qinghai Province, "Action to Eliminate Anaemia in Infants and Young Children", and Nutrition Intervention Pilot Project in Poor Areas will benefit more than one million infants and young children. Under the integrated YYB programme, nutrition counselling and health education for pregnant and lactating women as well as IYCF (infant and young child feeding) are also provided to work with the delivery of YYBs.

The review of YYB promotion experiences showed that the programme should be underpinned by all elements including government support, social mobilization, participation of companies, enough funding support and well developed project designs. Government policies, public service system and funding support remain the foundation for the development of YYB programme in China in particular. For example, YYB is being

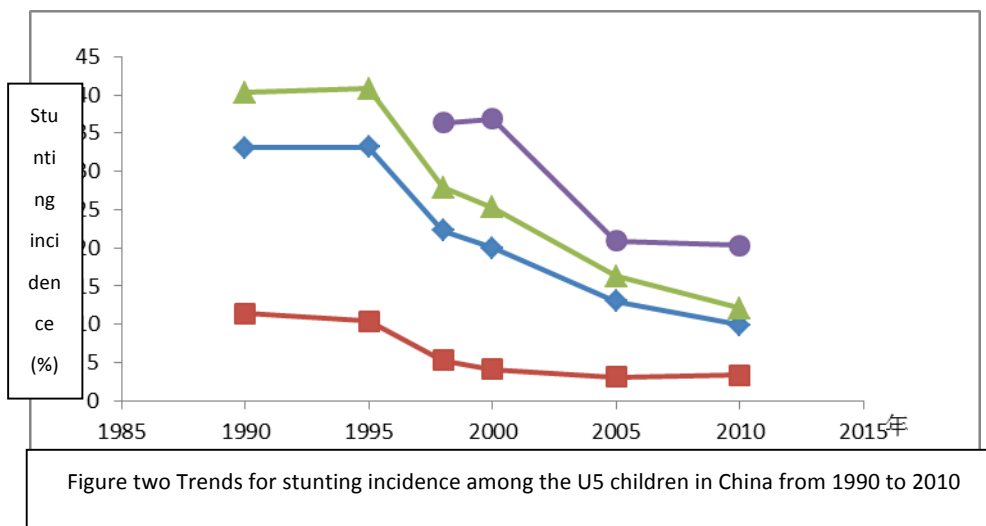
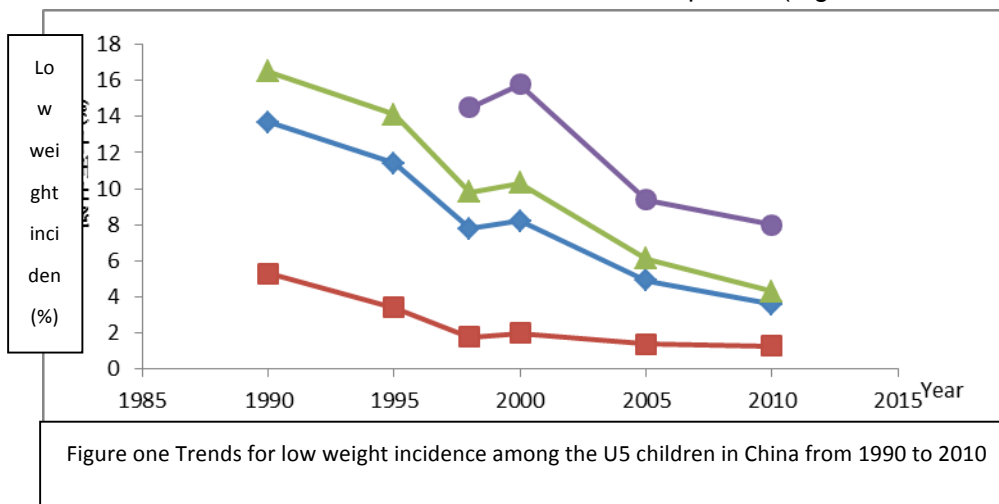
scaled up in 100 poor counties thanks to the funding of the national government; the solid advocacy and social mobilization efforts have increased the public awareness of YYB's vital nutrition value to infants and young children, which has resulted in greater acceptance of the product; YYB would have remained a pure research topic and would not have been implemented in real world without the participation of relevant companies; and sustainability of the YYB programme has been ensured by the scientific design of YYB formula and sound project implementation. However, issues such as compliance, involvement of healthcare professional in social marketing and motivation of manufacturers are still to be addressed.

The following efforts should be made to better develop YYB programme. The government should be convinced to fund the nutrition improvement programme for the children in all poor counties. Multiple channels should be explored to deliver YYBs in order to tackle the micronutrient deficiency among the children in general rural areas as well urban ones. The role of monitoring and evaluation should be brought to a better play during the project implementation. Advocacy of adequate infant and young children feeding should be strengthened and the government should be convinced to include in regular government budget the nutrition improvement programme of infants and young child as a basic public health service.

Part I Nutrition status and feeding practices of the Chinese children

1. Nutrition status of the Chinese children

In the past three decades, along with the 12-fold growth of China's per capita GDP, the living standards and medical protection of the Chinese people have greatly improved. Also, children have enjoyed much better health, with decreased child mortality and improved child nutrition status. The National Health Statistics Yearbook showed that the newborn mortality of China dropped by 75% from 33.1‰ in 1991 to 8.3‰ in 2010, that infant mortality decreased by 74% from 50.2‰ in 1991 to 13.1‰ in 2010, that U5 child mortality reduced by 73% from 61.0‰ in 1990 to 16.4‰ in 2010. The National Child Nutrition Surveillance data revealed that low weight prevalence among U5 children dropped by 74% from 13.7% in 1990 to 3.6% in 2010, the stunting incidence dropped by 70% from 33.1% in 1990 to 9.9% in 2010 over the same period. (Figure one and two)



The national aggregates have masked the urban and rural disparities as well as differences between age groups as a result of imbalanced regional development. It is a challenge essential to be tackled. In terms of child nutrition status, stark differences

existed in the nutrition status of U5 children in urban and rural areas from 1990 to 2010. The incidence of low weight and stunting of rural children was three to four times higher compared to the urban area, and the poor rural areas were twice as high compared to general rural areas for the two indicators. The National Child Nutrition Surveillance showed that 20% of U5 children in poor rural area were still stunted in 2010.

Weight and height are the common indicators to measure children's growth and development. Under most circumstances, normal weight gains indicate sufficient energy intake. However, the height gains of the children are linked to many other nutrition determinants, including protein and micronutrients. Some longitudinal studies have shown that the low weight and height of the children generally happens from the several months to two years after birth, which coincides with the complementary feeding period.

Anaemia incidence is a vital indicator to measure the iron deficiency of the children. The anaemia incidence across the age brackets has found that the children from six to 24 months account for the highest proportion among all children with anaemia. In 2010, 28.2% of the children from six to 12 months had anaemia and 20.5% of the children from 13-24 months had anaemia in China. The age brackets with high anaemia incidence also coincide with the complementary feeding period.

2. Feeding practices of infants and young children

Rural mothers will provide porridge and flour paste to infants on complementary feeding. Sometimes, some salt and chopped vegetable will be added in the porridge. With a low nutrient density and the energy density merely less than half of breastmilk, such foods cannot meet the growth and development demands of children. Studies showed that inadequate feeding of infants and young children and low-quality complementary foods are the main contributors to the micronutrient deficiency and stunting among the children from six to 24 months old and beyond. The improved quality of the complementary foods after six months can help to achieve better growth and development and higher micronutrients level among infants and young children. The 2010 National Child Nutrition Surveillance indicated low breastfeeding rates among the children from 0-5 months, early initiation of complementary feeding, and poor quality and lack of variety of the complementary foods among the infants and young children of 0-24 months in poor rural areas. Also, 5.24% of the children were fed with complementary foods within six months. The analysis of the kinds of complementary foods in the past 24 hours found that only 55% of the children received more than four kinds of complementary foods, that 66.6% of them had the minimal frequency of feeding, that grains and potatoes are the main foods, and that only around 50% of them had meat, fish, poultry meat and eggs (unpublished data).

The iron stored in the body at birth will be almost depleted in the infants and young children with normal birth weight when they reach six months, so that their demands for iron must be satisfied through complementary foods. The fast growth of the infants and young children requires the almost the same amount iron of adult men, and they are

prone to iron deficiency due to their small stomach volume and much less food intake compared with adults. The complementary foods for infants and young children in China are mostly made of grains, and the low level of iron and high level of iron inhibitors such as phytic acid in such foods make the iron difficult to be absorbed. Therefore, infants and young children will be more likely to develop anaemia in case of inadequate iron intake. The 2010 National Nutrition Surveillance showed that only 9.8% of the infants and young children in China received iron supplements and merely 55.8% of them were fed with iron-rich foods in the past 24 hours, which contributes to the high anaemia prevalence among the infants and young children in China.

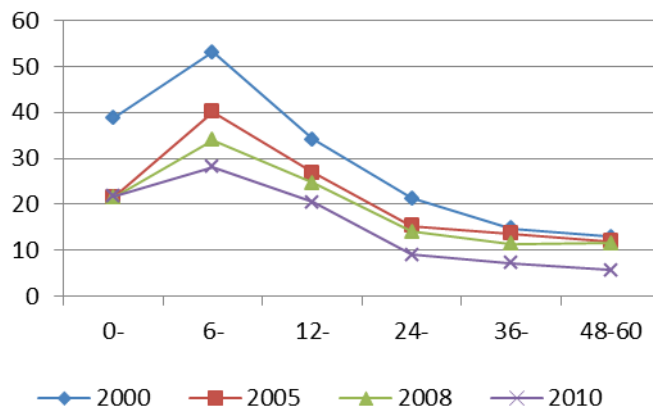


Figure three Comparison of anaemia incidence for rural children of different months

Analysis of the issues with the complementary feeding in rural China found that there is a lack of scientific parenting knowledge and skills among the rural parents and care-givers; they are poorly aware of the importance of breastfeeding and complementary feeding; they do not know how to introduce complementary foods in a correct way; the traditional foods fed by the rural families are mostly made of grains, such as rice porridge, flour paste and noodles, while few animal foods such as meat, fish and eggs are added and neither are fresh vegetables are given. The nutrient intake of the infants and young children thus cannot meet their daily required amount due to the inadequate types and density of nutrients in the foods. The poor financial conditions of the rural families also make it difficult to prepare and purchase nutritious foods for their children, so that the foods consumed tend to lack variety. Usually, children will be fed with the same food as that eaten by the parents. Or, such foods will be roughly processed before being fed to the children, as the families are not so resourceful to prepare separate complementary foods to meet children's nutrition needs.

It takes time to change the feeding practices of parents and care-givers and to diversify the complementary foods given by them through parenting training. In recent years, in-home fortified foods are used in some countries to address the low nutrient density in complementary foods prepared by families and to tackle the micronutrient deficiency

among the target population groups. Such in-home fortified food is developed specifically to meet the nutrition needs of infants and young children on complementary feeding after six months, with the concentration and bio-availability of nutrients, digestibility and quality of protein, and household diet habits all factored in. The in-home complementary foods, which are mass-produced pre-packaged products, can provide additional nutrients needed by the infants and young children when added to the traditional complementary foods prepared by families such as porridge and noodles. They have been widely applied in some countries due to their cost-effectiveness, convenience and sound nutrition improvement effects on infants and young children. Main in-home fortified complementary foods applied across the world include sprinkles, spreads and foodlets. First developed by the Nutrition Research Group of Toronto University's Children Hospital in Canada to address anaemia, the sprinkles contain capsule-based micronutrients that can be directly added to the foods. Initially intended to supplement iron only, sprinkles were added with other micronutrients including zinc, copper, folic acid, VitB6, VitB12, VA, and VD, as well as VC to increase the bio-availability of iron. Spreads contain powdered micronutrients in the fat which can prevent oxidation of such nutrients. Vegetable fats with good taste can easily cover the smell of soluble minerals and vitamins. Generally being water soluble, foodlets contain iron, zinc and vitamins often deficient in infants and young children and they are chewable or can be mixed with foods thanks to its stability and crushability.

Part II Evolution of YYB Programme in China

As the most widely applied in-home fortification in China, Ying Yang Bao is based on soybean powder and fortified with iron, zinc, calcium, VA, VD and other nutrients. A handful of projects also used sprinkles with micronutrients only. The YYB programme in China has evolved through the following phases.

Phase one: Gansu study in 201-2003, the first domestic study in the effects of YYB

From 2001, China CDC and ILSI China Focal Point jointly conducted the study on the effects of soy-bean based complementary food supplement for infant and young children (YYB) on the nutrition improvement of rural target population groups. The study involved 1,500 infants and young children from four to 12 months old with 1,000 as the intervention group and 500 as the control group. Those in the intervention group took one YYB of 10g on a daily basis with iron (6mg), zinc (4.1mg), calcium (385 mg), VB2 (0.2 mg), VD (7mg), protein (3.8g) and 167 kj energy. Those in the control group consumed a small pack of rice powder, which was added with vegetable oil to provide the same energy as the intervention group. The children in both groups were supplemented with one large dose of VA every six months. Such supplementation lasted until the children reached 24 months and one physical check was conducted on the children every six months including weight, height and haemoglobin. The development quotient of the children was measured at the end-line when the children reached 24 months old. The results of study showed that the anaemia incidence of the intervention group dropped from 35% as the baseline to 8.2%, which was significantly lower than the control group. Z score for age-specific height and

weight of the intervention group registered significantly better improvements compared with the control group. Development quotient at 24 months of both groups stood at 97.2 for the intervention group and 95.5 for the control group, which showed significant difference.

A tracking study was conducted on the long-term impacts of YYB among the children at three, four and five years old. The development quotient of the two groups numbered 92.7 and 90.4 at three years old, 96.7 and 94.5 at four years old, and 101.1 and 98 at five years old. The results with factors such as age and other social factors adjusted showed that YYB intervention for the infants and young children had long-lasting impacts on their intellectual development. The follow-up study in 2009 found that the intervention group was 2.0 points higher than the control group (93.8 vs 91.8) in terms of the total intelligence quotient and 2.1 points higher in terms of performance IQ, with significant statistical difference for both indicators ($P < 0.01$). Such difference still remains after relevant determinants were adjusted. (Unpublished data) The study proved that the quality of complementary feeding was improved through provision of YYB, which is replicable to improve health and nutrition in the early childhood and in particular nutrition of the children in poor areas. The tracking study also indicated the long-term impacts of YYB on the cognitive development of the children. The Gansu study laid a solid foundation for the further development of YYB programme in China.

Phase two: China's YYB programme recognized by international experts at 2007 Seminar on Nutrient Requirements and Complementary Food for Infants and Young children

Seminar on Nutrient Requirements and Complementary Food for Infants and Young children was hosted in November 2007 with the support of MCH and Community Health Department under MoH, Disease Control Bureau under MoH and UNICEF, in order to promote the scientific introduction of complementary food, improve the quality of complementary food, and enhance the nutrition status of infants and young children in rural China. Hosted by ILSI China Focal Point and China CDC, the meeting invited a number of international renowned experts in complementary food, including Prof Kathryn G. Dewey from UC Davis, Dr Chessa Lutter from PAHO (Pan-American Health Organization), Dr Marie T. Ruel from International Food Policy Research Institute, and Dr Jacques Berger from French Institute of Research for Development, as well as a dozen of domestic experts in this area. With researches and practical work presented by the experts, the meeting, attended by 160 participants from government departments, international organizations, universities, research institutions, child care facilities and food companies, discussed topics such as nutrient requirements for infants and young children, the status quo of complementary feeding in China and its impacts on the nutrition status of children, as well as measures to satisfy the demands of infants and young children for nutrients. Other topics discussed included the future directions, prospects and opportunities for complementary foods. The participants further understood how complementary food supplements were used in other countries through the seminar. The recognition given by the international experts on China's YYB programme boosted the confidence of domestic nutritionists to further develop the YYB programme.

Phase three: demands of children affected by Wenchuan earthquake in 2008 led to development of YYB related regulations

Nutrition status of the infants and young children in the areas affected by Wenchuan Earthquake in 2008 drew close public attention. According to the survey after three months of the earthquake, 15.6% and 9.1% of infants and young children between 18 to 23 months in Beichuan and Lixian County had low weight, 26.0% and 24.2% of them had stunting, 9.1% of the children between 18 to 23 months old in Beichuan were wasted, 49.6% infants and young children between six to 23 months old in Beichuan and Lixian had anemia, and 7.7% and 19.9% of them had moderate anaemia. The survey pointed to the need to fast improve the nutrition and health status of infants and young children from six to 23 months old through adequate interventions. Nutritionists such as Prof Chen Chunming submitted "Request for Nutrition Intervention among Infants and Young children in Areas Affected by Wenchuan Earthquake" through Nutrition and Food Safety Institute under China CDC to MoH, which included the experiences from home and abroad on YYB application and the effects of YYB intervention in China. Relevant departments of MoH attached great importance to the request and agreed to implement nutrition interventions through YYB on the infants and young children of the quake zones. This signifies that YYB was recognized by government as a main strategy to improve nutrition of infants and young children. In September of the same year, nutrition improvement project through YYB was implemented by Food Fortification Office under China CDC with the support of UNICEF and GAIN in Lixian, Beichuan and Maoxian of Sichuan Province. The project benefited a total of 6,000 children from six to 24 months old. The evaluation after 18 months of intervention indicated that the average haemoglobin level of infants and young children between six to 29 months significantly increased by 15.1g/L compared with the baseline. The total anaemia incidence dropped from 78.8% to 30.8%. The findings substantiated the effective intervention of YYB as a vital measure to ensure the nutrition of the children in areas affected by natural disasters in their aftermath.

Phase four: production and marketing of YYB ensured through the release of General Standards on Complementary Food Supplements in 2009

Based on the results of Gansu study and the nutrition intervention project in quake-affected areas, General Standards on Complementary Food Supplements was jointly developed by China CDC and ILSI China Focal Point, which was released by MoH and Standard Administration of China on December 15th, 2008 and went to effect on March 1st, 2009. The General Standards provided the legal underpinning for the R&D and marketing of complementary food supplements and made it possible to provide low-cost complementary food supplements with high nutrient density. According to the General Standard, "complementary food supplement" refers to the supplements added to the complementary food of the infants from six to 36 months old, which contain a variety of micronutrients (vitamins and minerals) with or without a food base and other auxiliary ingredients. With three common supplements including food, pills and sprinkles, the

amount of vitamins and minerals in the daily serving is developed based on RNIs, AIs and ULs for infants and young children from 6 months to one year as well as from one to three years. The mandatory micronutrients in the complementary food supplements include VA, VD, VB1, VB2, iron and zinc. Other nutrients are optional based on the amounts required by the standards. Supplementary food must contain the required amount of protein and calcium with the former mainly from soybeans and milk. See Annex One for the General Standards.

Phase five: gradual shift of YYB programme from projects to routine work

Subsequent to the release of General Standards on Complementary Food Supplements, a series of operational projects have been implemented to improve nutrition of infants and young children through YYB. The majority of the projects used YYB with soy-bean powder as the base and some used sprinkles with nutrients only. The main projects are listed as below:

- “Nutrition Intervention Project in Eight Counties of Three Provinces Affected by Wenchuan Earthquake” by UNICEF

UNICEF implemented an 18-month YYB intervention project in eight counties affected by Wenchuan Earthquake in Sichuan, Gansu and Shaanxi. Initiated in April 2010, the project covered 30,000 infants and young children from six to 24 months who used one YYB every day based on the monthly delivery by village doctors. More extensive advocacy was conducted by the project including the public made aware of YYB distribution and the vital nutrition of YYB through the public address in the community, posters, household advocacy and PSA during the lead-up to the distribution. Such efforts plus regular health education skills trainings to the village doctors resulted in more than 80% project coverage and compliance during the project term and a drop as high as 48% in the anaemia incidence among the infants and young children compared with the baseline. The iron nutrition of the children was also greatly improved. According to the project design, YYB distribution was successfully deployed based on the existing three-level healthcare network (county CDC and MCH hospital, township hospitals and village clinics), which proved that such a distribution system is feasible and village doctors are fully capable to distribute YYB. Highlights of the project include the successful distribution system, better staff capacity as a result of the project implementation, and improved awareness of nutrition knowledge and better command of scientific feeding methods among the parents.

- “ECD project in Ledu County of Qinghai Province” aimed to eliminate child poverty

In September 2009, China Development Research Foundation initiated the ECD Project in Poor Areas at Ledu County of Qinghai Province, which provided one sachet of YYB to all infants and young children of six months old in nine pilot townships and towns until they reached 24 months. In the same time, mothers’ lectures and household advocacy were conducted and posters put up to make the community members aware of the YYB

distribution and its vital role to improved nutrition, and to increase the consumption compliance. The nutrients of YYB were similar to the UNICEF's project in the quake-affected areas. The intervention impact evaluation after 20 months of project implementation indicated that the stunting incidence among the children from project townships/towns was greatly reduced; the height of the children from 24 to 36 months old was 1.8 cm higher compared with the control children of the same age bracket; the low weight incidence levelled off or dropped slightly from 18 months; anaemia incidence among children dropped by 41% after two months' intervention, and the incidence among the children 18 to 24 months old with intervention dropped by 17.5% compared with the children of the same age group before the intervention. The anaemia incidence among the children from 24 to 36 months old in the project townships/towns in 2012 after three years of intervention stood at 14.2%, while that among the children of the same age bracket from the control townships numbered 23.6%; the development quotient of the former was slightly higher than the latter and the scores of the former in fine motor skills and adaptability were higher than the latter with statistical significance (unpublished data). Convinced by the solid evidence from the YYB pilot, Qinghai provincial government decided to roll out the ECD Project in Ledu County to 15 poor counties in the province in November 2011, with an investment of 10 million RMB to improve the nutrition of the local children.

- “Child Nutrition Project in Poor Areas under the Spanish MDG Programme”

Supported by the Spain MDG Programme, UNICEF implemented a YYB intervention project in three poor counties in Guizhou, Shaanxi and Yunnan Provinces from October 2010 to March 2012, which covered 12,000 children through daily consumption of YYB provided by the village doctors once a month. Similar to UNICEF's project in the quake zones, extensive advocacy and communication were conducted before YYB distribution. Approaches such as community public address, posters, household advocacy, and PSA were adopted to inform the community members of the upcoming YYB distribution, the vital role of YYB and its rich nutrients. Besides, health education skills trainings were provided to village doctors through the village regular meetings. The project statistics showed that 61.1% of the children had YYB on a daily basis and 99.6% of the children had three sachets at least a week. The comparison of the child nutrition and health status between the baseline and end-line showed the following findings: among the post-intervention children from 6 to 23 months, incidence of stunting, low weight and wasting dropped by 35.9%, 58.2% and 35.5%, incidence of anaemia decreased by 33.8%, incidence of VA deficiency and insufficiency and VB12 deficiency reduced by 46.0% and 36.9%. The findings have shown the effective improvements of children's growth and development and micronutrient deficiency through YYB intervention.

- “Action to Eliminate Anaemia in Infants and Young Children”

In 2011, “Action to Eliminate Anaemia in Infants and Young Children”, a large pro bono project, was jointly launched by ACWF, MoH and CCTF (China Children and Teenager's Fund) with the funding raised from the public. Through the free delivery of YYB (sprinkles) to the infants and young children in poor areas as well as health education among their

parents, the project aims to reduce the anaemia incidence of the target population in the project areas, improve the skills of scientific parenting among the parents, and promote the sound development of the children in poor areas. The first round of the project was implemented in 32 national poverty counties in 10 western provinces of China, which covered 230,000 infants and young children six to 36 months old. On June 20th, 2012, the second round of the project was launched in Liangshan Prefecture of Sichuan Province, which covered another 230,000 infants and young children in 35 national poverty counties from 11 western provinces. Under the project framework, the three-level healthcare system is responsible for YYB distribution (county CDC and MCH hospital, township hospital and village clinics) and women's federation staff for advocacy and health education to increase the compliance of YYB.

- National Child Nutrition Improvement Pilot Project in Poor Areas (a government project)

In July 2012, MoH and ACWF decided to jointly develop "National Child Nutrition Improvement Pilot Project in Poor Areas", which covers 270,000 infants and young children from six to 24 months old in 100 counties in the eight national core poverty blocks from 10 provinces. The total funding was 100 million RMB invested by Ministry of Finance. One YYB sachet is provided to the target population free of charge along with communication campaigns to deliver scientific feeding and nutrition knowledge, so as to promote the sound growth of the children in poor areas. Launching of the project in Taiyuan in October 2012 was attended by Chen Zhu, Minister of Health, Liu Qian, Vice Minister of Health, Fan Xiaojian, Director of LGOP, Zhao Donghua, Vice Chair of ACWF, and Zhang Jianxi, Vice Governor of Shanxi Province. On October 18th, the project launching in Hunan Province was attended by Chen Zhili, Vice Chair of NPC and Chair of AWCF. The attendance of senior government leaders has given full indication of the commitment from the Government of China to child nutrition intervention. According to the project schedule, YYBs will start to be distributed in 2013.

Part III Best practices from child nutrition intervention with YYB

As a fortified complementary food supplement project, YYB has evolved step by step from researches, application, small pilots to extensive scalation. To sum up, YYB promotion in China has undergone three phases: 1) translation from researches to a pilot project; 2) one pilot gave way to multiple pilots; 3) pilots were scaled up to a community programme. As an integrated intervention project, YYB programme not only provides the complementary food supplements, but also delivers counselling on the nutrition of pregnant women and feeding of infants and young children as well as communication and health education. YYB promotion is underpinned by the essential elements of government support, social mobilization, participation of companies, funding support and sound project and programme design.

1. Government support leveraged to YYB programme

Backed up by the government support, YYB was translated from researches to pilot projects. The onsite trials in Gansu proved the effects of YYB on the improvement of

anaemia, growth and intellectual development among the infants and young children in poor areas. The tracking studies showed that the benefits of YYB intervention on the intelligence of infants and young children could still be observed up to eight year old. In the wake of the Wenchuan Earthquake, nutritionists such as Prof Chen Chunming recommended to the MoH to provide emergency nutrition intervention using YYB in the quake zones. As a high-density micronutrient supplement, the levels of micronutrients fortified in YYB exceed the dosage allowed in the national standard GB 14480 on nutrient fortificants in food. Despite this, MoH granted special approval on the use of YYB for the children affected by the earthquake in the aftermath, considering the urgent need to improve the nutrition of the children, and the proven effects of YYB in the earlier stage. In the same time, MoH and Standard Administration of China developed and released the General Standards on Complementary Food Supplements (GB22570-2008) in order to ensure the extensive use of YYB, ensure nutrition and safety of the product, standardize the production, technical requirements, distribution and use of YYB, and provide the legal basis for the market entry of YYB as a product. The standard has motivated the domestic manufacturers to produce YYB and is the legal basis to translate YYB as a concept to a real-world commodity.

YYB promotion has been listed as a government priority with an increasing number of nutrition and MCH experts as well as health officials having better awareness of the product. The role of government has thus shifted from providing support to being directly engaged in the YYB programme implementation. Since 2009, government of various levels has been directly engaged in projects such as “Nutrition Intervention Project in Areas Affected by Wenchuan Earthquake”, “Action to Eliminate Anaemia in Infants and Young children”, “Child Nutrition Project in Poor Areas under the Spanish MDG Programme”, “Nutrition Improvement Project for Infants and Young Children” (a MoH funded project), which covered approximately 600,000 infants and young children from six to 24 months old in 60 counties of 20 provinces. In the Fifth National Conference on Women and Children held in 2010, premier Wen Jiabao specified that nutrition improvement of the children should be prioritized by implementing the nutrition and health intervention project among pre-school children in poor areas. In order to fulfil the commitment, Qinghai government implemented YYB project in 15 counties with an investment of 10 million RMB in 2011, and YYB was provided in 100 counties in eight core poverty blocks across 10 provinces with 100-million investment from the Ministry of Finance in 2012. YYB promotion funded by the government has scaled up YYB and made the programme sustainable.

To sum up, availability of government policies, food standards and funding are the prerequisite and guarantee of the YYB programme, and a well-developed healthcare service system (CDC and MCH system) provides the solid implementation framework. In the pilot projects to provide free YYBs in poor areas, a three-level YYB distribution system involving the county CDC and MCH hospital, township/town hospital and village doctors was put in place thanks to the close collaboration among the national, provincial and county CDC and MCH system, so that it is possible to deliver YYB from producers to the

infants and young children. The programme has not only expanded the public health services, but also introduced more substantive nutrition services to infants and young children.

2. Increased awareness of decision makers, professional staff and the public

Successful implementation of YYB programme not only depends on the accessibility but also acceptability of YYB. As one of the key recipes for the project success, communication and health education through multiple channels helped to improve the perception of the decision makers, professional staff, parents and the public in general towards IYCF and YYB.

(1) Strengthened policy advocacy to prioritize child nutrition programme as a contributor to social development

Should YYB researches intend only to have the research outcomes published without being translated into projects and public health policies, they will play a restrictive role in nutrition improvement of infants and young children. And such translation is not possible without the pilots scaled up, evidence collected, and advocacy and communication among the policy makers to increase their awareness of YYB's significance and effects as well as the feasibility to implement the YYB programme

Nutritionists, child health experts, sociologists and economists in China have been able to take advantage of relevant data and disseminate the concept of YYB through policy recommendation, seminars and face to face communication to the decision makers in various sectors. In particular, child nutrition and pre-school education appropriate for the rural area were listed as measures to eliminate poverty in the Third International Symposium on Anti-poverty and Child Development in China. Multi-sectoral commitment including health, finance, quality inspection, social development, poverty alleviation, education and women's federation was also called upon at the symposium.

(2) Trainings to the professional staff

Training and education on YYB among health professionals is essential, as in-home fortification only emerged in the international community in the recent decade and it is still a brand-new idea for many health professionals in China. With more in-depth researches on YYB, a large host of academic papers were published in the domestic specialized journals such as Health Research, Journal of Child Health Care, Chinese Journal of Woman and Child Health, so that the healthcare professionals could learn about the YYB developments as early as possible. Seminars and academic conferences are another channel for such training, such as YYB seminars and YYB sessions in MCH and nutrition academic conferences. Also, professional staff from the project provinces, counties, townships and villages received training conducted by the project province before the project implementation. County CDCs and MCH hospitals combined YYB training with their routine trainings to the township and village staff. Staff from more than 20 provincial CDCs and MCH hospitals, as well as 60 county CDCs and MCH hospitals was trained on YYB in the past three years, which covered all western provinces except Tibet. Village doctors also received YYB health education training before providing counselling to

parents on adequate child feeding (six-month exclusive breastfeeding and continued breastfeeding after six months with complementary feeding) and correct use of YYB. Besides, partnerships were also developed with universities and research institutions to disseminate the messages on adequate child feeding and YYB.

3. Strengthened communication and education to the public and parents on YYB

Healthcare facilities and healthcare providers remain the vital channels for care-givers to access scientific feeding knowledge. Healthcare providers are the main distributors of YYB in the relevant nutrition intervention projects and more importantly they counsel the care-takers on breastfeeding and complementary feeding (including use of YYB). During the initial phase of YYB promotion, project trainings have become a major format to educate the healthcare providers on complementary feeding and use of YYB.

Public communication on adequate child feeding including YYB was conducted through mass media such as TV, the radio, newspaper, Internet and other channels at project sites. Public attention was also drawn to nutrition improvement through communication in public venues such as airports and shopping malls. A PSA “Glory of Maternity” was broadcast and *Manual on Infant and Younger Child Feeding* was distributed to inform mothers of the correct breastfeeding practices, importance of complementary feeding and use of YYB.

4. Companies motivated to produce YYB and key links explored on YYB market incubation and opening up the distribution channels

YYB production is the prerequisite and guarantee of the programme success. With implementation of YYB programme, professional staff and the government have come to recognize its effects, and care-takers and infants have been better aware and accepted YYB. However, the programme still would not have been sustained without companies’ stable production and provision of YYB in compliance to relevant standards.

Subsequent to the release of General Standards on Complementary Food Supplements, China CDC specifically met with companies to explain the standards, increase their understanding and perception on YYB and encourage more companies to produce such new products.

An experience gained from the massive promotion efforts of YYB showed that YYB as part of nutrition policy cannot be extensively scaled up and sustained if it is not prioritized by the product development, market service and sales departments. Nutrition policies will never be developed and delivered should efforts not move beyond the laboratory and epidemiological achievements.

5. YYB promotion models explored

The main funding during the initial YYB programming were provided from the domestic foundations and international organizations, and the projects supported by such organizations can be broken down into three models: 1) free provision model; 2) Minimal payment model with free provision of YYB and payment for the distribution costs by parents (as subsidies to the distributors); 3) Social business model where the companies implement CSR projects with YYB. Since the onset of 2011, the Government of China has started to fund the YYB programme with free provision. All government funded YYB projects provide free YYBs.

1) Free provision model

The following projects provided free YYB: Nutrition Intervention Project in Eight Counties of Three Provinces Affected by Wenchuan Earthquake, YYB Pilot Project in Ledu County of Qinghai Province, "Child Nutrition Project in Poor Areas under the Spanish MDG Programme", "Action to Eliminate Anaemia in Infants and Young Children", and National Child Nutrition Improvement Pilot Project in Poor Areas (a government project). The advantages of the model include: easy and fast implementation; able to cover the poorest population groups; in need of government leadership. Some issues to be addressed under the model for greater impacts including operational funding for distribution such as payment and incentive mechanism for healthcare providers, and perception of the mothers and family members. Also the regular delivery makes it difficult to identify the children who refuse to use YYB or have poor compliance due to various reasons and wastes may be caused.

2) Minimal payment model

From March 2011, Plan International (China) started to provide YYB to children from six to 36 months in its project areas in Shaanxi, Ningxia and Yunnan Provinces. YYBs were distributed by either the "Volunteer Mothers" selected by the villagers or village doctors. Minimal payment model was utilized by Plan International besides other common approaches such as public address announcement, putting up posters, household communication to make the community members better aware of the YYB distribution and its importance as well as health education training to distributors. Namely, when receiving YYBs, parents need to pay 0.1 RMB per sachet to the distributors (3 RMB for 30 sachets per month). The rationale for the payment model includes: 1) Recognition of the efforts made by the distributors through the subsidy and incentives, as they need to mobilize and persuade the parents, and register the pickup and use of YYB from door to door; 2) the small payment can enhance the recognition of the community members to the product value. In common terms, "you will eat what you pay for". 3) Free provision for poor, orphans and children with disabilities has made the distributors feel like a valued member of the community and also brought special care to the marginalized families most needy for YYB. Under this model, the community members need to pay for YYBs out of their pocket. Therefore, once they interrupt the use or compliance drops, it is not so likely for them to continue to pay for and use YYB as something unnecessary. Thus, the model can help to provide a timely update of coverage and compliance of YYB, increase the

effectiveness of the interantional assistance or public health projects, and reduce the possible waste of resources. In the meanwhile, the project also took advantage of Feition as the project information management system. Through the modern commuincation techonlogy, Volunteer Mothers provide regular reports on YYB distribution, which enables project managers of all levels to have an easy access to accurate data, identify issue and strengthen project management.

(3) Social business model

In 2008, with the support of GAIN, Qingdao-based Biomate Company initiated the YYB social marketing project in two pilot counties, in order to observe the results of YYB distribution and marketing under the social business model. Under the model, YYBs are sold in designated areas and the adequate ICYF practices and benefits of YYB are commuincated by MCH staff. The baseline survey showed that 78% of the care-takers were willing to purchase YYB at 0.60 RMR or 0.1 USD per sachet. Statistics after eight months of projecti implementation showed that 58.% of the care-takers understoold the benefits of providing YYBs to children and 13.5% of them made the prurhcae. Through the YYB social marketing, anaemia incidence of the target population experienced an insignificant drop from 36.3% to 28.8%. Child feeding practices were remarkably improved through the intervention. Other companies which implemented social business projects included: Shanghai-based NutriGo and its project in Enshi Prefecture of Hubei Province, and Qingdao-based Tiantian'ai and its prooject in some urban centres.

6. Funding support secured

YYB programme has become a reality as a result of multiple reasons, including the solid government support, enthusiasm of the companies to produce YYB, growing needs of care-takers, and also the sound funding support.

The high incidence of malnutrition among infants and young children in poor area is caused by the local scarce resources and poor family income, a lack of variety in the complementary food, and insufficient funding invested to nutrition programme of the population groups. Therefore, nutrition intervention remains an effective measure to improve the nutrition status of the local infants and young children. In the past years, international organization and domestic foundations such as UNICEF, China Development Research Foundation, China Children and Teenager's Fund, GAIN, Plan International developed YYB projects in more 50 counties in 10 plus provinces. As forerunners of the YYB programme, such organizations provided funding and technical support and explored the appropriate YYB models for China through combing the domestic research findings and international experiences. However, projects funded by international organizations and domestic foundations have their constraints such as such demonstration projects are geographically restrictive and are not sustainable. Therefore, advocacy for government funding and promotion of YYB social marketing remain a vital part to ensure sustainability of YYB projects.

7. Robust monitoring and evaluation

Monitoring and evaluation can not only ensure smooth implementation of existing YYB projects, but also can provide valuable experiences and lessons learnt to the future projects. With a well-developed monitoring and evaluation plan as an integral part of every YYB project, their results have enriched our understanding and substantiated once and again the effects of YYB in different areas and among the target population of various sizes and types. The findings from monitoring and evaluation can enhance the perception and acceptance of decision makers, professional staff and the public towards YYB as the most powerful communication and education tool. In the meantime, monitoring and evaluation can help to identify the issues with the project implementation, such as the tastes and formula of YYB, its distribution and roles of various determinants during promotion. Professional staff can also learn the sound concepts and practices of project implementation through monitoring and evaluation.

Part IV Future directions for YYB

YYB promotion aims to improve breastfeeding and complementary feeding among infants and young children, and ensure nutrition of infants and young children below two years old.

With the initial YYB pilot projects funded by international organizations and domestic foundations, they covered a modest number of areas and children. Later, more government funding was injected to provide free YYBs to infants and young child in poor rural area. For example, the 10-million funding from Qinghai Government which covers 14 poor counties in the province, and 100 million funding from MoF covering 100 national poverty counties. Looking ahead, it is essential to document experiences and lessons learnt from the existing projects and continue to advocate government investment to child nutrition intervention programme, so that the children from 600 national poverty counties can benefit from the national nutrition intervention programme.

Micronutrient deficiency among infants and young children not only exists in the children from poor rural area, also in those from the general rural as well as urban areas. In a developing country as China, it is difficult for the government to fund the free provision of YYBs to all infants and young children. Even in developed countries such as the US, the Women, Infants and Children Program only targets the low-income population. Therefore, besides free provision of YYB to the infants and young children from poor families, it is a vital part of the child nutrition intervention programme to mobilize the rural families with middle and above income levels and urban families to purchase YYBs.

A series of efforts in terms of communication and education, market incubation, setup of sales network and development of market promotion models are necessary in order to improve the awareness of the consumers including healthcare providers and parents towards YYB as a new product. Also, policy environment and promotion of public departments in the market play a key role, since it is a public health product to prevent and control micronutrient deficiency among infants and young children. For example, providing tax breaks and sparing the supermarket slotting fees can attract more companies to produce YYB. Subsequently, YYBs can become cheaper and benefit more children with

more competition. So far, some companies such as Tiantian'ai and DANONE have started to promote YYB through social marketing.

Part V Issues with YYB promotion

Challenge one: YYB compliance

It was found in many pilot projects that the effects of YYB became less “visible” after five months of use, as parents stopped adding or “forgot” to add YYB in the food of the children, causing a significant drop of the compliance. The trend was especially obvious in accessible areas or those close to the urban area, possibly because parents are more resourceful. Therefore, it is a challenge to maintain the YYB compliance.

Challenge two: Healthcare professionals involved in social marketing of YYB

Promotion of YYB as a new public health product demands joint efforts of companies and public health department in social marketing. However, it is still a sensitive model for the health system to promote sales of public health products through social marketing. Compared to promoting certain commercial product to bring some company profit, healthcare staff are more willing to engage in communication and health education on breastfeeding and complementary feeding without the products. Therefore, social marketing of YYB through health system is a challenge.

Challenge three: motivation of companies

YYB as a new product may have moderate sales in the market before the healthcare staff and parents are well informed of and recognize the product. Companies find it difficult to make a profit and some of them are loss making. Therefore, it is a vital task to motivate the companies and bring their social responsibility into play during the initial promotion of YYB.

Part VI Looking forward

To sustain YYB intervention and improve the nutrition of infants and young children, it is essential to incorporate YYB as a measure to improve the public wellbeing under the national socioeconomic development programme, which is binding to the government of all levels. The leadership of the government, general participation and recognition of the public, motivation of the companies, stable funding support, well designed distribution mechanism and robust monitoring and evaluation are the key contributors to a sustainable YYB programme. Looking ahead, the following aspects will be in focus for the future programming.

1. The role of monitoring and evaluation should continue to be strengthened. Monitoring and evaluation should not include only the biological indicators such as malnutrition and anaemia, but also the impacts to public health services, economic indicators such as cost-effectiveness analysis, and human resources indicators such as the impacts on intellectual development and education of children and on the per capita life

expectancy. Such scientific evaluation data will serve as the key decision-making evidence of the government, and pave the way to translate the projects to a routine programme. Some urgent issues also need to be addressed such as formula optimization, use frequency, applicable age brackets, and interaction between complementary feeding and breastfeeding.

2. Support of the government should not only be limited to policies and development of standards, also it should further increase the investment to the YYB programme by including the work in the regular government budget as a basic public health service. In this way the YYB coverage can be increased and its sustainability can be ensured.

3. The role of marketing should continue to be explored in YYB promotion. Commercialization of YYB can save up the government investment, maintain the compliance of the product, and ensure the sound development of YYB programme when the products are affordable to families. Under this commercial model, caregivers purchase YYB affordable to them with the awareness of the product's value. Consumer demands will further motivate the companies and sustain the production. However, YYB's commercialization may differ from general food for infants and young child as a pro bono product and thus the pricing structure and marketing strategy should require in-depth studies.

4. At present, no QS system is specifically available for YYB, which has bottlenecked its commercialization to certain extent. Food Fortification Office under China CDC is facilitating the revision of YYB standard, so that it can be made compulsory instead of a voluntary standard and the legal basis for the QS system can be put in place. Only through the cross-sectoral collaboration can the commercialization of YYBs be ensured and companies be motivated.

5. Communication and health education on ICYF is a long-term endeavour. ICYF (breastfeeding and complementary feeding including use of YYBs) should be included in the training programme of healthcare professionals (such as the textbooks of medical schools and the refresher training to the healthcare professionals). Multiple formats and channels of public health education should be conducted to make YYB better aware.

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