

A Survey of Infant and Young Child Feeding in  
Hong Kong:

Diet and Nutrient Intake

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## Executive Summary

### Background

It is known that a healthy diet is associated with reduced risk of obesity and associated chronic diseases. The first five years of life is the period when eating habits become established. Previous local studies on the food and nutrient intake of children aged 0 to 5 years were conducted more than 20 years ago and they were limited by small sample size and convenient sampling method, with limited information on daily nutrient intake and food source of nutrients.

The aim of this survey was to examine the current status of diet and nutrient intake of children aged 0 to 5 years in Hong Kong. This was the first large-scale survey of diet and nutrient intake on this population.

### Methods

This was a cross-sectional survey. Children of six age groups (6-7 months, 9-10 months, 12-13 months, 18-19 months, 24 months and 48 months) were recruited from Maternal and Child Health Centres (MCHCs) from January to September 2010. To be eligible for inclusion, both parents should be Hong Kong citizens, ethnic Chinese, be able to speak Cantonese or Putonghua, and read and write Chinese. In addition, the index child should be born at gestational age of 37 weeks or above. The exclusion criteria were chronic medical illness, or major congenital abnormalities requiring specialist care or long-term follow up in the index child. Participating families were selected using simple random sampling with the MCHC register as the sampling frame.

A 3-day dietary record was used to assess children's diet. The 3-day period included two weekdays and one day of a weekend. Parents or caregivers were asked to record all foods and beverages consumed by their children over the three days. A 'food portion size and utensils guide' was provided to parents or caregivers to facilitate completion of the dietary record. Daily nutrient intakes from the dietary records were analyzed using the nutritional analysis software CompEat Pro Version 5.8.0 (United Kingdom), and a food composition table of foods compiled by the Centre for Food Safety containing foods from China and Hong Kong. Chemical analyses of nutrient contents were also performed for selected formulae and baby foods commonly consumed among infants and children in Hong Kong.

Assessment of the nutrient adequacy of the studied children was made by comparison with the Estimated Average Requirement (EAR) (or the average individual requirement if the EAR is not available), and the Reference Nutrient Intake (RNI) of the World Health Organization/Food and Agricultural Organization (WHO/FAO). Other overseas dietary recommendations were also applied if daily requirement of a nutrient is not available from the WHO/FAO. The daily consumption of the various food groups was calculated and compared with local recommended intakes for children aged 12 months and above.

Body weight and length/height of the studied children were measured using

standardised methods and the body mass index (BMI) was calculated. Demographic characteristics of their parents were also collected. Weight, height and BMI were transformed to age-sex standardised z-score based on the WHO Child Growth Standard and the Hong Kong growth reference. The proportion of children with wasting (BMI for age z-score below -2), stunting (height or length for age z-score below -2), underweight (weight for age z-score below -2), 'possible risk of overweight' (BMI for age z-score between 1 and 2) and 'overweight or obesity' (BMI for age z-score over 2) was estimated with reference to the WHO Child Growth Standard.

### **Key findings**

Among 2,849 parents sampled, 1,893 were contactable and 1,581 consented to participate. The participation and response rate were 55.5% and 83.5% respectively. A total of 1,272 children (50.8% boys and 49.2% girls) with complete data were included in the final analysis. Key findings of the survey are as follows:

#### Growth status

Based on the WHO Child Growth Standard and cut-offs as described above, 12.7% and 2.7% of the studied children were classified as "having possible risk of overweight' and 'overweight or obese' respectively. The proportion of 'overweight or obese' children increased from 1.2% in the 12-month group to 3.8% in the 24- and 48-month groups. The prevalence of underweight and wasting was low, being 1.3% and 1.6% respectively, and 2.8% of the studied children were stunted in height.

#### Energy and nutrient intake

The mean energy intake of the children was found to be close to or above the WHO EAR for energy, and the protein intake was adequate. Only 0.2% had protein intake less than the average requirement, and 99.0% had an intake above the safe intake level. The mean protein intake of the group was approximately two to three times higher than the average requirement. Protein accounted for 10 to 16% of energy intake across all age groups. This was within the range recommended by the Institute of Medicine of the National Academies, USA (such recommendation was not available in the WHO/FAO reference). Regarding dietary fibre intake, over 80% of children of the 2- and 4-year-old groups had fibre intake lower than the recommended level.

The median dietary calcium intake of all age groups was above the age-specific RNIs, except for the 48-month one. There were more children (between 10.7% and 36.2%) in the age groups 18 months and above with intake below the EAR than the younger age groups (between 3.4% and 8.5%), possibly due to a lower intake of calcium-rich foods in children aged 18 months and above.

The median intake of dietary iron of all age groups was above the age-specific RNIs. Lower intake of dietary iron was mainly seen in children below 12 months, with 22.0% and 16.5% of the 6- and 9-month groups respectively having dietary iron intake below the calculated intake level that meets the median total absolute requirement of the WHO/FAO

recommendation. They were mostly breast fed children. It should be noted that though breastmilk is low in iron, the bioavailability of iron in breastmilk is much higher than that in formula milk.

The median intake of dietary zinc of all groups was above the age-specific RNIs, and 6.4% had zinc intake below the EAR. This proportion of zinc inadequacy was low compared to the Population Zinc Inadequacy Indicator of > 25% as defined by the International Zinc Nutrition Consultative Group. There were more children in the 9-month group with intake below the EAR than other age groups.

Overall, less than 10% of children aged 18 months or younger had dietary sodium intake higher than the recommended intake. The proportion of children with sodium intake higher than that recommended increased to 26.1% and 31.0% respectively in the 24- and 48-month groups. However, caution should be taken when interpreting the data on sodium intake since the estimation of intake of salt and other condiments are subject to bias towards underestimation.

#### Types of milk consumed

The survey showed that the use of formula milk was prevalent among children at all age groups and the breastfeeding rate at 6 months and beyond was low. Among the 6-month group, 6.8% consumed breastmilk as the sole source of milk; 13% consumed both breastmilk and formula milk and 80.2% took formula milk only. Among the 12- to 24-month groups, over 90% drank formula only. For the 48-month group, 77% still drank formula milk.

#### Food consumption pattern

The survey showed that our children's diet was unbalanced. The food consumption pattern of children 12 months and above was characterized by inadequate intake of vegetables and fruits, high intake of protein-rich foods and formula milk. Over 60% had vegetable intake and over 30% had fruit intake below the recommended level. The proportion of children with meat/fish/egg/legume intake higher than the recommended level increased with age, from 12.9% in the 12-month group, to 34.3% in the 48-month group. The survey revealed a high consumption of milk by children, with 69.6% in 12-month group, 47.6% in 18-month group, 35.7% in 24-month group and 9.9% in 48-month group consuming more than the recommended amount of 2 cups (480 ml) per day. It was also found that children who drank more milk (mainly formula milk) than the recommended volume generally consumed a smaller amount of grains, vegetables and fruits.

Findings of the survey revealed the emergence of some unhealthy dietary patterns in older children. The number of children consuming desserts, snacks, sweets, processed meat, fruit and carbonated drinks greatly increased at four years of age. Among the 48-month group, approximately 90% consumed desserts, snacks and sweets, and nearly 50% included processed meat in their diet. Over 40% of children had fruit drinks whereas a total of 17.8% of children consumed carbonated drinks.

### Use of health supplements and Chinese herbal remedies

Approximately one-third of the children used health supplements and Chinese herbal remedies. At 18 months or above, fish liver oil was the most common type of health supplement used, followed by pure vitamins and/or minerals.

### **Conclusions and recommendations**

This survey showed that the energy intake of 6-month to 48-month-old children was comparable to that recommended by the WHO/FAO. The dietary intake of protein was adequate and low protein intake was extremely rare. Though the dietary intake of calcium, iron and zinc was adequate as a whole, a higher proportion of children had a low intake of iron and zinc before 12 months and the intake of calcium may need to be improved in those aged 48 months. Fibre intake was low among the studied children. In addition, the proportion of children with sodium intake higher than the recommended level increased greatly after the age of two. With reference to the WHO Child Growth Standard, there was a low prevalence of wasting, underweight or stunting among the children. The data also suggested that overweight or obesity started to increase from 24 months onwards. These findings suggested that there was a tendency towards over- rather than under-nutrition among our children. The major dietary problem identified was dietary imbalance, characterized by a high intake of protein-rich foods, over dependence on formula use, and inadequate intake of plant-based foods.

### Importance of parental roles in helping infants and young children develop a healthy eating habit

Low fibre intake and inadequate consumption of fruits and vegetables have been suggested as risk factors for constipation in preschool and school children in Hong Kong. Accumulating evidence has shown an association between high intake of fruits and vegetables and reduction of chronic diseases, such as cardiovascular diseases, diabetes, and certain cancers. Establishing healthy eating habits during the early years is critical to reducing the burden of chronic diseases. During the period from 6 months to 2 years, there is radical shift in the pattern of food consumption where infants are expected to transition from a milk-based diet to an adult diet consisting of a variety of foods. Parents should foster healthy eating habits in children by providing a balanced diet with variety. Such a diet should contain plenty of fresh vegetables, fruits and grains (with some whole grain food); appropriate amount of protein-rich foods including meat, fish, egg and legumes; and an appropriate amount of milk. Iron-rich food, for example, meat, fish, some dark green vegetables and legumes should be introduced as early as the child starts solid food at around 6 months. With a varied diet, zinc intake can also be ensured. For children who dislike milk and older children who tend to reduce their milk consumption, parents can consider providing a variety of food which are good sources of bioavailable calcium, such as dark green vegetables, fortified soy milk and soy products (e.g. tofu).

### Types of milk recommended for children over one year of age

When choosing the different types of milk for young children, it is important to consider the composition of their total diet. With increasing age, children will be able to eat a diet of increasing variety and, therefore, be able to obtain essential fatty acids and energy from food



sources other than milk. Children over the age of one may continue breastfeeding or take whole (full-fat) cow milk along with a variety of foods until they are two years. Toddlers who are eating well can take reduced fat / semi-skimmed milk from two years onwards. Skimmed milk should not be given to children under five years. Specific advice on when to introduce low fat milk to children should also be based on the individual child's growth and needs.

*Volume of milk recommended for children over one year of age*

Excessive milk drinking may be a cause of low appetite at main meals. Children aged over one year should be eating a diet of increasing variety and adapting to eating family foods. The food they consume should be nutrient-rich, in particular iron-rich, and provide adequate energy. While milk remains a good source of energy and key nutrients such as protein, calcium, riboflavin and vitamin B12, the amount of milk intake can be reduced. An intake of 360 to 480 ml of milk per day is recommended for children aged over one year. This recommended intake level is based on several considerations, namely, the adequacy of calcium intake among children in this study with milk intake within this range, the higher fractional calcium absorption of Chinese children, the variety of calcium-rich foods in traditional Chinese diet and the better calcium bioavailability in these foods.