

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

Milk Consumption

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Summary

The participants were 1063 parents of children ranged from 12 to 48 months who were interviewed in 2010 about their practices and beliefs in milk feeding.

The use of follow-up formula was popular among toddlers and preschool children, with 85.7% taking it. Few children did not consume any milk and most were in the 48-month group. Close to half of the 18- and 24-month groups drank more than the recommended volume of 480 ml per day. The higher intake of milk was related to the persistent use of bottle for milk drinking, which was practised by 89.4% and 55.2% of the 24- and 48-month groups. Bottle users also had a higher BMI (mean BMI-z-score 0.24, 95% confidence interval: 0.14; 0.33) than non-bottle users (mean BMI-z-score -0.01, 95% confidence interval: -0.17; 0.15). Parents generally had a distorted understanding of the nutritive value of milk, particularly that of additives in the formula.

It is the responsibility of parents to provide their young children with a balanced diet, of which milk constitutes only a minor part. At the same time, parents should foster healthy eating habits, including age-appropriate feeding skills. They should be aware of the importance of stopping the use of bottle by 18 months, and take effective measures to help children transition to drinking milk from a cup at the appropriate age.

Introduction

Consumption of a balanced and adequate diet is necessary for children's growth and activities. During the transitional feeding period, children gradually move from a total dependence on milk to eating a diet of variety, with milk and milk products constituting only a minor part of the diet.

The amount of milk intake should be appropriate to avoid displacing other foods in children's diet. According to the recommendation of the World Health Organization (WHO), for children between 6 to 24 months¹ eating a diet containing meat and vegetable, a milk intake of 200 to 400 ml per day is considered adequate. Various countries recommend different levels of milk intake for children above 1 year of age. Most of them take calcium requirement as a major consideration. (Table 1)

Table 1: Recommended calcium requirement and milk intake in food-based dietary guidelines of various countries

	1 – 3 years		4 – 6 / 7 years	
	Calcium Requirement (mg / day)	Recommended Milk Intake	Calcium Requirement (mg / day)	Recommended Milk Intake
UK	350 ²	Not less than 360 ml ³	450	Not specified
Australia	500 ⁴	Not more than 600 ml ⁵ (in consideration of iron intake)	700	480 ml ⁶
New Zealand	500 ⁴	Not more than 500ml ⁷	700	500 ml (under 5y) ⁷
USA	700 ⁸	2 cups ⁹	1000	2 cups ⁹
China	600 ¹⁰	Not less than 350 ml ¹¹ (for 1-2 years)	800	300-600 ml ¹¹ (for 3-6 years)

The mode of milk drinking is related to the amount of milk consumed. It is well known that children have less control on milk intake if they are drinking from the bottle.^{12,13} According to the Avon Longitudinal Study on Parents and Children (ALSPAC), consumption of milk among 18-month-old children was significantly higher among bottle user than cup users¹⁴.

In the United Kingdom (UK), bottle use is actively discouraged after 1 year.¹⁵ The American Academy of Pediatrics and the American Academy of Pediatric Dentistry recommended that children should be weaned from bottles between 12 and 18 months¹⁶. In Hong Kong, the Oral Health Education Unit of the Department of Health advises parents to wean their children from bottle to training cup by the 14th month.¹⁷ However, it was observed that among children aged 1 to 3 years, 98% used the bottle for drinking and 73%

continued the use of bottle after 2 years in a previous study in Hong Kong¹⁸.

The local market of milk is different from the Western countries. It is flooded with various follow-up or fortified formulae, targeting children over 1 year. Parents' knowledge and belief about formula milk would influence their choice of milk and the quantity they give to their children.

The objective of this present study was to investigate the milk consumption pattern of the children aged between 12 and 48 months, and their parents' perception on milk.

Method

The study was part of a survey on infant and young child feeding carried out in Hong Kong from February to September 2010. The participants were randomly selected from the registry of Maternal and Child Health Centres (MCHCs). Details of participant selection and recruitment were described in report of survey of parental perception and practice on child feeding. Parents of children 12 months or above were recruited for this study.

Development of the questionnaire

The development of questionnaire was based on a qualitative study of parental perceptions and practices of child feeding. Individual interviews were carried out with parents of the target children to understand their experiences and views. The questionnaire was piloted and fine-tuned in September and October 2009.

The final questionnaire consisted of 4 parts: (1) the type of milk consumed; (2) daily milk consumption pattern; (3) child's milk drinking behaviour, (4) parents' belief about milk choices. The questionnaire is shown in the appendix.

Parents were requested to report their children's milk consumption behaviours in the preceding 7 days. For those taking formula milk or cow milk, the parents were also requested to respond to part 4 of the questionnaire. It consisted of 8 statements concerning their opinion on the importance of milk as part of children's diet, and choices of different types of milk.

Data Collection

Research assistants specially trained for the survey were responsible for data collection. Face to face interviews took place in the MCHC at which participating children were registered. The research assistants read the questions to the parents and provided clarification if required.

Results

1. Respondents

1063 parents participated in the survey. The sex distribution of the children is shown in Table 2.

Table 2: Sex distribution of children in the 4 age groups

	12-month (n=194) n(%)	18-month (n=276) n(%)	24-month (n=377) n(%)	48-month (n=216) n(%)	All (N=1063) n(%)
Boys	99 (51.0)	112 (40.6)	223 (59.2)	111 (51.4)	545 (51.3)
Girls	95 (49.0)	164 (59.4)	154 (40.8)	105 (48.6)	518 (48.7)

2. Pattern of Milk Consumption

2.1 Types of Milk Consumed

Of all the children, 37, 3.5%, did not drink any milk in the preceding 7 days. The proportion markedly increased from 1.0% in the 12-month group to 11.1% in the 48-month group (Table 3).

Overall, 48(4.5%) children received breastmilk. The proportion dropped from 9.8% in the 12-month group to 0.9% in the 48-month group.

Consumption of Infant Formula followed the same trend as breastmilk. Overall, 7.9% children consumed Infant Formula. The proportion dropped from 23.7% in the 12-month to 0.5% in the 48-month group.

Follow-up Formula milk was the most consumed milk product. It was consumed by 84.8% of children in the preceding 7 days. The proportion of children fed follow-up Formulae increased from 71.6% in the 12-month old group to 84.8% and 94.4% in the 18-month and 24-month groups respectively. It dropped to 79.6% in 48-month group.

Consumption of cow milk or other milk products was reported in 19.5% of children. More children consumed cow milk in the older age groups. Very few children, 4 out of 1063 (0.4%), consumed other types of formula such as special formula and goat milk formula.

Table 3: Type of milk consumed in the preceding 7 days

Type of Milk*	12-month (n=194) n (%)	18-month (n=276) n (%)	24-month (n=377) n (%)	48-month (n=216) n (%)	Overall (N=1063) n (%)
Breastmilk	19 (9.8)	16 (5.4)	11 (2.9)	2 (0.9)	48 (4.5)
Infant Formula	46 (23.7)	31 (11.2)	6 (1.6)	1 (0.5)	84 (7.9)
Follow-up formula	139 (71.6)	234 (84.8)	356 (94.4)	172 (79.6)	901 (84.8)
Other types of formula	1 (0.5)	2 (0.7)	1 (0.3)	0 (0)	4 (0.4)
Cow milk / milk products	6 (3.1)	40 (14.5)	79 (21.0)	82 (38.0)	207 (19.5)
No any milk intake	2 (1.0)	4 (1.4)	7 (1.9)	24 (11.1)	37 (3.5)

*Some children consumed 2 or more types of milk or milk products.

2.2 Pattern of Milk Intake

Some children consumed more than one type of milk. The details are illustrated in Table 4.

Overall, 1.0 % of children consumed breastmilk only. The proportion of children who consumed breastmilk only decreased from 3.1% in the 12-month group to 0.5% in the 24-month group. None in the 48-month group consumed breastmilk exclusively.

In our sample, 3.5% of the children were given other types of milk, in addition to breastmilk. Follow-up Formula was the most commonly reported type of milk, and this was the case for 2.6% of the children.

Overall, 65.9% of children consumed Follow -up Formula only. This was the most common pattern of milk drinking across all age groups. Over 60% of children in the 12- to 24- month groups consumed Follow -up Formula only, dropping to 50.0% in the 48-month group.

In total, 16.7% of children consumed both formula milk and cow milk . This pattern was more common in older age groups, and. increased from 3.1% in the 12-month group to 29.2% in the 48-month group.

Consumption of cow milk as the only milk source was reported in 2.0% of children only, with most of them being 48 month-old children.

Table 4: Milk consumption pattern in the preceding 7 days.

Milk Consumption Pattern	12-month (n=194) n (%)	18-month (n=276) n (%)	24-month (n=377) n (%)	48-month (n=216) n (%)	Overall (N=1063) n (%)
<i>No milk taken</i>	2 (1.0)	3 (1.1)	7 (1.9)	24 (11.1)	36(3.4)
<i>Breastmilk only</i>	6 (3.1)	3 (1.1)	2 (0.5)	0 (0)	11 (1.0)
Breastmilk & infant formula	2 (1.0)	1 (0.4)	0 (0)	0 (0)	3 (0.3)
Breastmilk & follow-up formula	11 (5.7)	10 (3.6)	6* (1.6)	1 (0.5)	28 (2.6)
Breastmilk & cow milk /milk product	0 (0.0)	2 (0.7)	0 (0)	1 (0.5)	3 (0.3)
Breast milk & other types of milk	0 (0.0)	0 (0.0)	3 (0.8)	0 (0)	3 (0.3)
<i>Breastmilk supplemented with other types of milk (subtotal)</i>	13 (6.7)	13 (4.7)	9 (2.4)	2 (0.9)	37 (3.5)
Infant formula only	43 (22.2)	28 (10.1)	4 (1.1)	1 (0.5)	76 (7.1)
Follow-up formula only	123 (63.4)	189 (68.5)	281 (74.5)	108 (50.0)	701 (65.9)
Other types of formula only	1 (0.5)	2 (0.7)	0 (0)	0 (0)	3 (0.3)
Formula milk & cow milk / product	6 (3.1)	37 (13.4)	72 (19.1)	63 (29.2)	178 (16.7)
<i>Formula milk (subtotal)</i>	173 (89.2)	256 (92.7)	357 (94.7)	172 (79.6)	958 (90.1)
<i>Cow milk or milk product only</i>	0 (0.0)	1 (0.4)	2 (0.5)	18 (8.3)	21 (2.0)

*among them 2 children taken cow milk /product as well

2.3 Frequency of milk drinking

The median frequency of milk drinking was 3 times per day in the 12- and 18- month groups, and 2 times per day in the 24- and 48-month groups.

A small proportion of children (4.5%) did not take any milk or only took breastmilk. Frequent milk drinking (i.e., consuming milk 4 times or more a day) was reported in 10.6% of children. This was more common among 12-month-old children (27.4%) and dropped to 1.4% in the 48-month group. The details are in Table 5.

Table 5: Frequency of milk drinking

	12 month	18 month	24 month	48 month	Overall
Frequency of milk intake	(n=190)	(n=276)	(n=374)	(n=216)	(N=1056)
	n (%)	n (%)	n (%)	n (%)	n (%)
Did not take any milk or took breastmilk only	8 (4.2)	6 (2.2)	9 (2.4)	24 (11.1)	47 (4.5)
Milk was not taken daily	1 (0.5)	3 (1.1)	3 (0.8)	17 (7.9)	24 (2.3)
Once daily	5 (2.6)	9 (3.3)	34 (9.1)	66 (30.6)	114 (10.8)
Twice daily	28 (14.7)	101 (36.6)	152 (40.6)	74 (34.3)	355 (33.6)
3 times a day	96 (50.5)	126 (45.7)	151 (40.4)	32 (14.8)	405 (38.3)
4 times or more a day	52 (27.4)	31 (11.2)	25 (6.7)	3 (1.4)	111 (10.5)

2.4 Amount of Milk Consumed per Day

The daily amount of milk intake decreased with age (see Table 6 for details). Among all children who drank milk other than breast milk, there were only 30.3% whose intake was within the recommended range of 360-480ml. About 40% of children consumed more than 480 ml in a day, though this decreased with age, dropping from about 71.7% in the 12-month group to 15.4% in the 48-month group.

While milk intake over the recommended range was common in the younger age groups, among children in 48 month-old-group, 60.3% consumed less than 360 ml per day, including 11.2% who did not drink any milk at all.

Table 6: Quantity of milk intake in the past 7 days

Quantity of milk taken in a day	12 month (n=184) n (%)	18 month (n=275) n (%)	24 month (n=365) n (%)	48 month (n=214) n (%)	Overall (N=1038) n (%)
Average (s.d.) (ml) *	571 (208)	499 (187)	471 (195)	305 (211)	462 (217)
Median (ml) *	600	480	480	250	480
Do not take milk	8 (4.3)	5 (1.8)	9 (2.5)	24 (11.2)	46 (4.4)
Less than 360 ml	10 (5.4)	46 (16.7)	71 (19.5)	105 (49.1)	232 (22.4)
360 – 480 ml	34 (18.5)	92 (33.3)	137 (37.5)	52 (24.3)	315 (30.3)
More than 480 ml	132 (71.7)	132 (47.8)	148 (40.5)	33 (15.4)	445 (42.9)

*Excluded those missing

2.5 Parental perception of the amount of milk taken

The majority of parents thought that their children's amount of milk intake was appropriate. There were more parents who thought that their children's milk intake was "inadequate" (14.5%) than those who thought their children were drinking too much milk (6.1%). The details are in Table 7.

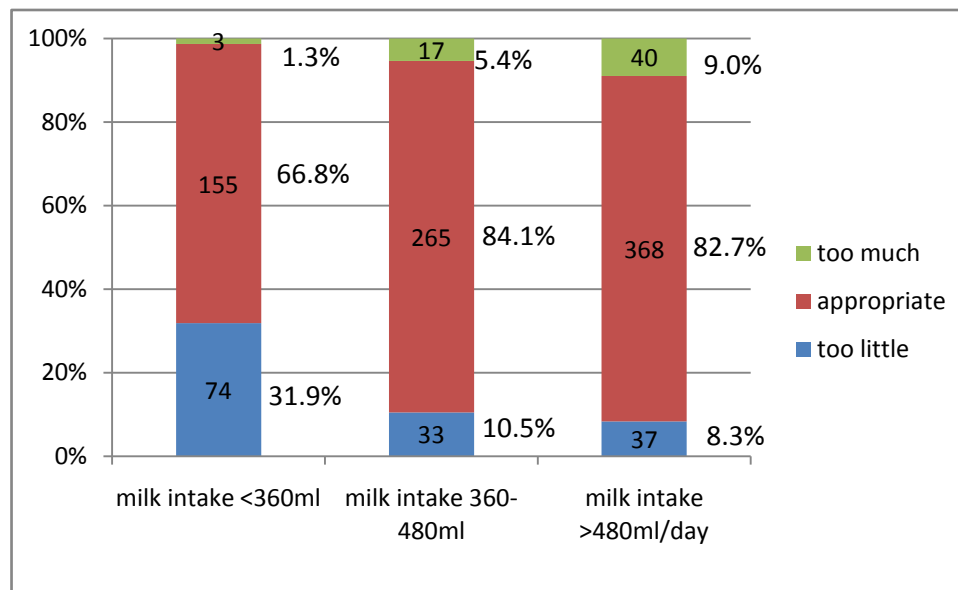
Table 7: Parents' perception of the adequacy of their children's milk intake

	12 month (n=186) n (%)	18 month (n=271) n (%)	24 month (n=368) n (%)	48 month (n=192) n (%)	Overall (N=1017) n (%)
Inadequate	31 (16.7)	33 (12.2)	51 (13.9)	32 (16.7)	147 (14.5)
Appropriate	148 (79.6)	223 (82.3)	293 (79.6)	144 (75.0)	808 (79.4)
Too much	7 (3.8)	15 (5.5)	24 (6.5)	16 (8.3)	62 (6.1)

*The question was not administered to those children who did not drink milk or received breastmilk only

Parent's perception of adequacy of intake was positively associated with the volume of milk consumed per day, $\chi^2(4) = 85.0$, $p < 0.001$. (Figure 1)

Figure 1: Association between reported volume of milk consumption & parent's perception of adequacy



2.6 Utensils for milk drinking

Milk bottle

Stopping use of the bottle is poor among respondents' children. 86.3% of all children used milk bottle for milk drinking. Although the recommended age of stopping milk bottle use was 14 months in the local recommendation, 95.2% and 89.4% of children in the 18- and 24-month group were still using the bottle for milk drinking. Majority of 48-month group, 55.2%, still used bottle to drink milk.

Cup & alternatives

"Wean to cup" was rather late among the children. 3.0% of children at 18 months used regular cup for drinking milk, and it increased to 12.0% of the 24-month group. Of the older preschoolers at 48 months, use of cup was reported in 53.1% only.

Drinking with an alternative, cup with straw, is more common than trainer cup and regular cup in the toddlers, 3.8% in the 12 month-old-group, to 9.2% and 16.3% in the 18- and 24-month-old group respectively.

Table 8: Utensil for milk drinking used by the child in the past 7 days

	12 month (n=186) n (%)	18 month (n=271) n (%)	24 month (n=368) n (%)	48 month (n=192) n (%)	Overall (N=1017) n (%)
Milk Bottle	185 (99.5)	258 (95.2)	329 (89.4)	106 (55.2)	878 (86.3)
Cup with a straw	7 (3.8)	25 (9.2)	60 (16.3)	28 (14.6)	120 (11.8)
Trainer cup	1 (0.5)	11 (4.1)	23 (6.3)	7 (3.6)	42 (4.1)
Regular cup	1 (0.5)	8 (3.0)	44 (12.0)	102 (53.1)	155 (15.2)

*The question was not administered to those children who did not drink milk or received breastmilk only

Multiple response was allowed.

3. Milk Drinking Behaviour, Milk Consumption and BMI in Persistent Bottle-users

3.1 Falling asleep during milk feeding

Among the 1017 children reported to have drunk milk in the preceding 7 days, 247(23.7%) were reported to have experienced falling asleep while drinking milk. The proportion declined with age, with 41.9% among children in the 12-month, 23.6% in the 18-month, and 21.2% in the 24-month groups. In the 48-month group, a significant proportion, (10.9%) still drank to sleep.

Table 9 showed the relative proportion of bottle users and non-bottle users reported having fallen asleep during milk drinking in the 24- and 48-month-old groups. It was evident that using the bottle for drinking milk was significantly associated with falling asleep while feeding.

Table 9: Association between bottle use and falling asleep while drinking milk

Age Group	Bottle users		Non bottle users		
	Fell asleep while feeding		Fell asleep while feeding		
	n	n (%)	n	n (%)	
24- month	329	75 (22.8)	39	3 (7.7)	p=0.03
48-month	106	20 (18.9)	86	1 (1.1)	p<0.001

*Chi-square test

3.2 Volume of Milk Consumption

Bottle users consumed significantly more milk than non-bottle users. The median milk intake per day of bottle users and non-bottle users in the 24-month-old group was 480 ml (interquartile range 210ml/day) and 360 ml (interquartile range: 280ml/day) respectively (Mann-Whitney U test, $p<0.001$). Among those in the 48-month-old group, bottle users had a median intake of 360 ml/day (interquartile range: 240ml/day) compared to 240 ml/day (interquartile range : 180ml/day) in non-bottle users (Mann-Whitney U test $p<0.001$).

3.3 Use of the bottle and BMI

Taking the 24- and 48-month-old groups together, the mean BMI of the bottle users was significantly higher than that of the non-bottle users, with mean BMI z scores of 0.24 compared to -0.01 in the latter($p=0.02$). In each of the 24- and 48-month-old groups, the difference in mean BMI was of similar magnitude though did not reach statistical significance due to a smaller sample size. (Table 10)

Table 10 : Comparison of BMI between bottle users and non-bottle users in children of 24 and 48 months

Age Group	Bottle users			Non bottle users			p
	N	BMI z-score		N	BMI z-score		
		Mean	95% C.I.		Mean	95% C.I.	
24- month	297	0.23	0.12;0.34	36	-0.07	-0.37;0.24	p=0.09
48-month	97	0.26	0.06;0.46	81	0.02	-0.17;0.21	p=0.09
All	394	0.24	0.14;0.33	117	-0.01,	-0.17;0.15	p=0.02

*t-test

4. *Parents' Perception and Knowledge about Milk*

Overall, 84.6% of parents agreed that “milk is indispensable for growth and development of children”. More parents of children during the stage of transitional feeding, e.g. 94.0% in the 12-month group, agreed with the statement than those of children normally consuming family food, e.g. 71.4% of the 48-month group. Similarly, a decreasing proportion of parents were of the opinion “Milk should still be a major part of a child’s diet”, with 59.2% of parents of the 12-month group compared to 14.1% of the 48-month group. On the whole, 58.5% agreed that “a child should drink milk to obtain adequate calcium”.

Concerning the relative benefits of formula and cow milk, 78.5% were of the opinion that “Follow-up Formulae are more suitable for 1- to 4-year-old children than cow milk”. Moreover, 53.4% believed that “Follow-up Formula is added with nutrients that promote children’s brain development, which cannot be found in other foods” and 25.4% believed that it “can replace other food to provide nutrients”.

In total, 78.0% correctly reported that the sugar content of Follow-up Formula was higher than that of cow milk. The 16.9% thought that “Milk with reduced fat can replace full-fat milk or formula milk in 1- to 2-year-old children”, which is contrary to the current recommendation.

Table 12 : Parents' perception and knowledge about milk

Parents agreed /strongly agree With the statement n (%)	12 month	18 month	24 month	48 month	Overall
	n=186 n (%)	n=271 n (%)	n=368 n (%)	n=192 n (%)	N=1017 n (%)
Importance of Milk in Children's Diet					
1. Milk is indispensable for the growth and development of a child.	175 (94.0)	238 (87.8)	311 (84.5)	137 (71.4)	861 (84.6)
2. Milk should still be major part of a child's diet.	110 (59.2)	114 (42.1)	98 (26.6)	27 (14.1)	349 (34.3)
3. A child must drink milk to obtain adequate calcium.	123 (66.1)	170 (62.7)	201 (54.1)	99 (51.6)	593 (58.5)
Knowledge about Formula and Cow Milk					
4. Follow-up Formulae are more suitable for the 1- to 4-year-olds than cow milk.	157 (84.4)	212 (88.3)	288(78.3)	131 (68.2)	788 (78.5)
5. Follow-up Formulae are added with nutrients that promote children's brain development, which cannot be found in other foods.	101 (54.3)	143 (52.7)	203 (55.2)	96 (50.0)	543 (53.4)
6. Follow-up Formula can replace other food to provide nutrients.	51 (27.4)	64 (27.6)	84 (22.8)	59 (30.7)	258 (25.4)
7. The sugar content of Follow-up Formulae is higher than that in cow milk.	130 (69.9)	201 (74.1)	297 (82.5)	166 (86.5)	794 (78.0)
8. Reduced-fat milk can replace full-fat milk or formula milk in 1- to 2-year-old children.	29 (15.6)	49 (18.1)	72 (19.6)	22 (11.5)	172 (16.9)

Discussion

The majority of children in the survey consumed some kinds of milk, other than breastmilk, in the preceding 7 days. A vast majority (85.4%) consumed Follow-up Formula and very few children were breastfed beyond 12 months. A significant proportion of children in the 12- to 24-month groups consumed more than the recommended amount of 480 ml of milk per day. Of those in the 48- month- group, 17% had high consumption of milk while 11.1% did not consume any milk.

Parents' Belief about Milk

While most (84.1%) of the parents of children drinking the recommended intake of 360-480 ml per day considered their children's milk intake as appropriate, a similar proportion (82.7%) of parents of children drinking more than the recommended intake also thought that the milk intake was appropriate. Parents' belief in the nutritional benefits of milk may have explained their milk feeding practices and choices. Follow-up formula was the most popular choice. This was consistent with the finding that the majority of parents believed that follow-up formula was more suitable for 1- to 4- year- olds than cow milk, and a significant proportion agreed that formula milk was supplemented with "nutrients that promote children's brain development that cannot be provided by other foods." Moreover a quarter of parents concurred that "follow-up formula can replace other food to provide nutrients". These beliefs are likely to be the drivers for their choice of milk. The findings probably reflect the permeation of aggressive formula advertising and parents' lack of awareness of the nutritive value of homemade food using everyday ingredients. It is also worrying that over-reliance on follow-up formula may displace children's appetite for eating a variety of foods, making it difficult for children to establish a healthy eating habit.

The nutrient additives in the formulae are actually widely available in a variety of food. (Table 13) It should also be noted that nutrients taken in isolation (e.g. as a supplement, or additive in formulae) do not produce the same health effect as those taken as constituents of a food, as the interrelation and balance between constituents in foods are important for bioavailability. Thus consumption of whole foods is superior over isolated constituents from the nutrition perspective.¹⁹

Moreover, parents also agreed that milk is the major food source of calcium. In fact, a variety of local Chinese food, such as green leafy vegetables, Tofu, and "dry shrimps", are rich in calcium²⁰. (Table 14).

Persistent Use of the Bottles

High milk consumption was associated with drinking from the bottle. Few children reported using cup to drink milk at 18 months, which is the recommended age when a child should stop using the bottle for milk drinking. The finding was consistent with the previous observational study in a group of 1 to 3 year old children in MCHCs¹⁸, where 56% of the children were given a bottle at sleep time, and among them 63.7% fell asleep while feeding with a bottle. Overall, 7.6% of the studied children were found to have caries.

Weaning from the bottle is not only a significant developmental milestone for children but also an important public health strategy to promote child health. Use of the bottle is a known risk factor for early childhood dental caries. Notably, night feeding with bottle or sleeping with bottles are common feeding practices that are associated with severe childhood caries^{21,22}. Sucking the teat of the bottle might bring a sense of comfort to children, making it easier for them to fall asleep. However, to prevent dental caries, parents should help children establish a bedtime routine during infancy, so that they can fall asleep on their own without the need for sucking a bottle.

In a recent report of a large cohort study in the US, continual bottle use at 2 years was associated with children being overweight and obese at 5.5 years²³. It was also shown that on changing to the use of cup, the quantity of milk consumed was reduced²⁴. Weaning from the bottle at an appropriate age enables children to cut down milk intake to a suitable level and eat a wider variety of foods, e.g. vegetables, fruits and grain, and meat. In this study, it was also observed that the quantity of milk intake quantity was inversely related to the consumption of grains, vegetables and fruits. Public awareness of the need for children to transition from bottle to cup use should be raised in child health and child feeding programmes.

Limitations

In interpreting the amount of milk intake, it should be noted that this was based on parents' report which might be different from the actual amount consumed. A food record may be a more reliable estimation of the actual consumption of milk. Nevertheless the association between bottle use and the amount of milk consumed as well as falling asleep while drinking is consistent with findings in other studies.

Table 13: Natural Food Sources of the Nutrients /Additives in Follow Up Formulae

Nutrient	Natural food sources
DHA (Docosahexaenoic acid) AA or ARA (Arachidonic acid)	<ul style="list-style-type: none">- Fish, such as salmon and flatfish, are the best sources of DHA.- Avoid deep sea fishes that may be high in mercury.
Taurine	<ul style="list-style-type: none">- Fish and animal protein.
Lutein	<ul style="list-style-type: none">- Fruits and vegetables, especially dark green leafy vegetables, such as kale, spinach, bokchoy and broccoli.
Choline	<ul style="list-style-type: none">- Many types of foods are rich in choline, among them, animal liver, milk, egg, beef broccoli and brussel sprouts are good sources
Beta-carotene	<ul style="list-style-type: none">- Yellow and orange fruits and dark green leafy vegetables
Prebiotics / FOS (Fructo-oligosaccharides)	<ul style="list-style-type: none">- Rich in fruits, soy and soy products, and whole grains.
Iron	<ul style="list-style-type: none">- Meat, especially red meat, is a good source of haem iron with high bioavailability.- Non-heme iron in soy, green leafy vegetable, nuts and iron fortified grain cereals are better absorbed by the body when consumed with vitamin C rich fruits.
Calcium	<ul style="list-style-type: none">- Milk and dairy products (e.g. cheese, yoghurt).- Some green leafy vegetables.- Calcium added Tofu prepared by calcium salt.- Vitamin D in the body can aid absorption of calcium. Moderate exposure to sunlight and consumption of vitamin D rich foods like egg and fish will improve vitamin D status in the body.
Zinc	<ul style="list-style-type: none">- Rich in most protein sources, such as milk, meats, eggs and soy products.

Table 14: Calcium Content of Selected Chinese Foods.

Food	Equivalent Portion to 100 g food	Calcium Content (mg/100 g food)
Dairy & egg products		
Whole cream milk	100 ml	104
Whole egg	2 pieces	60
Lentils, nuts & seeds		
Sesame	2 tablespoon or 18 g	176
Bean curd	1/2 cube	285
Soy bean, dried	3/4 medium bowl	191
Soy Beverage, Calcium Added	100 ml	119
Dark green vegetables		
Chinese spinach (莧菜)	1 medium bowl	187
Mustard(芥菜)	1 medium bowl	132
Chinese cabbage, Bok Choi, petiole (小白菜)	1 medium bowl	113
Fish & Shellfish		
Canned sardine in tomato sauce	2 pieces	240
Prawn, large	5 pieces	146
Dried Scallops (乾瑤柱)	10 pieces	77
Mushroom & fungus		
Wood ear fungus, soaked(木耳(已浸))	1 medium bowl	34
Shitake mushroom, dried(香菇, 冬菇(乾))	10 pieces, big size 20 pieces, medium size	83

Conclusion

Excessive milk intake in Hong Kong was common in the 12 to 24 months old and in a significant proportion of preschool children at 48 month. Persistent use of bottle for milk drinking is likely one of the reason. Wean to cup should be emphasized to parents when their children reach 1 year old, and it is a strategy to promote children to adapt eating a balanced diet. Nonetheless, parent's belief on the omnipotent formulae milk should be addressed in order to reduce the excess formula consumption.

Recommendations

Parents should be provided with adequate knowledge and practical skills to wean their children from bottle. They should start by offering infants a cup to drink at 7-9 months. The message on stopping bottle feeding by 18 months should be given to the public for united actions within the family. Parents' or public misbelief about milk and the position of milk in a balanced diet should be addressed through education. As the health care professionals are influential in parents' actions and decision on weaning / child feeding practices, dissemination of updated and unbiased nutritional information to them are necessary to avoid confusion to public.

References

1. Department of Child and Adolescent Health and Development. Guiding Principles for Feeding Non Breastfeeding Children 6-24 month of age. WHO. 2005
2. Dietary Reference Values for Food Energy and Nutrients for the United Kingdom. Report of the Panel on Dietary Reference Values of the Committee on Medical Aspects of Food Policy. Department of Health, UK. The 18th Impression 2008.
3. Weaning and the weaning diet. Report of the Working Group on the Weaning Diet of the Committee on Medical Aspects of Food Policy. Department of Health, UK. The 5th Impression 2003.
4. NHMRC. Nutrient reference values for Australia and New Zealand, 2006. Available at http://www.nhmrc.gov.au/files_nhmrc/file/publications/synopses/n35.pdf. Accessed on 25 October 2011.
5. Australian Government. Department of Health and Ageing. Healthy eating for various life stages 1-3 years. Available at <http://www.health.gov.au/internet/healthyactive/publishing.nsf/Content/boy-1-3>. Accessed on 25 October 2011.
6. Australian Government. Department of Health and Ageing. Recommended Daily Servings for 4-7 years. Available at <http://www.health.gov.au/internet/healthyactive/publishing.nsf/Content/recommended-daily-servings>. Accessed on 25 October 2011.
7. Ministry of Health, Wellington, New Zealand 2008. Food and Nutrition Guidelines for Healthy Infants and Toddler (Aged 0-2) A background paper (4th Ed). Wellington: Ministry of Health.
8. Dietary Reference Intakes for Calcium and Vitamin D. Report Brief Nov 2010. Institute of Medicine 2010. Available at <http://www.iom.edu/Reports/2010/Dietary-Reference-Intakes-for-Calcium-and-Vitamin-D.aspx>. Accessed on 8 November 2011.
9. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2010. 7th Edition, Washington, DC: U.S. Government Printing Office, December 2010. Available at www.dietaryguidelines.gov. Accessed on 8 November 2011.
10. 中國營養學會 (2009). 中國居民膳食營養素參考攝入量 Chinese DRIs. 北京：中國輕工業出版社. ISBN978-7-5019-2895-8.
11. 中國營養學會 (2008). 中國居民膳食指南. 西藏人民出版社. ISBN978-7-223-02324-5
12. Li R, Fein S, Grummer-Strawn LM. Do infants fed from bottles lack self-regulation of milk intake compared with directly breastfed infants. Pediatrics 2010;125:e1386-e1393.

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13. Li R, Fein B, Grummer-Strawn LM. Association of Breastfeeding intensity and bottle emptying behaviors at early infancy with infant's risk for excess weight at late infancy. *Pediatrics*. 2008; 122, Supplement 2; S77-84.
 14. Northstone K, Rogers I, Emmett P; ALSPAC Team Study. Avon Longitudinal Study of Pregnancy and Childhood. Drinks consumed by 18-month-old children: are current recommendations being followed? *Eur J Clin Nutr*. 2002;56(3):236-44.
 15. Department of Health. United Kingdom. COMA Report 45, Weaning and the Weaning Diet, 1994.
 16. American Academy of Pediatric Dentistry. Policy on Early Childhood Caries (ECC): Classifications, Consequences and Preventive Strategies. 2011.
http://www.aapd.org/media/Policies_Guidelines/P_ECCClassifications.pdf
 17. Oral Health Education Unit. Department of Health Hong Kong SARG. Tooth Club. Oral Care for Infants. http://www.toothclub.gov.hk/en/pnc/en_pnc_2_1_1_3.html#start
 18. Chan SC, Tsai JS, King NM. Feeding and oral hygiene habits of preschool children in Hong Kong and their caregivers' dental knowledge and attitudes. *Int J Paediatr Dent*. 2002;12(5):322-31.
 19. Jabcobs DR, Gross MD, Tapsell LC. Food Synergy: An Operational Concept for Understanding Nutrition. *Am J Clin Nutr*. 2009;89(suppl):1543S-8S.
 20. Weaver CM. Calcium requirements: the need to understand racial differences. *Am J Clin Nutr*. 1998;68(6):1153-4.
 21. Slabšinskienė E, Milčiuvienė S, Narbutaitė J, Vasliauskienė I, Andruškevičienė V, Bendoraitienė E, Saldūnaitė K. Severe early childhood caries and behavioral risk factors among 3-year-old children in Lithuania. *Medicina (Kaunas)* 2010;46(2):137-141.
 22. Azevedo TDPL, Bezerra ACB, de Toledo OA. Feeding habits and severe early childhood caries in Brazilian preschool children. *Pediatric Dentistry* 2005;27(1):28-33.
 23. Gooze RA, Anderson SE, Whitaker RC. Prolonged bottle use and obesity at 5.5y of age in US children. *J Pediatr*. 2011 Apr 27 [Epub ahead of print]
 24. Bonuck KA, Huang V, Fletcher J. Inappropriate bottle use: an early risk for overweight? Literature review and pilot data for a bottle weaning trial. *Maternal and Child Nutrition* 2010. 6;38-52.

6a. 我的孩子現在有沒有用以下的器皿飲奶：(可選多個)

- | | | |
|------------|---|--|
| i. 學習杯/訓練杯 | <input type="checkbox"/> ₁ 有 | <input type="checkbox"/> ₀ 沒有 |
| ii. 直接用普通杯 | <input type="checkbox"/> ₁ 有 | <input type="checkbox"/> ₀ 沒有 |
| iii. 用飲管吸吮 | <input type="checkbox"/> ₁ 有 | <input type="checkbox"/> ₀ 沒有 |
| iv. 奶樽 | <input type="checkbox"/> ₁ 有 | <input type="checkbox"/> ₀ 沒有 |

7. 下列的描述是我對孩子飲奶的想法。

	極 不 同 意 1	不 同 意 2	同 意 3	極 同 意 4
a. 一歲以上的孩子來說成長配方奶粉(大仔奶粉)能代替其他食物，提供孩子所需的營養。				
b. 成長配方奶粉(大仔奶粉)所含的糖份比鮮牛奶高。				
c. 成長配方奶粉(大仔奶粉)含有添加的營養份能促進腦部發展，是其他食物沒有的。				
d. 奶對於 _____歲 (即訪問對象的孩子的年齡) 的兒童的成長及發展是不可缺少的。				
e. 1至2歲 的孩子可以飲用低脂/脫脂牛奶來替代全脂牛奶/大仔奶粉。				
f. 孩子必須飲奶，才能攝取足夠鈣質。				
g. 對_____歲 (即訪問對象的孩子的年齡)的兒童，奶還是主要的食物。				
h. 成長配方奶粉(大仔奶粉)比全脂牛奶更適合一至四歲的孩子生長發展需要。				