

# Supplemental Information

## SUPPLEMENTAL INFORMATION 1: A BRIEF INTRODUCTION OF PRESCHOOL EDUCATION IN GUANGZHOU

Kindergartens are educational establishments or learning spaces offering early childhood education, usually between the ages of 3 and 6, before the commencement of compulsory (and free) primary education. In Guangzhou, kindergartens may be run by the municipal government or private enterprises, providing mainly full-day program with 2 semesters every year. In 2016, 511 417 children (out of 540 821 eligible, or 95%) were enrolled in kindergartens across the city. Most kindergartens are staffed by fully qualified teachers who have a degree in early childhood education. At the same time, a training framework has been in place for existing preschool teachers.

Although there is yet to be a uniform consensus on the areas of development covered by preschool education curriculum, the following main themes emerge, including health and physical development, emotional and spiritual well-being, social competence, intellectual development, and communication skills.

Currently, a reform in curriculum is taking place in Guangzhou aiming to improve kindergarten teachers' professional knowledge, such as their understanding of the concept of play and pedagogy, and perceptions of inclusion and kindergarten-based curriculum. The involvement of parents and family in supporting preschool education has been emphasized and the collaborative partnership between kindergarten and family has been strengthened considerably in recent years.

## SUPPLEMENTAL INFORMATION 2: COMPONENT 1: DIETARY INTERVENTION

Children attending preschools in Guangzhou are provided with meals (breakfast, lunch, and snacks), the dietary standard of which is based on the Chinese dietary guidelines set by the Chinese Nutrition Society and aims to achieve a balanced diet as shown in the "China Food Pagoda 2016," which contains all the major groups and amounts of foods in the Chinese daily diet: (1) cereal potato and beans (recommended daily amount, 180–260 g per day); (2) fruits (recommended daily amount, 200–250 g per day) and vegetables (recommended daily amount, 150–300 g per day); (3) animal products, including eggs (recommended daily amount, 60 g per day), aquatic products (recommended daily amount, 40–50 g per day), meat and poultry (recommended daily amount, 30–40 g per day); (4) legumes and nuts (recommended daily amount, 30–50 g per day), milk and its products (recommended daily amount, 200–300 g per day); and (5) oil (recommended daily amount, 25–30 g per day).<sup>47</sup>

To understand the dietary intake of children from school meals in this trial, we conducted a dietary survey in all 6 preschools at baseline. During a 4-day period, food was weighed before and after cooking and after meals (for the leftovers) and was analyzed for nutritional intake of the children by food groups (as per the dietary pagoda). A summary of the daily nutrient intake at baseline (and the recommended intake) is given in Supplemental Table 8. The following issues were identified:

- protein content exceeded recommended intake;
- vegetable oil was also excessive;

- however, vegetable intake was insufficient in most preschools;
- fruit was served 2 to 3 times every week; and
- too much sugar was added to a local traditional soup.

We designed the intervention component to specifically target these areas, with an aim to enhance the nutritional quality of the food served in the preschools in the intervention group, to comply with the Chinese Nutrition Society guidance for preschool-aged children dietary intake. Kitchen staff in the preschools receiving intervention were given lectures on the fundamentals in child nutritional needs and a dietary software was provided to assist the planning of healthy and balanced meals and snacks.

At ~6 months into the trial, the dietary survey was repeated in all preschools in the intervention group. In Supplemental Table 8, we show the daily nutrient intake of children, calculated from the weight of food provided by the preschools, assuming 35% and 40% of intake come from breakfast and lunch, respectively. Macronutrient content became closer to the reference daily intake values, with slightly reduced energy, protein, and fat content and a higher proportion of carbohydrates compared with the baseline. There were substantial changes in micronutrients such as calcium (from 332.8 to 612.5 mg), sodium (780.9 to 801.44 mg), and vitamin C (50.8 to 64.9 mg). Of note, phosphorus content, which was essentially unchanged in the intervention, far exceeded the recommended intake value.

**SUPPLEMENTAL TABLE 6** Characteristics of Eligible Preschools at Baseline by Participation Status

	Preschools That Took Part in the Study ( <i>n</i> = 6)	Preschools That Did Not Take Part in the Study ( <i>n</i> = 16)	<i>P</i>
Preschool setting			
Government run, <i>n</i> (%)	5 (83.3)	12 (75.0)	.67
Y of running since establishment, mean (SD)	25.0 (20.2)	31.6 (20.8)	.51
Full-day education, <i>n</i> (%)	6 (100)	16 (100)	.92
Children			
No. children			
Mean (SD)	177.2 (62.1)	209.0 (50.7)	.23
Range	117–277	112–289	
Age (mo), mean (SD)	49.8 (7.6)	51.2 (6.1)	.29
% boy, mean (SD)	51.9 (0.2)	53.4 (1.4)	.02
Staff			
Teachers			
No., mean (SD)	24.0 (7.8)	21.8 (6.6)	.52
Teacher/children ratio, mean (SD)	0.14 (0.01)	0.10 (0.01)	.01
Years of service, mean (SD)	7.6 (1.4)	6.1 (1.3)	.04
Medical staff			
No., mean (SD)	2.5 (0.5)	2.1 (0.3)	.02
Years of service, mean (SD)	4.3 (1.1)	4.8 (2.3)	.68
Kitchen staff			
No., mean (SD)	7.2 (2.4)	6.9 (1.4)	.73
Y of service, mean (SD)	3.7 (0.7)	3.6 (1.0)	.95

**SUPPLEMENTAL TABLE 7** Demographic Characteristics of the Children and Families at Baseline by School

	Intervention Preschools				Control Preschools	
	A	B	C	D	E	F
<i>n</i>	261	155	130	73	208	90
Age (mo), mean (SD)	48.6 (8.5)	49.4 (7.6)	50.1 (5.9)	45.9 (6.7)	52.2 (7.1)	51.5 (7.1)
Sex, <i>n</i> (%)						
Boy	130 (49.8)	82 (52.9)	67 (51.5)	38 (52.1)	120 (57.7)	39 (43.3)
Girl	131 (50.2)	73 (47.1)	63 (48.5)	35 (47.9)	88 (42.3)	51 (56.7)
Birth wt (kg), mean (SD)	3.3 (0.4)	3.3 (0.5)	3.2 (0.5)	3.1 (0.4)	3.1 (0.5)	3.2 (0.4)
Birth length (cm), mean (SD)	50.0 (1.5)	49.7 (1.9)	49.7 (2.0)	50.0 (1.8)	49.6 (2.0)	49.9 (1.6)
Feeding mode before 6 m, <i>n</i> (%)						
Exclusive breastfeeding	119 (45.6)	75 (48.7)	68 (52.3)	17 (23.3)	71 (35.7)	49 (55.1)
Partial breastfeeding	101 (38.7)	51 (33.1)	49 (37.7)	33 (45.2)	74 (37.2)	18 (20.2)
Formula feeding	41 (15.7)	28 (18.2)	13 (10.0)	23 (31.5)	54 (27.1)	22 (24.7)
Time spent outdoors (h), mean (SD)	1.8 (1.1)	1.5 (1.0)	1.6 (1.0)	1.6 (0.9)	1.9 (0.7)	1.6 (1.4)
Time spent watching television (h), mean (SD)	1.1 (0.7)	1.2 (0.8)	1.1 (0.6)	1.1 (0.7)	1.1 (0.9)	1.7 (1.2)
Nighttime sleep duration (h), mean (SD)	8.9 (0.6)	9.0 (0.8)	9.1 (0.7)	9.2 (1.2)	9.6 (1.3)	9.3 (1.3)
Average feeding time for a meal (min), mean (SD)	34.6 (11.8)	30.5 (10.6)	32.1 (12.2)	29.1 (10.2)	30.9 (7.6)	29.6 (11.9)
Mother's BMI, mean (SD)	20.6 (2.3)	20.8 (2.3)	20.9 (2.6)	20.9 (2.3)	21.2 (2.7)	20.8 (2.2)
Father's BMI, mean (SD)	23.5 (2.8)	23.3 (2.7)	23.2 (2.7)	23.4 (2.5)	23.6 (3.3)	23.0 (2.6)
Family structure, <i>n</i> (%)						
Nuclear family	99 (38.8)	49 (33.6)	48 (40.0)	28 (40.6)	80 (41.2)	24 (35.3)
Extended	149 (58.4)	89 (61.0)	70 (58.3)	24 (34.8)	109 (56.2)	41 (60.3)
Other	7 (2.8)	8 (5.4)	2 (1.7)	14 (20.3)	5 (2.6)	3 (4.6)

**SUPPLEMENTAL TABLE 8** Daily Nutrient Intake Before and During Intervention (6 Months Into the Trial) in Preschools

	Daily Intake <sup>a</sup>		Daily Reference Intake <sup>b</sup>
	Preintervention	During Intervention	
Macronutrients			
Energy, kcal	1509.0	1461.9	1466.1
Carbohydrate, g	190.3	199.1	197.3
Protein, g	55.1	49.6	50.0
Fat, g	58.6	51.9	53.0
Micronutrients			
Sodium, mg	780.9	801.4	816.8
Calcium, mg	332.8	612.5	733.4
Phosphorus, mg,	717.6	712.1	483.4
Selenium, mg	33.7	30.2	23.3
Iron, mg	14.9	11.8	12.0
Zinc, mg	8.2	7.6	11.0
Vitamin A, IU	524.8	515.7	566.7
Thiamine, mg	0.9	0.8	0.7
Riboflavin, mg	0.7	0.7	0.7
Niacin, mg	8.1	7.8	6.7
Vitamin C, mg	50.8	64.9	66.7

<sup>a</sup> Daily intake was measured from the breakfast and lunch provided by the preschools by using the weighing method and calculated on the basis of the assumption that 35% and 40% of total daily intake come from breakfast and lunch, respectively.

<sup>b</sup> Daily intake level of a nutrient that is considered to be sufficient to meet the requirements of 97% to 98% of healthy preschool-aged children.

## SUPPLEMENTAL REFERENCE

47. The Chinese Nutrition Society. *Dietary Guidelines for Chinese Residents*. Beijing, China: People's Medical Publishing House Press; 2016