Original Article

JHSMR Journal of Health Science and Medical Research

Using Infant and Child Feeding Index and Its Components to Assess Infant Feeding Practices and Risk of Anemia among 6–12–Month–Old Thai Infants

Praenapa Chaithaweesup, M.D.[1], Somchit Jaruratanasirikul, M.D.[1], Sasivara Boonrusmee, M.D.[1], Maneerat Puwanant, M.D.[1], Hutcha Sriplung M.D.[2]

[1]Department of Pediatrics, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand.

[2]Department of Epidemiology, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand.

Received 11 April 2024 ● Revised 24 May 2024 ● Accepted 28 May 2024 ● Published online 14 November 2024

Abstract:

Objective: To examine the feeding practices among the mothers of 6-12-month-old infants using Infant and Child Feeding Index (ICFI) scores and to determine which components in the ICFI were associated with anemic infants.

Material and Methods: One hundred nineteen healthy term infants aged 6-12 months were recruited from November 2020 to December 2021. Infant feeding practices of the mothers were assessed using a 24-hour food record to collect which foods the infants consumed before the scheduled visit, and food group frequencies during the previous week. The food intakes of the infant were categorized into seven food groups and ICFI scores were calculated. Each infant had their weight and length measured, and a complete blood count was performed to assess anemia.

Results: The number of food groups was significantly higher in the 9-12-month-old infants than in the 6-9-month-old infants (5 vs 4, respectively, p-value<0.01) and also the ICFI scores (6 vs. 5, respectively, p-value<0.01). Anemia was found in 35 infants (29.4%) and was significantly higher in infants who were mainly breastfed, who were given complementary meals with dietary diversity <4 food groups, and who had an ICFI score <5. However, multivariate logistic regression found that the only significant factors associated with anemia were mainly breastfed (adjusted odds ratio 3.15, p-value<0.001) and dietary diversity <4 food groups (adjusted odds ratio 3.94, p-value=0.01).

Conclusion: Infants older than 6 months should be mainly breastfed with 3-4 complementary meals with at least 4 food groups daily to prevent anemia from iron deficiency.

Contact: Prof.Somchit Jaruratanasirikul, M.D.
Department of Pediatrics, Faculty of Medicine, Prince of Songkla University,
Hat Yai, Songkhla 90110, Thailand.
E-mail: somchit.j@psu.ac.th

J Health Sci Med Res
doi: 10.31584/jhsmr.20241115
www.jhsmr.org

Keywords: complementary feeding, dietary diversity, food group diversity, infant anemia, infant and child feeding index, iron deficiency

Introduction

During infancy, a year of rapid weight gain, optimal nutrition is necessary for an infant's overall health and well being. Insufficient consumption of macronutrients can lead to either wasting or stunting, while inadequate essential micronutrients can result in notable health issues. According to the World Health Organization (WHO) recommendations, infants should be exclusively breastfed for up to six months. After 6 months, in addition to breastfeeding, complementary foods should be given 2-3 times a day between 6-8 months, gradually increasing to 3-4 times a day by 9-10 months, to ensure they meet their minimum micronutrient requirements[1-3]. To assess the feeding practices and the quality of complementary feeding for infants, the Infant and Child Feeding Index (ICFI) was developed based on an age-specific scoring system using five indicators[4]: 1) breastfeeding, 2) bottle use, 3) number of food groups intake or dietary diversity the previous day, 4) food group frequency in the past seven days, and 5) feeding frequency in a day.

Thailand has been undergoing a transition from a low-income to an upper middle-income country since 2011[5], and is facing an increasing prevalence of overweight and obesity while undernutrition is still persistent, the so-called 'double burden of malnutrition'[6]. During 2021-2023, there have been reports in other low- to middle-income countries of micronutrient deficiencies in both underweight and overweight infants, the 'triple burden of malnutrition[7,8]. Recently, we described the nutritional intakes of macro- and micronutrients among 120 infants and found that most of the infants received adequate macronutrients, but about one-third of them who were fed 1-2 complementary meals with 2-3 food groups a day received inadequate amounts of iron, magnesium, selenium and vitamin E[9]. Therefore, our current study aimed to investigate the feeding practices of mothers of infants aged 6-12 months using ICFI scores and to explore the associations between total ICFI score and each component of the ICFI in anemic infants, which we felt would be of value in our practice, and thus also in assisting other practitioners in providing more specific guided treatment, particularly for anemic infants.

Material and Methods

This study was a cross-sectional study of nutritional intake in healthy 6–12-month-old infants in the Well Child Clinic of Songklanagarind Hospital, which was approved by the Human Research Ethics Committee, Prince of Songkla University (REC. 63-358-1-1). The calculated sample size was 95 infants based on the 30% prevalence of iron deficiency anemia (IDA) in infants and young children reported in the South-East Asian Nutrition Surveys (SEANUTS)[10]. From December 2020 to November 2021, 119 infants were enrolled. After explaining the purpose of the study, informed consent was obtained from the parents. The characteristics of the infants and demographic data of the families were collected. A complete blood count (using the automated Sysmex XN-3000 Hematological Analyzer, Japan) was done for each child to screen for anemia as a part of a routine child health visit. Following the WHO definition, anemia was diagnosed by a hemoglobin (Hb) level <11 g/dL. IDA was diagnosed in infants with anemia whose Hb levels increased by at least 1 g/dL after one month of iron supplementation[11]. Our protocol for the treatment of infants with IDA was a therapeutic trial with 4–6 mg/kg/day of elemental iron for 1 month and subsequently 2–3 mg/kg/day for a total of 3–4 months.

Assessment of infant feeding and ICFI

To assess the foods the infant consumed, an open-ended 24-hour food record (00.00 hours to 24.00 hours prior to the scheduled visit) was used. The mothers were asked to completely document their infant's food intake, including the frequency and timing of breastfeeding, formula feeding and the amount and components/ingredients of each complementary food group consumed. The foods consumed by the infants were categorized into seven groups[4]: 1) grains, roots, and tubers; 2) legumes and nuts; 3) dairy and dairy products; 4) flesh meat (poultry, pork, beef, animal organs, and fish) 5) eggs; 6) vitamin A-rich vegetables/fruits; and 7) other fruits/ vegetables. Feeding frequencies per day and food group frequencies in the past week were also collected. At the scheduled visit, the 24-hour food records were reviewed by a nutritionist with the mothers to check them for the accuracy of each food type the infants consumed.

Anthropometric measurements

Each infant had their weight and length measured without clothing or a diaper on a digital weighing scale. The length was measured in the standard supine position with an infantometer. Following the 2006 WHO Child Growth Standards, the measured weights and lengths were transformed to weight-for-age z-scores (WAZ), length-for-age z-scores (LAZ), and weight-for-length z-scores (WLZ), and classified into normal (WAZ and LAZ between -2 to +2 of the median values), underweight (WAZ score lower than -2), stunting (LAZ score lower than -2), wasting (WLZ score lower than -2), and overweight (WLZ score greater than +2)[12].

Statistical analysis

All data were entered into the Epidata program (version 3.1), and statistical analyses were performed by the R program (R Foundation for Statistical Computing, Vienna, Austria). The characteristics of the infants and demographic data of the families were described in numbers and percentages (categorical variables) or means±standard deviations (continuous variables). The ICFI scores and their components were reported in numbers and percentages (categorical variables). The student t-test was used to compare continuous variables, while the chi-square or Fisher's exact test was used for categorical variables. Multivariate logistic regression was used to determine the associations between anemia and food group intake. A p-value<0.05 was set as statistically significant.

Results

Characteristics of the infants

The mean age of the 119 infants was 7.7±1.1 months, with 92 infants (77.3%) aged 6-9 months. The average weight and length of the infants were 7.9±1.1 kg and 68.3±3.2 cm, respectively, with mean WAZ and LAZ scores 0.45±1.27 and 0.56±0.99, respectively. Two infants (1.7%) were underweight, none were stunted and 13 (10.9%) were overweight. The maternal education level was mostly a bachelor's degree (79.8%). The mean monthly family income was 39,730±24,570 Baht per month.

Infant feeding and ICFI scores

Of the 119 infants, 48 (40.3%) were exclusively breastfed, 10 (8.4%) received no complementary meals, 57 (47.9%) received 1 complementary meal, 41 (34.5%) received 2, and 21 (17.6%) received 3-4 complementary meals a day. The popular food groups the mothers fed their infants were grains (84%), vitamin A-rich vegetables/fruits (81.5%, common sources mashed pumpkin and/or carrot), fruits (71.4%, banana, orange and papaya) and meat (67.2%, common sources pork, poultry and fish). Eggs were given to 38.6% of the infants and dairy products were given to 37.8%. Nuts/legumes were not given to any of our study infants. For dietary diversity or the number of food groups the infants consumed in the previous day, 32 infants (26.9%) received 1-3 food groups 77 (64.7%) received 4-6 food groups and 10 (8.4%) received no complementary meals. None of our infants received vitamins or iron supplementation

Following the ICFI age-specific scoring system, the infants were divided into 2 age groups, 6-<9 months (n=92) and 9-12 months old (n=27). There were no differences in percentages of breastfeeding and bottle use between the two groups, but significantly higher percentages in dietary diversity, food group frequency given in the past week and feeding frequency per day in infants aged 9-12 months than in infants aged 6-<9 months (Table 1). The total food groups number per day was significantly higher in the older infants aged 9-12 months (Figure 1) as well as the dietary diversity in a day, food group frequency in the past week, feeding frequency per day, and ICFI scores. The median ICFI score of 5 in infants aged 6-<9 months was thus from the combined scores from breastfeeding (2), no use of bottle (1), number of food groups of 2-3 groups per day (1), and food group frequency in the past week of 3-4 days (1). In infants aged 9-12 months, the median ICFI score of 6 was from the combined scores from the number of food groups of at least 4 groups (2), food group frequency in the past week of at least 5 days (2), and feeding frequency 3-4 meals per day (2).

Comparison of ICFI scores in infants with and without anemia

Anemia was diagnosed in 35 of the 119 infants (29.4%), 26 in the 6-<9 months age group (28.9%) and 9 in the 9-12 months age group (31.0%). Twenty-nine of the 35 anemic infants (82.8%) were diagnosed with IDA (Hb increased 1.1-1.5 g/dL after iron treatment at the dosage of 4 mg elemental iron/kg/day for 1 month) while 3 infants (8.6%) were found to have the thalassemia trait (Hb increased 0.6-0.8 g/dL after iron supplementation for 1 month) and 3 infants (8.6%) had no further blood tests, indicating that IDA was the common cause of anemia among our study infants. Hb typing using a Sebia automated capillary electrophoresis machine (CAPILLARYS 3 OCTA, France) was performed in 3 anemic infants who did not respond to their 1-month therapeutic trial of iron supplementation. Hb E was reported in 1 infant and beta thalassemia trait was diagnosed due to Hb A2>3.5% in 2 infants. However, the alpha thalassemia trait cannot be detected or interpreted through Hb typing, and as a resource-limited country, molecular studies for alpha thalassemia are not routinely performed in our institute, therefore, the alpha thalassemia trait may be underdiagnosed in anemic infants with normal Hb typing.

In comparisons between infants with anemia (thalassemia trait infants were included in the analyses as their Hb levels increased after iron supplementation, indicating in these infants the thalassemia trait might coexist with IDA) and without anemia, there were no significant differences in demographics or growth parameters, family income or maternal education between the two groups. (Table 2) Anemia was significantly higher in infants mainly breastfed than infants without anemia (80.0% vs. 23.8%, respectively, p-value<0.001), in infants fed complementary meals with dietary diversity <4 food groups than those fed with ≥4 food groups (82.8% vs. 15.5%, respectively, p-value<0.001), and a total ICFI score <5 than ≥5 (80.0% vs. 46.4%, respectively, p-value<0.01). Multivariate logistic regression found that the significant factors associated with anemia were mainly breastfed and dietary diversity <4 food groups (p-values<0.001 and 0.01, respectively (Table 3).

Table 1 Comparision on infant and child feeding index (ICFI) scores in the 119 study infants

ICFI item	Aged 6–<9 months N=92	Aged 9–12 months N=27	p-value
Breast feeding, n (%)			0.28
No	37 (40.2)	14 (51.9)	
Yes	55 (59.8)	13 (48.1)	
Bottle use, n (%)			0.11
No	50 (54.3)	10 (37.0)	
Yes	42 (45.7)	17 (63.0)	
Dietary diversity*, n (%)			0.02
no complementary food given	7 (7.6)	0 (0.0)	
1–3 food groups	32 (34.8)	3 (11.1)	
≥4 food groups	53 (57.6)	24 (88.9)	
Food group frequency in the past week, n (%)			0.02
0–2 days	11 (11.9)	0 (0.0)	
3–4 days	24 (26.1)	3 (11.1)	
≥5 days	57 (62.0)	24 (88.9)	
Feeding frequency, n (%)			0.01
0–1 meal/day	55 (59.8)	2 (7.4)	
2 meals/day for infants aged <9 months, ≥3 meals per day for infants aged ≥9 months	30 (32.6)	11 (40.7)	
≥3meals/day for infants aged <9 months, 4 meals/day for infants aged ≥9 months	7 (7.6)	14 (51.9)	
Total ICFI score, median (IQR)	5 (2, 6)	6 (3, 8)	0.01

ICFI=infant and child feeding index, IQR=interquartile range, N=number
*Seven food groups: 1) grains, roots, and tubers; 2) legumes and nuts; 3) dairy products; 4) flesh foods e.g. meat, fish, poultry and liver/organ meats; 5) eggs; 6) vitamin A-rich fruits and vegetables; 7) other fruits and vegetables

Table 2 Demographic and feeding practice data of the 119 study infants according to anemia status

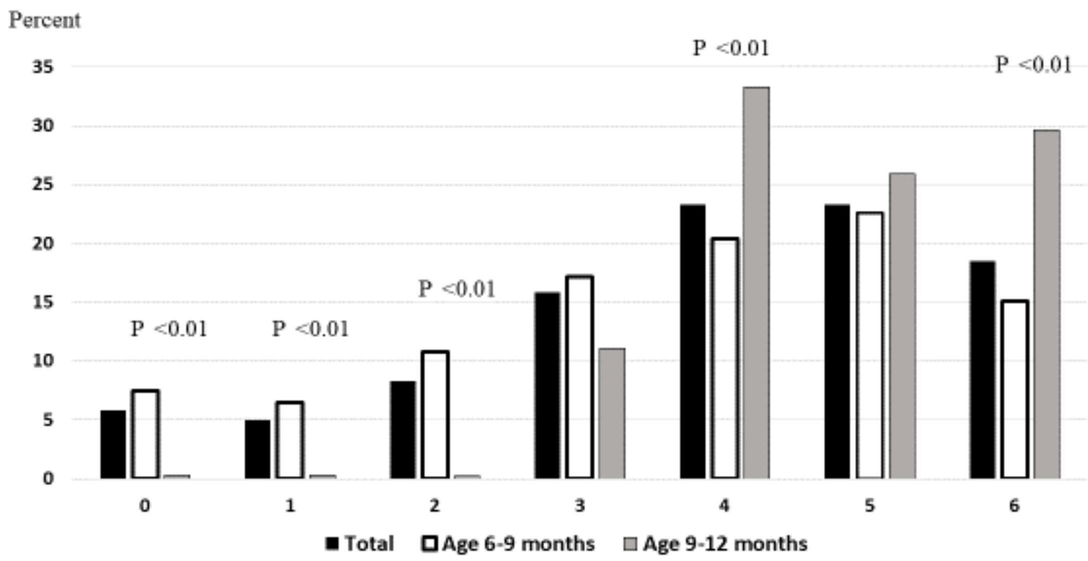
Demographic / feeding practice	Total N=119	Anemia N=35	No anemia N=84	p-value
Hemoglobin, g/dL	11.3±1.0	10.3±0.7	11.8±0.7	<0.001
Gender, male	70 (58.8)	25 (71.4)	45 (53.6)	0.11
Age (months)				0.99
6-<9, n (%)	90 (75.6)	26 (74.3)	64 (76.2)	
9-12, n (%)	29 (24.4)	9 (25.7)	20 (23.8)	
Birth weight (g)	3,109±387	3,006±382	3,152±383	0.06
Birth length (cm)	49.5±1.5	49.6±1.5	49.1±1.5	0.09
Current weight (kg)	7.7±1.1	7.8±1.2	7.7±1.1	0.69
Current length (cm)	68.2±3.3	68.1±3.3	68.3±3.3	0.73
Weight/length z-score	0.16±0.92	0.08±0.91	0.20±0.93	0.52
Family income, (Baht per month)	39,730±24,570	39,410±22,400	40,030±28,500	0.40
Maternal education ≥bachelor's degree, n (%)	92 (77.3)	26 (74.3)	66 (78.6)	0.79
Mainly breastfed, n (%)	48 (40.3)	28 (80.0)	20 (23.8)	<0.001
Dietary diversity <4 food groups, n (%)	42 (35.3)	29 (82.8)	13 (15.5)	<0.001
Food group frequency <3 days/week, n (%)	82 (68.9)	21 (62.9)	61 (72.5)	0.17
Feeding frequency, <2 feeds/day, n (%)	57 (47.9)	12 (34.3)	45 (53.6)	0.55
ICFI <5, n (%)	67 (56.3)	28 (80.0)	39 (46.4)	<0.01

g=gram, dL=deciliter, cm=centimeter, kg=kilogram, ICFI=Infant and Child Feeding Index
data are presented as mean±standard deviation, or n (%)

Table 3 Multivariate analysis of factors associated with anemia among the 119 study infants

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Mainly breastfed	2.35 (1.59, 3.48)	<0.001	3.15 (1.94, 5.11)	<0.001
Dietary diversity <4 food groups	1.02 (0.44, 2.32)	0.02	3.94 (1.29, 12.05)	0.01
ICFI score <5	0.75 (0.29, 1.97)	0.08	2.87 (0.81, 10.24)	0.11

ICFI=Infant and Child Feeding Index, CI=confidence interval, OR=odds ratio



P=p-value

Figure 1 Comparison of number of food groups given to infants 6-<9 months and 9-12 months

Discussion

In our study, we found that all the mothers favored feeding their infants with breast milk and/or infant formula for up to 6 months of age and commenced giving the first complementary feedings at the age of 6-8 months with 1-2 meals per day, with each meal containing only 1-2 food groups (generally, rice congee sometimes mixed with mashed pumpkin), and the most common fruit the mothers gave their infants was mashed banana similar to the findings of other recent studies in Thailand[13,14]. Our recent report on infant feeding practices found that the percentage of breastfeeding decreased in infants aged 7-9 months and further decreased in older infants aged 10-12 months, while feeding with infant formula increased along with the increase in complementary feedings to an average of 1-3 meals with 4-5 food groups a day, generally comprised of rice congee mixed with pumpkin and meat and/or egg and fruit (mashed banana or papaya)[9]. The increase in food group diversity, feeding frequency and food group frequency in older infants aged 9-12 months resulted in a significantly higher median ICFI score than for the infants aged 6-<9 months. Anemia was found in both age groups of our study infants at the same level of about 25-30%, indicating that there would be some common factors associated with this condition. By multivariate analysis, the significant factors associated with IDA were being mainly breastfed and the dietary diversity in the complementary feedings fewer than 4 food groups.

Among the micronutrient deficiencies, iron deficiency is the main cause of nutritional anemia and infants aged 6-12 months are vulnerable to iron deficiency due to the depletion of their iron stores. This vulnerability is compounded by the rapid growth in this age group, which increases iron demands, but with inadequate iron intake from complementary feeding[15]. The reported prevalence of anemia in children aged 6-59 months in Thailand from 2000 to 2019 was approximately 24-26% which is classified as a significant level of public health concern by the WHO[15]. In our study, IDA was significantly associated with mainly breast feeding and a low dietary food diversity intake. As is known, breast milk contains a low level of iron of approximately 0.5 mg/L. Therefore, iron-rich complementary foods (red meat, animal liver, and egg yolk) should be given to infants older than 6 months. In our study, meat and eggs were given to about 30-40% of our 6-9-month-old infants and about 60% of the 9-12-month-old infants. However, our anemic infants were mostly given only 1-2 meals of complementary feeding with only 1-3 food groups, mostly rice, pumpkin, and banana, which provided very little iron. In our study, the total ICFI score was not associated with anemia, as the score from the component of "breastfeeding with no bottle use" resulted in a higher total ICFI score while masking other ICFI components, particularly in mainly breastfed infants who had higher feeding frequency and food group frequency but with low dietary diversity. In general, earlier studies have reported that the more diverse the food groups in an infant's diet, the more micronutrients the infant received, particularly the micronutrients that are very low in breast milk (iron, folate, iodine)[18,19]. The results of our study are consistent with studies from India and central Thailand showing that insufficient intakes of energy, protein, and/or fat with only 1-3 food groups dietary diversity per day were associated with anemia[20,21].

Wasting was found in about 2% of our infants while 11% were overweight. In our study, the relatively low prevalence rate of wasting/stunting along with a relatively high prevalence rate of overweight/obese infants can be explained by noting that our study infants were mostly from middle- to high-income families in which most of them received an adequate nutritional intake. The low prevalence of wasting and stunting infants in our study was similar to a previous study in central Thailand done at Pathum Thani with the prevalence rates of wasting infants and stunting of 3.6% and 8.2%, respectively[14].

There were some strengths and limitations of our study. The main strength is that we found significant associations between IDA and mainly breastfeeding with lower food group diversity intake in our 6-12-month-old infants. Second, a 24-hour food record was used to collect a full day's food intake for accurate infant feeding practices including the amount and ingredients of foods the infant consumed, feeding frequency and dietary diversity, which were reviewed by an experienced nutritionist to ensure the accuracy of the dietary intake record. The main limitation is that the sample size was small with the varieties of food the mothers fed the infants. We were concerned about the iron-rich food sources and the frequency of these food groups the infants were given. However, perhaps related to the limitation of the small sample size in our study, we found no significant differences when calculating the different food groups separately. When the combined number of food groups was at least 4 meaning one of the iron-rich sources would have to be included, we found a significant difference between the infants with anemia and no anemia, indicating consuming at least one of the iron-rich food sources, either meat or eggs or dairy products, was adequate to prevent anemia. Second, the infants were enrolled in a Well Child Clinic of a university hospital, potentially leading to a selection bias that favored infants from families in an urban area with middle- to high-income levels and parents with higher education backgrounds. Despite these potential limitations, however, our study identified a clear association between iron deficiency anemia and breastfeeding with lower food group diversity given to infants. Practitioners can use the findings of the study to ensure their patients receive current recommendations for a proper diet, which is very important in development. At the time we conducted this research, the Royal College of Pediatricians of Thailand recommended universal screening for anemia in infants aged 9–12 months. However, our study found a 20-25% prevalence of IDA in infants aged 6-7 months who were mainly breastfed. Thus, we suggest that mainly breastfed infants should be screened for anemia at an earlier age of 6-9 months because breasted infants were more likely to be anemic than those who were formula-fed. Furthermore, we suggest preventing iron deficiency anemia by a supplemental dosage of 1-2 mg/kg/day of elemental iron to mainly breastfed infants starting at 4 months of age as recommended by the American Academy of Pediatrics (AAP) and recently recommended by the Royal College of Pediatricians of Thailand. Future research is still required on daily supplementation with 1-2 mg/kg of elemental iron in mainly breastfed infants to increase iron storage beginning at age 4 months as in the AAP recommendations[23].

Conclusion

In our study, infants who were mainly breastfed and given fewer than 4 food groups in their daily complementary meals were at risk of anemia. This suggests that in our setting, infants aged 6-7 months should be mainly breastfed but with at least 4 food groups diversity in their complementary meals as recommended by the WHO to prevent iron deficiency and other micronutrient inadequacies.

References

1. World Health Organization. Breastfeeding [homepage on the Internet]. Geneva: WHO; 2021 [cited 2023 Dec 25]. Available from: https://www.who.int/health-topicsbreastfeeding#tab=tab_1.
2. World Health Organization. Complementary feeding [homepage on the Internet]. Geneva: WHO; 2021 [cited 2023 Dec 15]. Available from: https://www.who.int/health-topics complementary-feeding.
3. World Health Organization. Infant and young child feeding [homepage on the Internet]. Geneva: WHO; 2021 [cited 2023 Dec 15] Available from: https://www.who.int/data/nutrition/nlis/info/infant-and-young-child-feeding#.
4. Ruel MT, Menon P. Child feeding practices are associated with child nutritional status in Latin America: innovative uses of the demographic and health surveys. J Nutr 2002;6:1180-7.
5. The World Bank. The World Bank in Thailand [homepage on the Internet]. Bangkok: The World Bank; 2018 [cited 2023 Dec 25]. Available from: https://www.worldbank.org/en/country/thailand/overview
6. Winichagoon P. Transition of maternal and child nutrition in Asia: implications for public health. Curr Opin Clin Nutr Metab Care 2015;18:312-7.
7. Rah JH, Melse-Boonstra A, Agustina R, van Zutphen KG, Kraemer K. The triple burden of malnutrition among adolescents in Indonesia. Food Nutr Bull 2021;42:S4-8.
8. Christian AK, Dake FA. Profiling household double and triple burden of malnutrition in sub-Saharan Africa: prevalence and influencing household factors. Public Health Nutr 2021;26:1-14.
9. Puwanant M, Jaruratanasirikul S, Chaithaweesup P, Boonrusmee S, Chimrung K, Sriplung H. Complementary feeding, food group diversity and probability of nutrient adequacy among 6-12-month-old infants in Southern Thailand. J Health Sci Med Res 2024;42:e20231016.
10. Rojroongwasinkul N, Kijboonchoo K, Wimonpeerapattana W, Purttiponthanee S, Yamborisut U, Boonpraderm A, et al. SEANUTS: the nutritional status and dietary intakes of 0.5-12-year-old Thai children. Br J Nutr 2013;110:S36-44.
11. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity [homepage on the Internet]. Geneva: WHO; 2011 [cited 2023 Dec 15]. Available from https://apps.who.int/iris/handle/10665/85839.
12. World Health Organization. WHO child growth standards [homepage on the Internet]. Geneva: WHO; 2006 [cited 2023 Dec 15]. Available from: https://www.who.int/tools/childgrowth-standards
13. Supthanasup A, Cetthakrikul N, Kelly M, Sarma H, Banwell C. Determinants of complementary feeding indicators: a secondary

analysis of Thailand multiple indicators cluster survey 2019. Nutrients 2022;14:4370.

14. Thaweekul P, Sinlapamongkolkul P, Tonglim J, Sritipsukho P. Associations between the infant and young child feeding index and nutritional status. Pediatr Int 2021;63:958-64.
15. World Health Organization. Prevalence of anaemia in children aged 6–59 months [homepage on the Internet]. Geneva: WHO; 2021 [cited 2023 Dec 10]. Available from: https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-anaemia-in-children-under-5-years-(-)
16. Benedict L, Hong SA, Winichagoon P, Tejativaddhana P, Kasemsup V. Double burden of malnutrition and its association with infant and young child feeding practices among children under-five in Thailand. Public Health Nutr 2021;24:3058-65.
17. Bureau of Nutrition, Department of Health, Ministry of Public Health, Thailand. Dietary reference intake for Thais 2020 [homepage on the Internet]. Bangkok: Ministry of Public Health; 2021 [cited 2023 Dec 25]. Available from http://www.nutrition.anamai.moph.go.th/images/dri2563.pdf
18. Di Maso M, Eussen SR, Bravi F, Moro GE, Agostoni C, Tonetto P, et al. Dietary intake of breastfeeding mothers in developed countries: a systematic review and results of the MEDIDIET study. J Nutr 2021;151:3459–82.
19. Carretero-Krug A, Montero-Bravo A, Morais-Moreno C, Puga AM, de Lourdes Samaniego-Vaesken M, Partearroyo T, et al. Nutritional status of breastfeeding mothers and impact of diet and dietary supplementation: a narrative review. Nutrients 2024;16:301.
20. Kathuria N, Bandyopadhyay P, Srivastava S, Garg PR, Devi KS, Kurian K, et al. Association of minimum dietary diversity with anaemia among 6-59 months' children from rural India: an evidence from a cross-sectional study. J Fam Med Prim Care 2023;12:313-9.
21. Thaweekul P, Surapolchai P, Sinlapamongkolkul P. Infant feeding practices in relation to iron status and other possible nutritional deficiencies in Pathumthani, Thailand. Asia Pac J Clin Nutr 2019;28:577-83.
22. The Royal College of Pediatricians of Thailand & Pediatric Society of Thailand. Guidelines for child health supervision from 0-18 years old [homepage on the Internet]. Bangkok: The Royal College of Pediatricians of Thailand & Pediatric Society of Thailand; 2021 [cited 2024 May 10]. Available from: http://www. Guideline-in-Child-Health-Supervision-24-9-2021.pdf
23. Baker RD, Greer FR. Committee on Nutrition American Academy of Pediatrics. Diagnosis and prevention of iron deficiency and iron-deficiency anemia in infants and young children (0-3 years of age). Pediatrics 2010;126:1040-50.