Review Article

Breaking the Cycle of Stunting Beginning in the First 6 Months of Life Through Effective Breastfeeding and Timely, Appropriate Complementary Feeding

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ABSTRACT

Introduction: Childhood undernutrition is a significant public health indicator of a country. A publication by the Institute for Public Health and Nutrition Division stated that the total prevalence of underweight was 11%, stunting 18%, wasting 14.5% among infants below 6 months. Impactful nutritional interventions are needed to overcome poor growth during early infancy.

Case Illustrations: The author presents two typical cases to enhance understanding of the impact of effective breastfeeding and timely initiation of complementary feeding.

Discussion: Factors such as ineffective breastfeeding patterns (obtaining mostly foremilk from both breasts per feeding), poor feeding practices, insufficient dietary intake, maternal nutritional deficiencies, and lack of awareness about the timing of introducing solid foods contribute to faltering growth, nutritional anaemia, and developmental delays. Current research supports introducing complementary foods between 4 and 6 months of age when developmental readiness is achieved, while continuing effective breastfeeding. Nutritionally sound complementary feeding should focus on dietary diversity, nutrient-dense foods, appropriate texture progression, responsive feeding practices, and avoiding foods with low nutritional value.

Conclusion: Effective breastfeeding and proper, early complementary feeding, started between 4 and 6 months of age and provided with adequate frequency, quantity, diversity, and nutrient density, are essential for healthy infant growth and development. Enhancing caregiver education and promoting good feeding practices are practical strategies to reduce stunting, prevent micronutrient deficiencies, and improve long-term health and developmental outcomes.

Keywords: effective breastfeeding, complementary feeding; porridge, stunting; child nutrition; infant feeding; anaemia; dietary diversity; Malaysia.

INTRODUCTION

Every child has the fundamental right to adequate nutrition for growth and development. According to the National Health and Morbidity Survey (NHMS) 2022, the rate of stunting in children under five years, being underweight, and wasting among Malaysian children are 21.2%, 15.3%, and 11.0%, respectively[1]. The magnitude of malnutrition burden among infants below 6 months of age in Malaysia is worrying. The national prevalence of 3 parameters in this group showed underweight (WAZ<-2SD) was 9.4%, severe underweight (WAZ<-3SD) was 1.6%, stunting (HAZ<-2SD) was 13.9%, severe stunting (HAZ <-3SD) was 4.1%, while wasting (WHZ <-2SD)

was 10.9 % and severe wasting (WHZ <-3SD) was 3.6%[2]. The prevalence of wasting remains seriously concern as it continues to rise from 10.9%[2] in infants below 6 months to 11.9%[1] in all children under 5 years, whereas stunting increases from 13.9%[2] to 20.5%[1].

Despite being richer than many neighbouring countries that have successfully reduced stunting in children younger than 5 years old since 2000, Malaysia, however, has seen a constantly rising stunting trend, with a prevalence of 24% in 2024[3]. This reveals critical systemic issues in child nutrition and health. Despite much efforts[4,5] being carried out within Ministry of Health, the practice insufficiently addresses a specific standardised approach for children with poor growth. There is not much intersectoral leadership to combat this issue, such as more sustainable measures to overcome poverty, safeguard food marketing, filter mass communication on effective nutritional practice and prevent adolescent pregnancy.

Complementary feeding can be considered between 4 and 6 months[6,7], in infants with poor growth[5,8,9] who are developmentally ready, after all the efforts to improve breastfeeding practices have been undertaken[9].

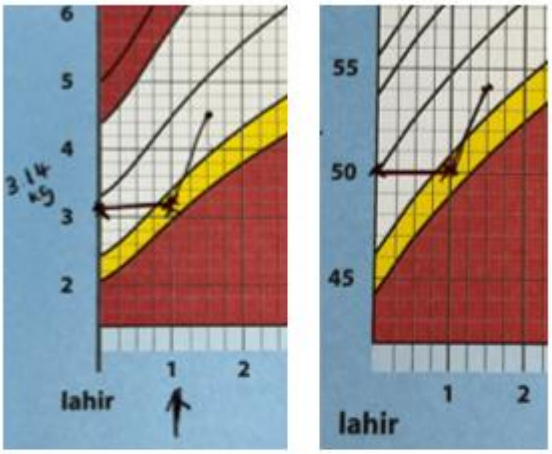
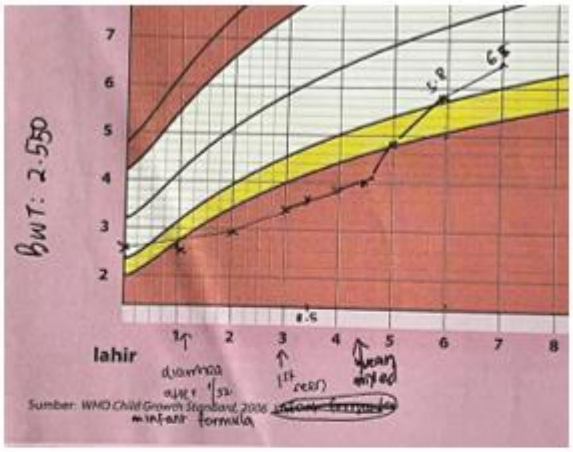
Infant experiences maximum growth velocity and development between birth and 6 months of age. This growth, once stunted, together with inadequate cognitive stimulation, iron-deficiency anaemia, and other factors, represents important major risk factors for long-term cognitive neurodevelopment potential[10,11,12], as most cerebral growth occurs in the first 2 years of life. This writeup is to simplify and stress the two most impactful steps in infants below 6 months. Often, healthcare providers and parents are overly anxious about allergies when introducing foods between 4 and 6 months. In fact, Fleischer DM et al., in the consensus approach to the primary prevention of food allergy through nutrition, confidently reassured that the introduction of diverse food[7] during this period may help to prevent of food allergies[7].

Case Illustration

The author presents two typical cases involving infants aged one and three months, respectively, to enhance understanding of the impact of effective breastfeeding and timely initiation of complementary feeding (Table 1).

These two case illustrations highlight that there is always something simple that everyone can do, something basic that everyone can know, and a key that everyone can use to solve a nutritional problem. The focus is on effective breastfeeding by understanding the physiology behind hindmilk and timely, appropriate complementary feeding between 4 and 6 months, as breastmilk or formula milk alone during this critical period is often no longer sufficient for an infant to grow, leading to the typical right turn of the growth chart between 4 and 6 months. The outcomes of these two cases represent many other clinical cases that the author has managed, provided that the mothers carried out what was advised.

Table 1. Case illustrations of common breast-feeding issues.

Case 1	Case 2
	
Admitted for no weight gain at one month old. The mother was breastfeeding both breasts multiple times during one feeding. There was a fungal infection over neck and perineal regions, with oral thrush. The child was not contented and often cried at night. The mother never had a good sleep at night. After a 30-minute session of feeding counselling by the author, the mother was advised to feed from one breast per feeding until hindmilk, then use the other breast for the next feeding. The fungal infection was treated. The next day, the mother was very happy that the infant can sleep longer and that she also had a good rest. The weight continued to increase over just 2 weeks and remained within the normal range for weight and height thereafter. The infant was fed with fat-rich hindmilk, giving him satiety and good sleep, which enhance growth.	This girl was referred to the author at the age of three months for faltering growth. The mother was breastfeeding her from both breasts multiple times during one feeding. She had a history of diarrhoea at one month old after one week of introducing add-on formula milk by the mother. Formula milk was discontinued. The child was not contented after breastfeeding and often cried at night. The mother was advised to practise feeding from one breast per feeding until hindmilk. then use the other breast for the next feeding. She was reviewed again at 4 months old and complementary feeding was introduced. The infant's weight and height continued to increase and normalised within 2 months. The introduction of complementary feeding after 4 months revealed the benefit of breaking the cycle of stunting.

Challenges

As rule of thumb, adult height can be roughly estimated by doubling the child's height at 2 years of age[13]. This highlights the critical importance of the period from conception to a child's second birthday, underscoring why the first 1,000 days are vital. While fetal growth depends heavily on maternal health and nutrition, development in the first two years of life relies substantially on caregivers for nurturing and nourishment. This two-year window is particularly important for ensuring high-quality nutrition than many other life stages. A recent review by ESPGHAN CoN showed that infants and young children are at particular risk of dietary iron deficiency because of their high iron requirements during this period of rapid growth[6]. Iron-deficiency anaemia in infancy is associated with an increased risk of adverse and potentially long-lasting effects on cognitive development[14]. Iron therapy in iron-deficient children may improve growth rate[15]. Poor growth during this stage is associated with lower survival rates, an increased risk of obesity and diet-related non-communicable diseases (NCDs) in adulthood, and poorer cognitive and educational outcomes[16]. Since height lost due to poor growth in early childhood may not be fully recovered, height-for-age is an important public health indicator of a country's nutritional status. Breaking the cycle of stunting requires timely introduction of responsive, nutritious complementary feeding, which may help reduce the risk of iron deficiency anaemia[6] and support appropriate growth.

In Malaysia, many mothers nowadays also face nutritional deficiencies, with anaemia during pregnancy estimated at 31.6%–34.6%[17.] Inadequate maternal nutrition during pregnancy and lactation may affect maternal nutritional status and potentially influence some aspects of breastmilk composition, highlighting the importance of adequate maternal dietary intake.

Recommendation

The European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) recommends introducing complementary feeding between 4 months (17 completed weeks) and 6 months of age while continuing breastfeeding[6]. Indicators of readiness include interest in food, hand-to-mouth activity, persistent hunger after breastfeeding, declining growth parameters, and developmental milestones such as good head control, the ability to sit with support, and effective swallowing. Responsive feeding should be encouraged, avoiding pressuring infants to finish meals. Establishing structured meal routines can foster healthy eating behaviours. For preterm infants, there is no consensus on the optimal timing of complementary feeding. In general, introduction is considered between 5 and 8 months of postnatal age or after at least 3 months of corrected age, depending on the level of prematurity[18]. Family preferences and cultural practices should be considered while providing clear, evidence-based guidance.

An adequate diet is marked by dietary diversity which may help foster prevention of food allergy[7], high nutrient density, inclusion of animal-source foods, fruits, vegetables, fortified foods, or vitamin and mineral supplements, alongside continued breastfeeding[16]. Caregivers should avoid foods and beverages with low nutritional value, added sugars, salt, or ultra-processed commercial foods[16]. Porridge should be prepared simply, cooked until soft,

mashed with a spoon to a medium consistency, and served without blending or filtering, with no added salt, starting with a few tablespoons 2 to 3 times a day after[8] the effective breastfeeding. After a few days, a single ingredient[7] (such as meat, fish, carrot, pumpkin, peas, etc) can be added and cooked with rice, increasing the frequency to 3 to 5 times daily for about two weeks. Gradually, more varieties and texture progression can be introduced, such as mixing a quarter of a hard-boiled egg yolk into each feeding to boost nutritional value.

To achieve nutritional goals, children should consume foods from at least 5 of the 8 main food groups: breast milk, carbohydrates/grains, beans/peas, dairy products, vegetables/fruits, orange-coloured vegetables or fruits, eggs, and meats[16,19]. Portion sizes should be measured using the child's hand size: one to two palm-sized portions each for carbohydrates and proteins, and one fist-sized portion each for vegetables and fruits. A balanced, diverse diet can help prevent anaemia, enhance iron absorption, and support healthy growth and better cognitive development. Lastly, avoiding gadget use and encouraging infants to sit with the family during meals enhances bonding, stimulates curiosity, and creates meaningful opportunities for interactive parenting and a fun mealtime.

To optimise breast milk production, mothers should adopt demand or responsive breastfeeding and nurse from one breast[20,21] at a time to get fat-rich hindmilk, alternating sides (the author has been practicing this for more than 25 years, with good result in weight gain based on clinical observation) every 2–3 hours[22]. It is not necessary to feed from both breasts at each feed, but the other side should be offered first during the next feeding[20]. If the infant is still hungry after finishing the first breast, the second breast can then be offered if the infant still wants it[20]. Even in a normal healthy child, complementary feeding can be introduced between 4 and 6 months of age[6,22]. For infants with poor growth, complementary feeding can be safely introduced as early as four to six months[5,7,8,23]. Catch-up growth is often achievable through timely feeding interventions and close monitoring by healthcare professionals. Effective breastfeeding and complementary feeding are among the most significant turning points in these first two years. The World Health Organization (WHO) defines it as a process that begins when breast milk or infant formula alone no longer meets the nutritional requirements of infants, necessitating other foods and liquids alongside breast milk or a substitute. This represents a sensitive period in human development, offering a crucial opportunity for growth and development through the timing and method of introducing solid foods.

Challenges to implement the Recommendation

There is always a practice gap. We do need to identify local focal persons as champions to implement and monitor the recommended practice and correct all the misconceptions at regular intervals. Malaysia advocates exclusive breastfeeding thorough the country. Secondary data extracted from National Health and Morbidity Survey (NHMS) 2016 revealed that overall prevalence of infants below 6 months of age who were exclusively breastfed was 40.3%, bottle-feeding was 51.9%, while predominant breastfed was 56.6%[1]. This translates into approximately 60% being either predominantly breastfed or formula fed. Non-predominantly breastfed infants below 6 months of age were more likely to be wasted[1], and this becomes our burden.

Complementary feeding practices are heavily influenced by national policies, family traditions, culture, myths, and

healthcare professionals' beliefs[18]. Unfortunately, several misconceptions persist. The introduction of complementary foods is almost strictly withheld due to the rigid compliance with the exclusive breastfeeding policy without addressing the adverse impacts of compromised growth, immunity and cognitive development in infants below 6 months. Even though the *Training Manual on approach to unwell children under 5 years (ATUCU-5)*[5], a public health programme, states that it is doctor's prescription to start complementary feeding in children below 6 months with one of these three conditions: shows interest in semisolid foods, appears hungry after breastfeeding, or is not gaining weight adequately, many doctors are still scared of being reprimanded. This is even more taboo for nursing staff when introducing complementary feeding in infants below 6 months. Ultimately, the primary goals of complementary feeding—to support adequate physical growth, prevent faltering growth, foster neurological and taste development, and encourage healthy eating behaviours—are not being achieved.

Teaching about blending porridge or other foods from official sources and social media should be avoided. Blending gives porridge, a slightly metallic, bitter and sometimes "off" taste due to oxidation during the blending process. The hygiene and cleanliness of blender are difficult to maintain. Porridge should be cooked until soft then mashed to preserve the original taste of the food. Malaysia has a rapidly growing food industry and produces many processed commercial foods for infants that potentially lead to nutritional imbalance. Some families choose commercial food for its convenience rather than freshly prepared home-cooked food. Filtering porridge is still being practised in some places. This is an unnecessary step and is potentially overdone for a prolonged period, preventing nutritious porridge from being introduced in a timely manner.

The Way Forward

Malnutrition in infants below 6 months of age is significantly associated with poorer socioeconomic status, low birth weight, not being exclusively breastfed, poorer maternal nutritional status and ethnicity[1]. Perhaps we shall adopt the approach of our neighbouring country, Indonesia, which addresses stunting through a strong national policy with multisectoral involvement, political leadership, and commitment from other ministries. This includes safeguarding infant commercial foods, together with clear and intensive communication on food quality and our porridge preparation steps, and empowering healthcare staff and the community to recognise of wasting and stunting and bring about behavioural changes.

Policy should strongly advocate responsive breastfeeding, allowing the infant to feed effectively from one breast until the infant lets go the breast, followed by the second breast if he/she still wants it. At the next feeding, the other breast should be offered first. For healthy infants with satisfactory growth, complementary feeding should generally be introduced around 6 months when developmentally ready. For infants between 4 and 6 months with poor or faltering growth, breastfeeding should first be assessed and optimised to one breast per feeding. If growth remains inadequate and the infant is developmentally ready, complementary feeding may be considered under healthcare professional supervision, particularly when the infant shows interest in semisolid foods, appears hungry after breastfeeding, or is not gaining weight adequately.

Effective breastfeeding and proper complementary feeding—initiated at the right time, with appropriate frequency, portions, and variety, while correcting misconceptions—profoundly impact a child's long-term healthy growth and cognitive development. Fundamentally, they remain among the most important tools for breaking the cycle of stunting and ensuring a healthier future for the next generation.

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Conflict of Interest

The authors declare no conflict of interest.

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