

# Maternal Nutrition Macronutrients VS. Micronutrients

1. Improving nutrition and establishing healthy eating habits in adolescent girls and in the preconceptional period of women paves the way for healthy pregnancies and healthy babies.
2. A woman's fitness and health is the foundation for her future and that of generations to come.
3. Benefits for the next generation include reduced risk of stunting, obesity and chronic non-communicable diseases and improved cognitive and behavioural development.

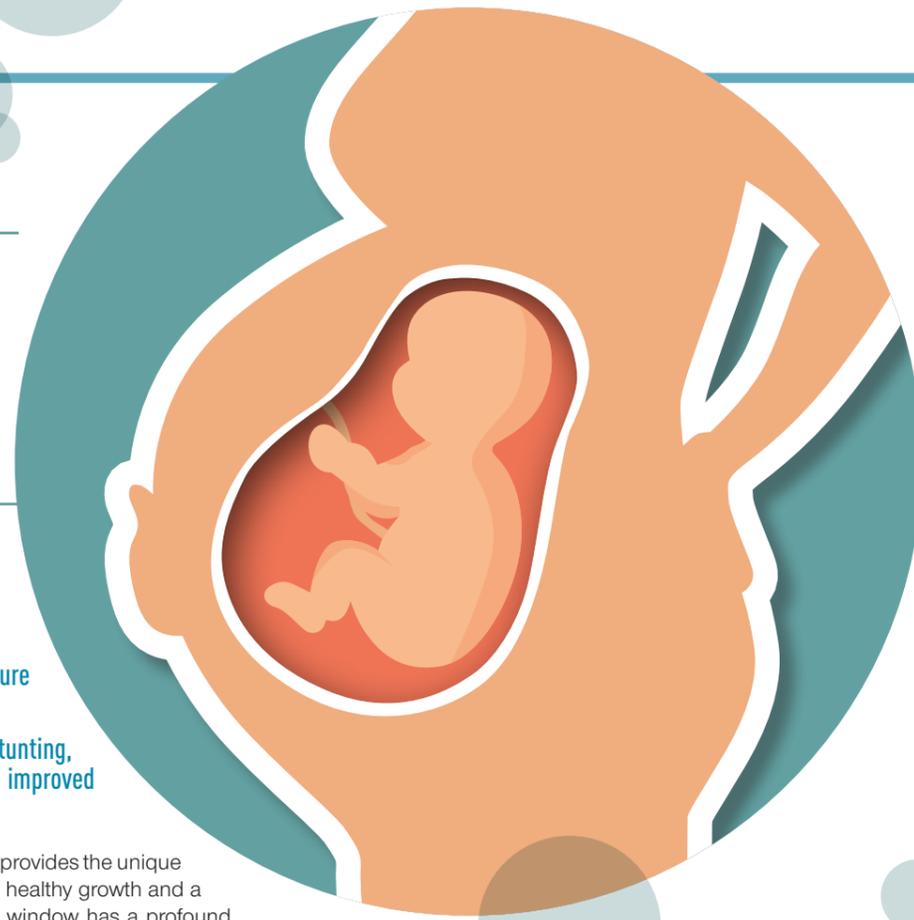
Nutrition during pregnancy and in the 1st two years of a child's life provides the unique opportunity and essential building blocks for brain development, healthy growth and a strong immune system. The right nutrition during this 1000 day window has a profound impact on a child's ability to grow, learn and thrive—and a lasting effect on a country's health and prosperity. In fact, a growing body of scientific evidence shows that the foundations of a person's lifelong health—including their predisposition to obesity and certain chronic diseases—are largely set during this 1000 day window.

Maternal malnutrition may alter physiologic adaptation and changes in pregnancy, leading to infertility, fetal malformations and pregnancy diseases. Malnutrition early in life can cause irreversible damage to children's brain development and their physical growth, leading to a diminished capacity to learn, poorer performance in school, greater susceptibility to infection and disease and a lifetime of lost earning potential. It can even put them at increased risk of developing illnesses like heart disease, diabetes and certain types of cancers later in life.

The impact of poor nutrition early in life has lasting effects that can transcend generations. This is seen throughout the world as malnourished women given birth to malnourished daughters who grow up to become malnourished mothers themselves, thereby perpetuating the cycle. Many of these countries are said to have the double burden of malnutrition— continued stunting of growth and deficiencies of essential nutrients along with the emerging issue of obesity.

Epidemiological analyses and animal studies have shown that nutritional influences early in life can influence the responsiveness of the body to the nutritional environment much later in life. The nutritional well-being of women as they conceive affects not only the development of the fetus but also the genetic organization of the future metabolic responsiveness of the child and, later, the adult.

The area of epigenetics has become one of the fastest growing and most complex areas of biological science. In the 'fetal programming hypothesis', it was proposed that fetal under-nutrition could occur for a variety of reasons, including poor maternal diet and/or problems with the mobilisation and transfer of nutrients from mother to fetus (table 1). In the face of this threat to survival, the fetus makes adaptations to limit its growth, prioritise the development of essential tissues, and hasten maturation. For example, there is a reduction in the blood supply to the lower body and limbs to preserve brain blood flow, and with it the sacrifice of muscle deposition and the development of the liver, pancreas and kidneys. The secretion of and sensitivity to hormones that promote fetal growth (e.g., insulin and insulin-like growth factors) is reduced. The hypothalamus-pituitary-adrenal axis is up-regulated to advance fetal maturation. It was argued that these changes in the fetus or young infant became permanent, an example of the biological phenomenon known as 'programming'.



In developed countries, with increasing energy intake, micronutrient intake seems to be below recommendations for pregnancy for the essential micronutrients e.g. iron, folate and vitamin D. Moreover, micronutrient supplementation seems to have decreased in the last decade, while the dietary pattern has significantly worsened towards a high-fat and low-quality diet. It seems necessary to encourage women to establish a healthy dietary practice before conception and to use individualized supplementation related to specific conditions such as low socioeconomic status, obesity, adolescence, vegetarian diet, twin offspring, celiac disease and specific pregnancy risks. Programs of food fortification for folate need to be evaluated in order to avoid a deficiency, with more attention to high-risk women (i.e. adolescents and mothers of advanced age). However, potential risks with prolonged supplementation need to be further investigated.

Paternal nutrition matters as well. Paternal overweight or obesity induces paternal programming of offspring phenotypes likely mediated through genetic and epigenetic changes in spermatozoa. These programmed changes to offspring health appear to be partially restored via diet and exercise interventions in obese fathers preconceptionally, which have been shown to improve aspects of sperm DNA integrity.

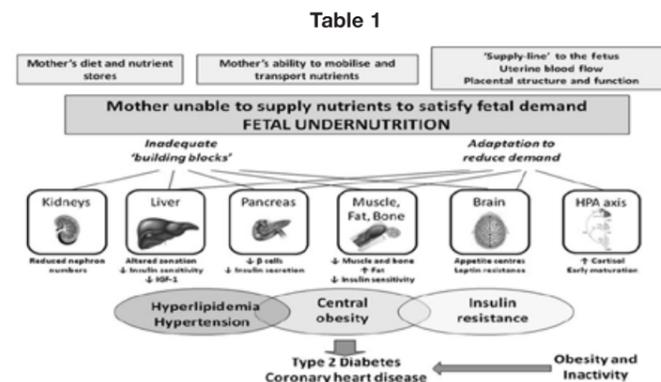
Undernutrition causes approximately 3.5 million death of women and children. Over-nutrition is producing an increase in chronic non-communicable diseases such as diabetes and hypertension. Micronutrient deficiencies affect 2 billion people worldwide and are caused by an inadequate diet which lacks vitamins and minerals. In Singapore, dietary gaps & nutritional inadequacies point to the relevance of nutritional supplementation today (Table 2 and 3). Women should be encouraged to establish healthy dietary and lifestyle practices prior to conception. Nutrition education and evidence-based, individualized nutrition supplementation that takes account of the phenotypic, genotypic and metabolic differences among individuals of the same population can address nutrient gaps in the diet and improve maternal & fetal health and outcomes.

**Table 2: Distribution (%) of percentage of RDA met for calcium among adult Singapore female residents, by age (years) groups**

	< 50%	< 70%	< 100%	≥ 100%
18-29	10.3	27.7	66.8	33.2
30-39	6.1	19.7	50.0	50.0

**Table 3: Distribution (%) of percentage of RDA met for iron among adult Singapore female residents, by age (years) groups**

	< 50%	< 70%	< 100%	≥ 100%
18-29	6.5	27.5	68.1	31.9
30-39	5.6	22.4	65.6	34.4



Graduated in 2003 from medical school of National University of Singapore, Dr Chin pursued her specialist training locally and obtained her postgraduate qualification from Royal College of Obstetrics and Gynaecology, United Kingdom in 2008. She is a Fellow of the Royal College of Obstetricians & Gynaecologists (London) and a Fellow of the Academy of Medicine (Singapore).

Having worked in KK Hospital for many years prior to setting up her own practice, she has vast experiences in managing various obstetric and gynaecological cases including deliveries and gynaecological surgeries.

She has a special interest in minimally invasive surgery especially advanced hysteroscopic surgery for which she did her HMDP (human manpower development plan award) in Japan in mid-2014. She is accredited for advanced minimally invasive surgeries. She is familiar with hysteroscopic ligation and has extensive experiences in hysteroscopic myomectomies.

She also takes an interest in pre-invasive diseases, for which she obtained colposcopic and laser accreditations. She set up the molar clinic for the KK hospital during her time there to better look after the special needs of this group of patients.

Apart from her clinical roles, she is passionate about teaching and imparting clinical and surgical skills to the juniors. She was appointed as clinical lecturer and MBBS examiner at NUS Yong Loo Lin School of Medicine and currently still holds Clinical Physician Faculty Member at SingHealth Residency Program as part of her role to train future specialists. She is also actively involved in clinical research. She has published on several scientific journals and presented in many international conferences. She is an editor to several international journals.



**DR CRYSTAL CHIN HSUAN**  
CONSULTANT OBSTETRICIAN & GYNAECOLOGIST  
MBBS, MRCOG (UK), FAMS

**HAFcare Novena Clinic**  
38 Irrawaddy Road #09-35 Mount Elizabeth  
Novena Specialist Centre S (329563)