# PREVENTIVE PEDIATRICS

**Nguyen Cong Khanh[1], Nguyen Hoang Nam[2]**
*[1]Vietnam Pediatrics Association*
*[2]Vietnam National Children's Hospital*

**ABSTRACT**

*Preventive pediatrics is defined as the prevention of disease and promoting health. Any child's health reflect the interaction of various factors including the individual's genetic endowment, nutrition, environmental factors, familial care, school education, social, politic and economic circumstances, and availability of health care. There are 3 levels of prevention. The aims of primary level are promoting health and preventing occurrence of disease. The aims of secondary level are preventing recurrence and reducing consequences of disease. The aims of tertiary level are reducing progress and limiting impairment of disease. Preventive pediatrics has been broadly classified as antenatal and postnatal prevention. Preventive pediatrics should be early intervention by specific means depend of physiological and pathological features of child developmental periods.*

***Keyword:*** *Pediatrics, Disease Prevention*

Preventive pediatrics is defined as preventing diseases and promoting physical, mental and social health so that children have good health.

## DETERMINANTS OF CHILD HEALTH

Children's health and development reflect the interaction of various factors:

- Individual's genetic endowment;
- Nutrition, lifestyle;
- Living environment, including housing, customs, sanitation, climate;
- Familial care, school education;
- Economic and social circumstances;
- Health care, treatment and prevention of diseases.

*Individual's genetic endowment* is highly dependent on lineage, ethnicity, family, parents. However, genetic endowment is also greatly influenced by the environment, which can affect the regulation of gene activity and expression. It is possible to improve genetic factors. Children's health care must aim to maximize the available genetic endowment, limiting the influence of adverse genetic factors for children.

*Nutrition, lifestyle* are important for the formation, development of pregnancy, physical growth, mental development, immunity enhancement. Therefore, nutritional care is vital from the prenatal period to adulthood, particularly during the first 1000 days of life. Prenatal and maternal nutrition plays a significant role in the complete formation and structure of the fetus or or complete "fetal programming", helping babies develop well after birth, preventing many chronic diseases later. Adequate postnatal and age-appropriate nutrition helps children catch up with growth, prevents malnutrition, overweight, obesity, fosters intellectual and emotional development, and strengthens the immune system to prevent and combat illnesses.

*Living environment* such as housing, sanitation, clean water supply, climate also greatly affects health. Damp and poorly lit housing is a risk factor for childhood rickets. Inadequate sanitation and clean water supply increase susceptibility to diseases. Climate change changes the living environment, weather and ecology, affecting health and disease.

*The familial care, society and school education* has a great impact on child growth and

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*Corresponding Author: Nguyen Cong Khanh*
*Email: nguyencongkhanh.vpa@gmail.com*
*Address: Vietnam Pediatrics Association*

development. The quality of care and nurturing of parents, families, relationships between children and primary caregivers as well as care received during early childhood in daycare centers and preschools, accelerates a child's development in motor skills, mental faculties, and personality formation. School education contributes to a comprehensive development of a child's knowledge, intellect and creative thinking.

*Economic and social circumstances* greatly affect children's health. Inequality between affluent and developing nations creates disparities in child health across countries. Even within wealthy nations, health indicators for children vary between those from favorable and less favorable circumstances. Vietnam is categorized among countries with low child mortality rates in the Asia-Pacific region and is closer to nations with significantly higher per capita income. However, the child mortality rate in rural areas is twice that of urban areas, and infant mortality among ethnic minorities is 2 to 3 times higher than among the Kinh ethnic group (Figures 1 and 2).

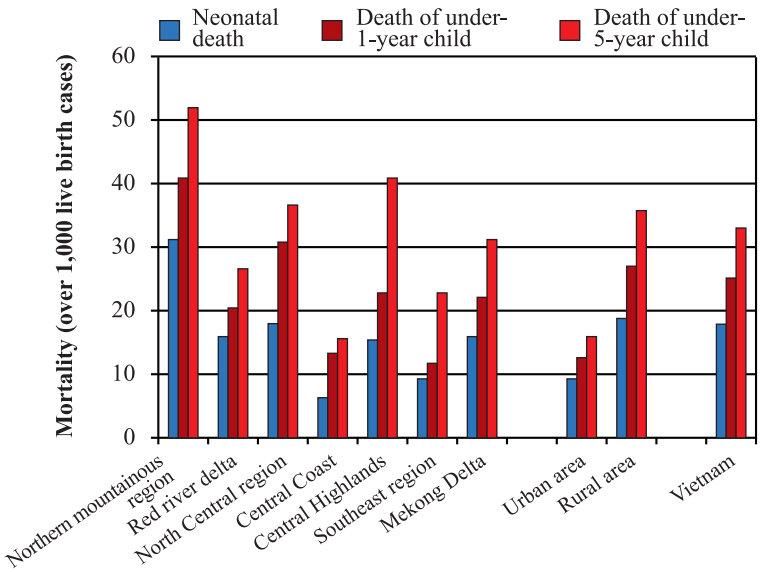


**Figure 1.** Neonatal, under-1-year-old and under-5-year-old mortality by region

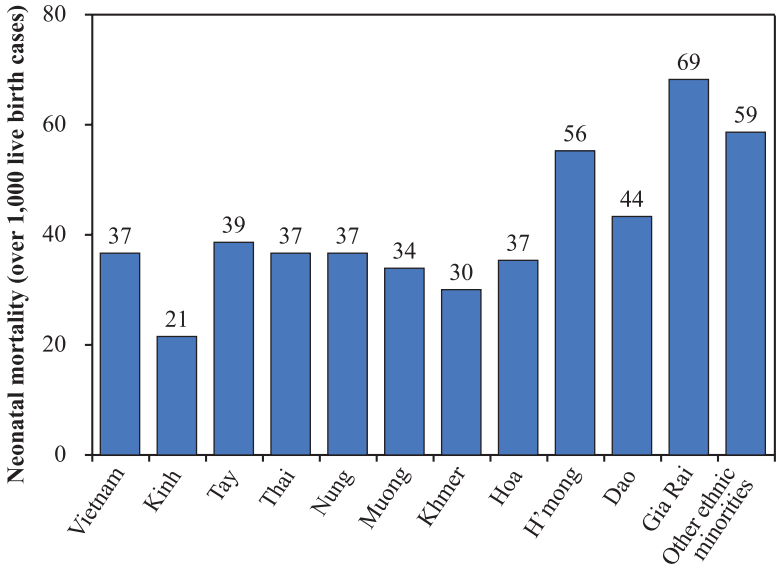


**Figure 2.** Neonatal mortality by ethnic group

*Source: Vietnam National Health Survey 2001-2002*

Economic and social circumstances not only affect mortality rates, but also other health indicators (Figure 3, 4),

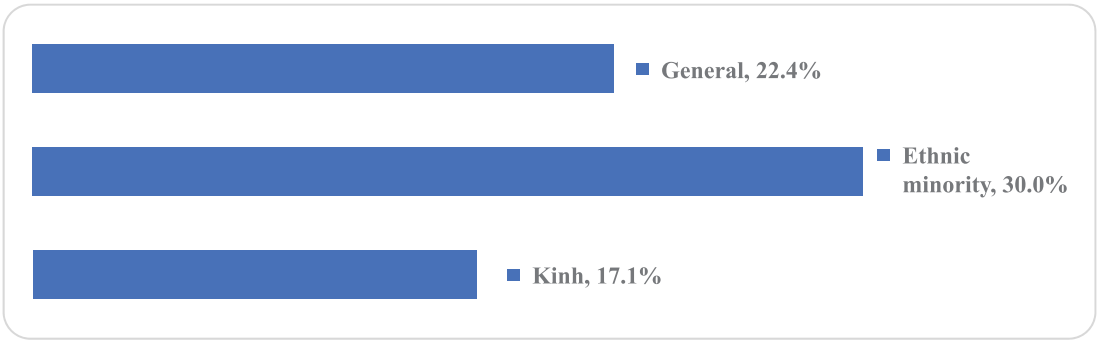


**Figure 3.** Children's malnutrition rate by ethnic group

*Source: National Nutrition Census 2010-2020*

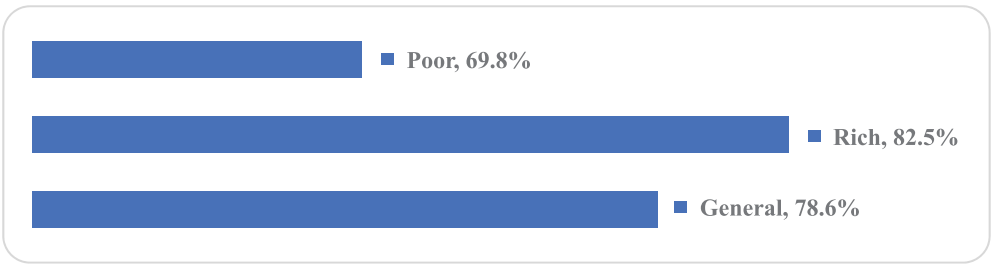


**Figure 4.** Immunization rate of children aged below 5 by family economy

*Source: MICS Survey 2021*

Health care, treatment and prevention of diseases have a great direct impact on health improvement, reducing child mortality. Since the inception of the Convention on the Rights of the Child, countries have had many strategies towards preventive care, focusing on health enhancement, child development, prevention of diseases and disabilities for children.

Vietnam Health approach right from the years after 1945 took preventive measure as the main one. The widely developed health care network nationwide has brought great efficiency in people's health care. Under-1-year-old and under-5-year-old child mortality have declined significantly and steadily in recent years and are currently low in the Asia-Pacific region, while reducing rural-urban differences (Figure 5)

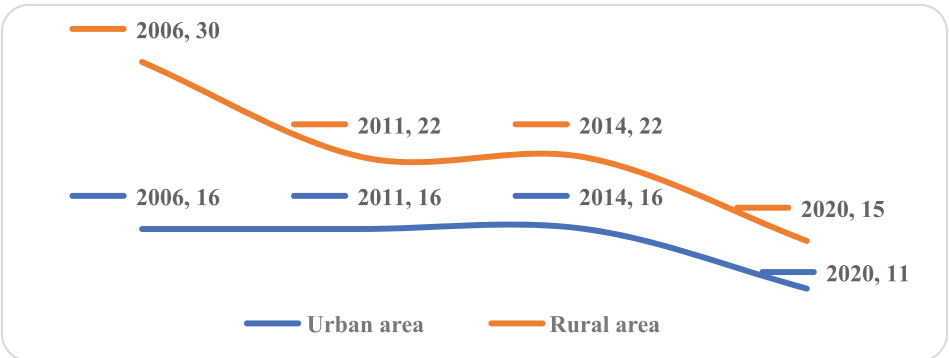


**Figure 5.** Disparity in under-5-year-old child mortality by region

*Source: MICS Survey from 2006 to 2020*

## PRINCIPLES OF PREVENTIVE PEDIATRICS

### *Early prevention, through different periods of childhood.*

The health of individuals is influenced by various factors, accumulating from prenatal life to infancy, childhood, adolescence, and adulthood. Each period presents distinct physiological and pathological features. Therefore, preventive pediatrics must be carried out early, prenatal prevention, postpartum prevention, through childhood, pre-conception, gestational, neonatal, under 1-year-old, young children, older children and adolescent periods. Early prevention is more effective, preventing diseases arising both early and later in life, promoting health from the outset. Late prevention might miss diseases that originated early on.

### *Comprehensive, full 3 levels of the prevention*

Preventive pediatrics is comprehensively defined, is disease prevention and health enhancement, including prevention and treatment, divided into three levels: 1, 2 and 3, with different objectives

Level 1 prevention, or primary prevention, aims to enhance health and reduce the frequency of new diseases by focusing on nutrition, controlling causative factors, or risk factors. For instance, educating on nutrition for health improvement, administering vaccines to prevent infectious diseases, treating streptococcal throat infections to prevent rheumatic fever, iodine supplementation in salt to prevent goiter, prenatal folate supplementation to prevent neural tube defects, and using condoms to prevent HIV transmission.

Level 2 prevention or secondary prevention aims to reduce the disease prevalence, preventing disease recurrence, minimizing disease consequences, and deaths by early diagnosis and treatment. For example, early diagnosis and treatment to cure diseases, penicillin injections for rheumatic fever prevention, screening for congenital hypothyroidism in infants for early thyroxine replacement and preventing cretinism, newborn hearing screening to improve hearing loss in children, advising on contraception to avoid severe birth defects, or preventing genetic diseases.

Level 3 (tertiary) prevention aims to reduce the disease progression or complication, limiting their consequences, including measures to limit disabilities due to diseases or injuries. For example, tertiary disease prevention involves restoring function in children with paralysis to facilitate their integration into life and improve their health.

### *Equity, satisfaction with disease prevention needs for all subjects and individuals*

According to the World Health Organization: "Health equity is the absence of differences in health care among groups of people, regardless of differences in economic, social, gender, ethnicity, demographics and habitat aspects".

In order to realize equity in preventive pediatrics, the children's health care network must be extensive, reaching all regions of the country: urban, rural, plains, mountains, remote areas, and all demographics, covering people of all age. Early and postnatal screening measures can be preventive for each individual.

### *Evidence-based, high-quality*

"Evidence-based pediatrics is the right combination of individual clinical experience with the best evidence from systematic research" (Sackett *et al*., 1996). Contents and preventive measures must be based on accurate research results on epidemiology, physiological and pathological features of childhood periods.

## PREVENTIVE APPROACH TO CHILDHOOD PERIODS

The prevention of diseases and enhancement of children's health must be carried out throughout the developmental periods of childhood, right from the formation and development of the fetus, then neonatal, under-1-year-old, young children, older children and adolescent periods. Each period of childhood has a specific focus on prevention.

***Pre-conception prevention***

A mother's health before pregnancy greatly affects the fetus during conception. Pre-conception prevention includes:

- Enhance the health of women of reproductive age by guiding a healthy lifestyle, balanced nutrition, regular exercise, avoiding unbeneficial habits.

- Advice on conception, such as gestational age (not too young under 18 years old or not too old), optimal frequency of pregnancies, interval between pregnancies (recommended after 3 years).

- Immunization against tetanus, Rubella.

***Prevention during pregnancy***

The fetal period is a very important period for the formation and development of the fetus. The first two weeks after conception are the period of nesting, division of zygotes, mitral embryos, where adverse effects might lead to fetal abnormalities and infertility. From the 2nd to the 9th week, organ formation occurs, where adverse effects might result in miscarriage or major birth defects. From the 10th to 37th week, the fetus develops rapidly; where adverse effects might result in premature birth, low birth weight and functional defects. The prenatal period is said to be the period of "fetal programming" or "early life programming" that shapes the rest of life. Many diseases in adulthood and adults are of fetal origin. Therefore, early preventive intervention from prenatal period is very important, not only to improve children's health, but also to prevent some diseases in adults.

Preventive measures and contents during the prenatal period include:

- Ensure adequate pregnancy nutrition, by enhancing nutrition for pregnant women, In the latter of pregnancy, pregnant women must gain from 11-12 kg. Compared to non-pregnant women, the nutritional needs are significantly higher, with a 10% increase in energy requirements and greater demand for vitamins and minerals. Additional supplements like iron and folic acid are essential to prevent anemia, neural tube defects, stunted fetal development, and preterm birth (Figure 5).

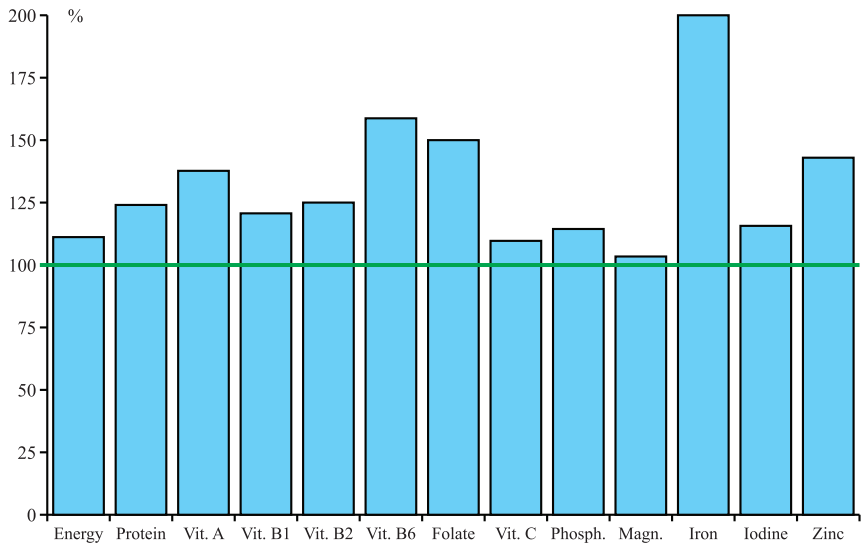


**Figure 5.** Nutritional needs for pregnant women

*Source: According to Koletzko B et al. 2013*

- Undergo a minimum of 3 prenatal check-ups during pregnancy (Recommendation of Vietnam Obstetrics and Gynecology) to monitor fetal development, detect any abnormalities, assess potential risks and predict the due date.

- Provide guidance for safeguarding the fetus, avoiding risks that impede fetal growth, abnormal developments, or anomalies. Avoid exposure to viral infections, especially during the first trimester; use medications cautiously, only when necessary; avoid X-rays, chemical exposure, harmful substances, or radiation.

- Prevent preterm birth by advising cessation of smoking, limiting alcohol intake, eliminating stressors such as depression, violence, or social impediments, and avoiding toxic environments. For women with a history of preterm birth, it is necessary to go to a medical facility to receive steroids for prevention of endometriosis.

- Perform prenatal screening for maternal diseases affecting the fetus, such as anemia, hepatitis B, syphilis, HIV infection, preeclampsia, and other risk factors. In cases where mothers have specific genetic risk factors, pre-birth diagnosis is necessary for appropriate genetic counseling and possible consideration of termination if deemed necessary.

- Administer Anti-D immunoglobulin for Rh(-) mothers to prevent hemolytic disease in newborns due to Rh blood group incompatibility and cerebral nucleus jaundice.

- Recommend natural childbirth, resorting to cesarean section only when medically indicated.

***Prevention in neonatal period***

In the neonatal period, when a baby is just born, there are many physiological changes to adapt to the ectopic environment, such as lung respiration initiation, establishment of full-fledged circulation system, digestive system activation, physiological weight loss and jaundice. Infants are extremely fragile, prone to asphyxia, hypothermia, hypoglycemia, bleeding, infections, and have a high mortality rate. The mortality rate is very high. Studies in Vietnam indicate a neonatal mortality rate of 12 per 1000 live births in 2002, accounting for nearly 50% of deaths under 5 years old and nearly 70% of deaths under 1 year old. The preventive measures during the newborn period are as follows:

- Ensure safe childbirth, prevent asphyxia, birth trauma, conduct sterile umbilical cord cutting, prevent infections, especially in mothers at risk of difficult childbirth, preterm birth, or preeclampsia.

- Provide essential care for newborns. Keep warm, avoid hypothermia, especially in preterm or low birth weight babies, because their ability to regulate body temperature is weak. Sterile umbilical cord care is crucial; the umbilical cord stump is susceptible to infection and can lead to systemic sepsis. Physiological jaundice may occur 3-4 days after birth; instruct mothers on care practices, monitor for early detection of jaundice, increased bilirubin levels, and promptly manage complications like kernicterus.

- Perform breastfeeding soon after birth. Early breastfeeding helps babies recover from rapid physiological weight loss, reduce the risk of diarrhea, necrotizing enterocolitis and other bacterial infections.

- Administer vitamin K to all newborns. A single dose of vitamin K1 injection immediately after birth or multiple oral doses in the first week after birth to prevent hemorrhage, hypoprothrombinin in newborns and young infants.

- Preventive immunization carried out during the neonatal period is immunization against BCG tuberculosis, hepatitis B and polio.

- Screen specific newborn groups suspected of congenital hypothyroidism, metabolic disorders, hearing impairment, primary immunodeficiency (HIV), and hemoglobinopathies for early intervention.

***Prevention for children under 1 year old and young children***

The common characteristics of children at this age are rapid growth and development, high nutritional needs, extensive exposure to the external environment and susceptibility to infections. Common diseases at this period are the ones related to nutrition, such as malnutrition, rickets, iron deficiency anemia, or

conversely, overweight, obesity; and respiratory, gastrointestinal and dental infections. Children of this age are very active, prone to accidents. Preventive measures during this period are as follows.

- Nutritional care is a fundamental measure to meet the demands of rapid growth, development and disease prevention related to both undernutrition and overnutrition, while strengthening immunity. Exclusive breastfeeding is applied for the first 6 months, extending up to 18 months and potentially to 2 years. Introduce complementary feeding providing adequate energy and nutrients from around 6 months. Pay attention to supplementing nutrients rich in vitamin D to prevent rickets; iron to prevent anemia; vitamin A to prevent dry eyes and enhance immunity, and iodine to prevent goiter.

- Immunization is an important preventive measure for the prevention of infectious diseases. Children under 1 year old must complete an extended immunization program, including immunization against tuberculosis, diphtheria, pertussis, tetanus, polio, measles, hepatitis B. Depending on the circumstances, *Hemophilus influenzae type B vaccine* is added for preventing pneumococcal infection, mumps, *Rubella*, *Varicella*, meningococcus and vaccine against new outbreaks.

- Take preventive oral care for dental diseases. Guide children to limit sugar intake, brush their teeth twice a day, and use fluoride toothpaste.

- Accident prevention. During the early childhood, common accidents are falls, injuries, drowning, scalds, poisoning, foreign object choking. Appropriate preventive measures are to organize safe playgrounds, playrooms, age-appropriate toys, closely supervise children near water sources, power sources, fire, boiling water, store medicines in sealed jars out of reach of children, take care of eating and drinking carefully to prevent inhalation of foreign objects, etc.

- Regular examination, early diagnosis, effective treatment of diseases will limit some chronic diseases, reduce complications causing disability in the future. For example, early diagnosis, aggressive treatment of meningitis, meningocephaly-hemorrhagic diseases will reduce severe neurological sequelae. Early diagnosis, good treatment of streptococcal pharyngitis will avoid rheumatic heart disease, glomerulonephritis

- Guide and facilitate physical activity and outdoor play in children is a preventive measure that enhances health, reduces the risk of obesity, promotes proper bone development, and diminishes the risk factors for cardiovascular diseases.

***Prevention in the period of older children and adolescence***

At this period, the children undergo puberty, experiencing rapid physical growth and development, emotional fluctuations, behavioral changes, sexual development, and exploration. Health concerns that require preventive measures during this phase include obesity, mental health disorders such as depression, anxiety, substance abuse like smoking, alcohol consumption, addiction to harmful substances, accidents, especially road accidents, and sexually transmitted infections including unintended pregnancies among adolescents. Additionally, issues related to abuse or abandonment are prevalent challenges at this age. Therefore, preventive measures for this age group include:

- Guide a healthy lifestyle, proper nutrition, balanced nutrients, limit too much sugar, lipids, increase vegetables and fruits, and exercise regularly to avoid overweight and obesity.

- Eliminate harmful health habits, such as smoking, alcoholism, illegal drug addiction, stay away from other social evils.

- Spiritual and psychological care, with a combination of family, school, social organizations, cultural family building advocacy, is a measure to prevent psychological and behavioral disorders, and reduce the rate of child abuse and abandonment

- Sex and healthy sexuality education right from school age for adolescents is an effective measure to prevent sexually transmitted infections and unwanted teenage pregnancies.

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