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Factors Affecting Early Childhood Growth and Development: Golden 1000 Days

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Abstract

Globally, more than 200 million children under five years fail to reach their potential in cognitive and social development due to poverty, poor health, malnutrition, and deficit care. The prevalence rate of cognitive development problem in Bhutan is 15%, 33.5% of children less than five years are stunted and 9.9% of infants are born with low weight of less than 2,500 grams. Five main factors identified in contributing to growth and developments at early childhood are nutrition, parent's behaviours, parenting, social and cultural practices, and environment.

Understanding the extent and magnitude of these problems especially within 1000 days of child includes from the date of conception till the child attends 2 years of age is very important. If timely interventions are taken within this critical period, the problems are reversible and will gain maximum benefits. A healthy child especially within this age will have better cognition and learning capabilities, and consequently have impact on social, economic, physical and cognition. Therefore, healthy children within 1000 days will lay the foundation for nurturing bright school children, healthy and productive adulthood thus will promote Gross National Happiness of the country.

Keywords: Child development; Environment; Nutrition; Parenting; Parent behavior; Social and culture factors

Introduction

Child development is a gradual unfolding of biologically determined characteristics and traits that arises as the child learns from experiences. In developing countries, more than 200 million children under five years fail to reach their potential in cognitive and social development due to poverty, poor health, nutrition, and deficit care. Most of these children live in South Asia and Sub-Saharan Africa and many of them are exposed to multiple risks including poverty, malnutrition, poor health and un-stimulating home environment, which detrimentally affecting their development [1]. Health associated to poverty, nutrition and social factors hinders from attaining to their full developmental potential. Other factors that compromise overall development during pregnancy and after birth are parent's behavioral, dietary deficiencies, chronic infections, exclusive breastfeeding, inadequate feeding practices and lack of stimulation [1].

Therefore, this paper examines factors affecting early childhood growth and development and categorizing them in five main contributing factors in Bhutan with placing more focus on first 1000 days. In addition, it identifies the possible interventions to enhance child growth and development.

Review and Discussion

The first 1000 days of life span from day of conception till the child attends two years of age (UNICEF, Nepal), is consider most important development phase. Early healthy child development includes physical, social, emotional, and cognitive domains of development. What happens to the child in these early days has immense impact on child's development at latter part of the year. Most of the children failing to reach their potential in cognitive and social development are living in South Asia and sub-Saharan Africa [1]. The result of this review and discussions are under the main five factors such as nutrition, parenting, parent behavior, environmental, and social and culture factors as shown in Figure 1.

Nutrition

Maternal nutrition

Nutrition is important before and during pregnancy and is most influential non-genetic factors in foetal development. Women with preconception healthy Body Mass Index (BMI) tend to gain an appropriate amount of weight during pregnancy [2] and women with BMI below 19.1 have fivefold increase in delivering low birth weight baby [3]. Maternal under nutrition is a risk factor for foetal growth restriction and adverse perinatal outcomes [4].

Inadequate intake of good nutrition and mother's poor nutritional status during pregnancy are indicative of intrauterine growth restriction [5] whereby affecting brain development [6]. Low maternal weight before conception is associated with an increased risk of low birth weight and symmetrical growth restriction [7] and pregnancy loss [8]. In developing countries, intrauterine growth restrictions is mainly due to poor maternal nutrition and infections [8], which makes up to 11% of births [9]. Furthermore, low birth weights babies are more likely to be stunted by age of two years [10]. In 2010, 9.9% of 72.2% Bhutanese babies weighed at birth had low weight of less than 2500g but whether this low birth weight is associated with maternal under-nutrition is not known. Similarly, 33.5% of Bhutanese children are found to be stunted [11].

A study in Brazil had shown that low birth weight infant with

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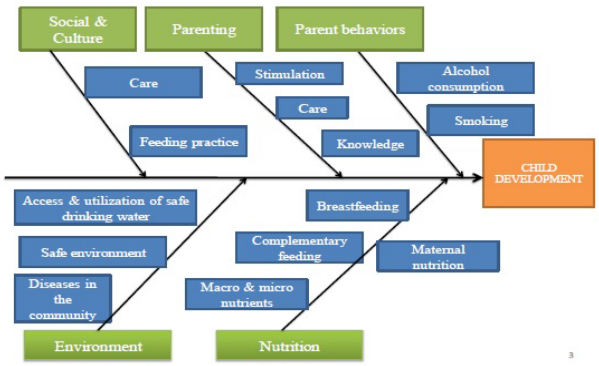


Figure 1: Fish bone diagram for child development causality. Fish bone diagram presenting the factors affecting child development.

intrauterine growth restriction have lower developmental levels than infants with birth weight of 3000-3499 g [12]. Infants born at term with low birth weight in Guatemala had lower cognitive scores at age 2 and 3 years [13] and in Jamaica had poorer problem solving ability at 7 months [12] and lower developmental levels at 15 and 24 months [14]. Moreover, low birth weight infants in Brazil and Jamaica were also rated as less active, less vocal, happy or cooperative [12,14].

Status of foetal development is associated with maternal nutrition and low birth weight is a major risk factor affecting child's mental, physical and cognitive development.

Childhood Nutrition

Breast feeding

Breast milk is ideal and best food for infants [15], it provides a unique nutrient constituting of proteins, carbohydrates and fats needed for optimal cell function and growth. Further, the contents changes to suit the nutrient requirements of child's development with age [8]. Exclusive breastfeeding up to six months of age helps in improving health and development of the child. Breastfed babies are less likely to develop obesity [8] and will have lower cholesterol level in their later life [16]. Fatty acid in breast milk develops brain and thus enhances cognitive development and visual acuity [17,18]. In Bhutan, despite considerable effort put in promoting exclusive breast feeding, only 48.7% of mother breastfed their children exclusively, 59% have initiated breastfeeding within one hour of birth and 65.7% continued to breastfeed up to 24 months [19]. Much effort needs to be emphases in early initiation of breastfeeding along with skin to skin contact between mother and baby in order to help in increasing exclusive breastfeeding.

Complementary Feeding

An appropriate and adequate start of complementary feeding at six months is critical for development. In many developing countries, children of these age groups do not receive timely, appropriate and adequate feeding to grow to optimum level. Adding food too soon takes the place of breast milk which results in a low nutrients and increases risk of illness. Often the child does not receive appropriate nutrients thus resulting in restriction of growth and development. In Bhutan, not all the infants above six months of age are introduce timely complementary feeding, only 66.7% of them received complementary feeding at 6-8 months [19]. Feeding young infants requires active care and stimulation where the caregivers need to be responsive to the child clues for hunger and also encourages the child to eat. Most of the health workers and nurses in Bhutan are trained on Infant and Young Child feeding and Care for child development counselling whereby they can help the caregivers in feeding their children.

Complementary feeding contributes to child growth and development as infant from 6 months to18 months are especially vulnerable in developing malnutrition [20]. According to UNICEF, a third of children younger than 5 years in developing countries have linear growth retardation or stunting [21]. Stunting is a chronic malnutrition and is caused by poor nutrition and infection [1]. Stunting are also associated with lethargy, less positive effect, lower levels of play and poor attention [6]. Like global pattern, stunting in Bhutan is increasing dramatically from 6 months to 2 years of age. Receiving food in addition to breast milk from 6 months onwards with right amount and consistency will avert malnutrition and stunting associated developmental delays.

Dietary Deficiencies (Macro and Micronutrients)

Macro and micro nutrients are essential for normal growth and development and it is more important during pregnancy. Vitamin A is essential for vision, cellular differentiation, immune function and bone remodelling [8]. Iodine is essential trace element to prevent goitre and cretinism, deficiency with it results in developmental delay and other health problems. Although, iodine and vitamin A deficiencies are also risk factors but these two micronutrients is not a major issue in Bhutan with 98.4% coverage of iodized salt at the household level and 87.8% of babies had received one dose of vitamin A in the last six months [2].

One of the concerns of micronutrients deficiency is anaemia and it is a critical public health problem in Bhutan. Over a span of 18 years, there has been no significant improvement on prevalence of anaemia in Bhutan as indicated in Figure 2. With initiation of weekly iron supplementation in schools may reduce the anaemia prevalence in Bhutan.

It has found that half of estimated prevalence of anaemia in developing countries are due to iron deficiency [6]. Anaemia in Bhutanese children is greatest in the first two years of life accounting 89.5% and 88.7% respectively at the age of 6-11 months and 12-23 months [22]. Anaemia during pregnancy not only influences the growth of the foetus but also affects immunological, cognitive, motor and social-emotional development of children after birth. Soon we will know the anaemia status on children under five years of age, adolescent, and pregnant women form National Nutrition Survey findings.

Parent Behaviour

Smoking during pregnancy and exposure to environmental tobacco smoke has serious health consequences for both mother and the baby. The estimated relative risk of negative outcomes associated with smoking in pregnancy is 2.04. In the similar magnitude, consumption of alcohol has adverse effect to the development of the foetus during pregnancy. The adverse effects of alcohol consumption during first eight weeks of pregnancy are cranio-fecial, limb and cardiovascular defects, which is known as Foetal Alcohol Syndrome (FAS) and exposure in the later pregnancy may affect growth of foetus and associate with behavioural and cognitive development [23]. No research has proven the safe amount of alcohol drinking during pregnancy. As per the Gross National Happiness (GNH) survey of 2010, 41.3% and 4.6% of the Bhutanese population were reported consuming alcohol and smoking respectively, of which, 2.8% and 2.4% of female population were currently consuming alcohol and smoking respectively [24]. With

the easy accessibility and affordability of alcohol, and wide acceptability of alcohol consumption, I feel that there is need of research to see the prevalence of pregnant women drinking alcohol.

Parenting Factors

Young children are dependent on the care they receive and their growth depends on the capacity of the caregivers. Lack of personalized care during the early years of life has a devastating effect on the child's health, growth, personality adjustment and cognitive capacity. Sensitivity and responsiveness have been identified as key features of care giving behavioural related to later positive health and development outcomes in young children [25]. Several experimental and intervention studies on cognitive stimulation on young children shows higher cognitive functioning with additional cognitive stimulation or learning opportunities than those children compared with no stimulation [8].

Language and cognitive development are especially important during first six months to three years of life. When children spend their early years in a less stimulating environment, brain development is affected and leads to cognitive, social and behavioural delay. High levels of adversely and stress during early childhood can increase the risk of stress-related diseases and learning difficulties [6]. Fifteen% of Bhutanese children aged between 2 to 9 years were identified having problem in cognitive development [19,26]. Country office of Save the children and Ministry of Education have established Early Childhood Care and Development Centers in the rural areas of Bhutan to maximize the development of young children and to educate the caregiver of their responsibility in nurturing and caring children for healthy development. In addition, Ministry of Health has trained all community health workers on Care for Child Development.

Social Culture Factors

Feeding practices

Traditional practices being strong in Bhutan, 8.2% of new born are given water or butter (pre lacteal feeding) within 24 hours of birth [2] and it is an important factor in delaying initiation of lactation [16]. Common feeds given on the first day of life are butter (5.6%) and water (2%) [2]. Introduction of pre lacteal feed delays the milk let down reflex and could contribute to lactation failure. Education including curtailing the use of pre lacteal feeds in addition to promoting early initiation of breastfeed with skin to skin need to be strengthens.

Care

Babies and young children have potential to learn soon after birth and they learn through seeing, doing, hearing and touching. They learn more as they grow older. They are naturally sociable and curious, and interested in communicating with other people in a various way including eye contact, body movement, sounds and facial expression. These potential can be unfolded only through play and communication and interaction with caregiver and other people [27,28].

Bhutanese believe that babies do not see at birth and takes around

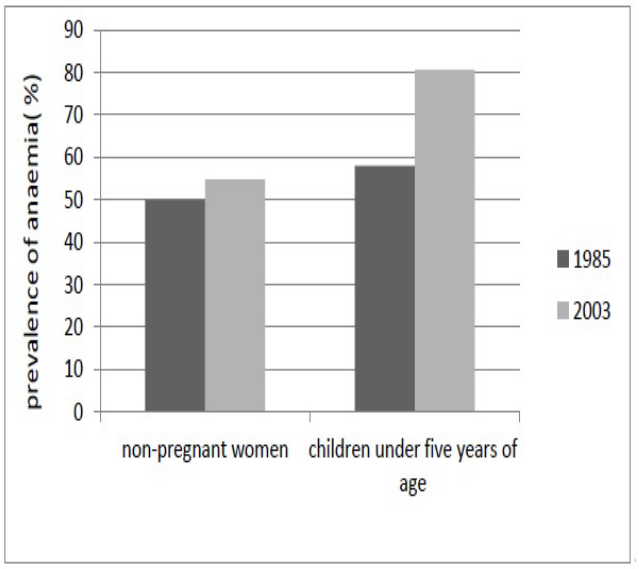


Figure 2: Prevalence of anaemia (%) in various group of population in Bhutan [26].

Factors	Bhutan Status/indicators	Intervention
Maternal Nutrition (preconception and during pregnancy		Assessment of nutritional status in preconception during antenatal booking and educating and advising accordingly.
Child Nutrition	Breastfeeding: Early initiation of breastfeeding: 59%; Exclusive breastfeeding: 48.7%	Initiation of skin to skin contact between mother and infant to initiate breast feeding soon after birth.
	Complementary feeding: 66.7%	-Every caregiver has an access to Infant and Young Child Feeding and Care for Child Development Counseling. -Identify local feeding practices and common problems associated with feeding and counselling accordingly
Dietary deficiencies (macro and micronutrients)	98.4% coverage of an iodized salt at the household level. -87.8% of babies had received one dose of vitamin A in the last six months. -80.6 % of under five children are anaemic.	Vitamin A and iron supplementation. -Ensure 100% iodized salt intake at every household level.
Parent behavior		-Education on adverse effect of alcohol consumption and smoking during pregnancy.
Parenting factors		Strengthen early childhood care for development counseling.
Social culture factors: feeding practices and child care	Prelacteal feed: Common feeds given on the first day of life are butter (5.6%) and water (2%).	Education curtailing pre lacteal feeding and promoting early initiation of breastfeeding.
Environmental factors	97.7% access to improved drinking water in 2012. 66.3% use improved sanitation in 2012.	-Access to clean and safe drinking water. -Management of diarrheal disease.

Table 1: Summary of factors affecting child growth and development with possible interventions.

three to four weeks to see. This belief does not allow the caregivers to talk to new born babies. This belief prevents from providing an opportunity to help to stimulate the development of child's skills. Wrapping the new born tightly "swaddling" is common in Bhutan, which does not allow new born to move and touch people and things freely. Another belief is talking to those children who does not speak a word is considered as sin, thus limiting the communication activity for stimulation of child's development.

Environmental Factors

Fetuses exposed to lead and arsenic before birth may be born early or underweight and thus compromise child development. The prevalence rate of exposure to lead worldwide is 40% and children in developing countries are at higher risk and at least 30 million people in Southeast Asia are exposed to arsenic via drinking water [6]. Infectious diseases in children can affect development through direct and indirect pathway [29]. Diarrhoea is particularly prevalent during first 2 years of life due to lack of accessibility to clean water or inadequate sanitation [30]. In Bhutan, over the two years of time, there is increased in access to improved drinking water by 1.6% with 96.1% in 2010 and 97.7% in 2012 [31]. There is also increase in use of improved sanitation by 7.9% with 58.4% in 2010 and 66.3% in 2012 but still diarrhoea remains a problem in Bhutan [31] (Table 1).

Conclusion

Children during early years of age undergo through rapid growth and development that is greatly influenced by above mentioned factors. Exclusive breastfeeding, adequate complementary feeding, stimulation, safe environment and care need to be ensured for optimum physical, mental, social and cognitive development and to prevent to adverse impacts on short-term survival as well as long-term health and development. Children who have a good start in their life will be healthier adults resulting in a better social, economic, physical and cognition and they live better for their families and their communities and promoting Gross National Happiness of the country. This article is intended to be useful for individual in understanding the factors affecting child growth and development and to prevent adverse effects with adoption of good practices.

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