

The Global Problem of Malnutrition

Larry H. Bernstein*

Triplex Medical Science, Northampton, USA

*Corresponding author: Larry H. Bernstein, Triplex Medical Science, 54 Firethorn Lane, Northampton, MA 01060, USA. Tel: +12032618671; Email: larry.bernstein@gmail.com

Citation: Bernstein LH (2017) The Global Problem of Malnutrition. Food Nutr J 2: 159. DOI: 10.29011/2575-7091.100059

Received Date: 20 November, 2017; **Accepted Date:** 04 December, 2017; **Published Date:** 11 December, 2017

Introduction

The field of biochemistry and enzymology that concerns intermediary metabolism has a relationship to the processes of the living cell and organisms that precedes the evolution of molecular biology and genomics. However, nutrition as a science and as an essential for healthcare is challenged in our current existence. The global importance of nutrition, food sources and water supplies has not retreated despite extensive knowledge about nutrition, improvements in agriculture, and the evolution of food science. The insurmountable problem is the long global history of centuries of European colonialism and more recent post WWII hegemony, repeated wars, the decay of states, rural and/or urban poverty, massive weather changes, and mass migrations. These have much to do about environment and of economic disparities that make continuation of the current situation unsustainable as it exists. The solutions are both economic and political.

The Nature of Protein-Calorie Under Nutrition

We concern ourselves here with macronutrient deficiency, such as carbohydrate, protein and fat. Carbohydrate is the fuel for short term energy and, in the form of lipoprotein, for structure. Fat, dense in caloric content, issued for long term energy and for structure in lipoprotein. I concern this discussion with essential proteins, which may bind to carbohydrate or to lipid in membrane structure. Deficiency of this major nutritional class is called protein-energy malnutrition, which exists as marasmus or as kwashiorkor, the latter which exhibits edema and wasting [1]. Edema may occur at a serum albumin concentration less than 2.8 mg/dl [2], at which water accumulates in the interstitial tissues, and in severely malnourished children accumulates in the peritoneal cavity. Serious Protein-Energy Malnutrition (PEM) can result in death, either from sufficient loss of lean body mass [3], or from co morbidity of infection, septicemia, or organ failure, and may also be concurrent with anemia, congestive heart failure, pulmonary edema, or viral or parasitic infection as co morbidity. On a global scale, PEM is most common in children under age 5-6 years age, and it is accompanied by stunting (growth failure) and mental

retardation [4]. PEM in urban or rural areas is associated with high poverty rates. In some regions it is found concurrent with waste water contamination [5]. In other circumstances there is a lack of dietary animal protein from milk at birth into the first months of life. Still later there may well be lack of milk, eggs, chicken, fish, or meat intake [6].

Malnutrition is a major worldwide health problem, especially in developing countries. Water supply, sanitation and hygiene are critically important for preventing malnutrition, and these also have a direct impact on infectious disease, especially diarrhea. Poverty, inadequate water supply, poor sanitation, and war are all related to malnutrition [5,7]. However, in the Indian Hindu population along the Ganges, there is also a practice of outdoor defecation without sanitation [5,8]. This is a factor in a better health of the poorer Moslem co inhabitants. There is also an impact of repeated or persistent diarrhea on the impoverished population with an associated malnutrition. The effect of malnutrition on susceptibility to infectious diarrhea [7] reinforces the same elements of a vicious circle among children in developing countries.

Malnutrition increases the risk of disease and early death. Protein-energy malnutrition plays a major role in half of all under-five deaths each year in developing countries [9-12]. The severe forms of malnutrition include marasmus (chronic wasting of fat); kwashiorkor (severe wasting of muscle and lean body mass); cretinism and irreversible brain damage due to iodine deficiency; and blindness and increased risk of infection and death from vitamin A deficiency. When people are exposed to high levels of infection due to unsafe and insufficient water supply and inadequate sanitation, they also develop compromised nutritional status. In secondary malnutrition, In addition, individuals who develop insidious diarrhea don't benefit from food because of a consequent inadequate absorption of nutrients. In addition, those individuals who are experiencing Protein-Energy Malnutrition (PEM) are more susceptible to, and less able to recover from, infectious diseases.

Malnutrition and poverty both contribute to a situation that fuels an increase in the affected population burden of disease, stunted

childhood development and reduced ability to work. Poor water and sanitation are important determinants of malnutrition and infectious disease, as well as toxicities. Improvements in water quality and contaminants don't necessarily benefit the entire population, particularly when only the wealthy can afford better drinking-water supplies or where irrigation is used to produce export crops. Civil conflicts and wars, by damaging water infrastructure and contaminating supplies, may also contribute to increased malnutrition. Chronic food deficits affecting roughly 792 million people in the world [13] includes 20% of the population in developing countries. Worldwide, malnutrition affects one in three people. Consider that each of its major forms dwarfs most other diseases globally [12]. Although malnutrition affects all age groups, it is especially common among those in poverty, those with inadequate access to health education, and those to who clean water and good sanitation is unavailable. More than 70% of children with protein-energy malnutrition live in Asia, 26% live in Africa, and 4% in Latin America and the Caribbean [12].

Children and Hunger

Children are victims of under nutrition in highly populated and living in developing countries, but also in poor highly populated and nonurban populations in developed countries. Under nutrition in the aggregate, which includes fetal growth restriction, stunting, wasting, and deficiencies of vitamin A and zinc along with suboptimum breastfeeding, is a cause of 3.1 million child deaths annually or 45% of all child deaths in 2011 [9]. The deaths from diarrhea (61%), malaria (57%), pneumonia (52%), and measles (45%) are very similar to the estimated death a rate in which under nutrition is an underlying cause [14]. The diseases that cause diarrhea the body's ability to convert food into usable nutrients subsequently leads to malnutrition. Moreover, 161 million under-five year olds globally were estimated to be stunted, 51 million under-five year olds were wasted, and 17 million were severely wasted in 2013 [15]. Two thirds of all wasted children lived in Asia, almost one third in Africa, and similar proportions for severely wasted children in 2013.

Malnutrition in India

Stunting contributes to the deaths of a million children under the age of 5 each year [15,16]. Those children who survive suffer cognitive deficits. They are poorer and sicker than children not affected by stunting. India's stunting problem affects 20 times more people in India alone than H.I.V./AIDS does around the world. Sanitation and air quality are among the worst in the world. Parasitic diseases and infections like tuberculosis, often linked with poor sanitation, are common in India [16]. More than one in four newborn deaths occurs in India. Open defecation has been an issue that Gandhi tried to address in India [17]. Even though widespread housing discrimination confines many Muslims to separate slums, nevertheless, their children are less exposed to the higher levels

of waste in Hindu communities. This may save thousands of Indian Muslim babies from death each year. Moreover, few rural households have the latrines that have almost eliminated outdoor waste in neighboring Bangladesh.

Malnutrition in Nigeria

In a Nigerian study most of the admissions and case fatality were noted in those infants being weaned aged 6 to 24 months. This period of infancy is associated with a higher case fatality rate than other forms of PEM [18]. The problem of nursing infant feeding practices is that breastfeeding should be exclusive for the first six months of life, and then the following months there would be breast feeding with appropriate weaning. The main prerequisite for the reduction of high infant and under five mortalities is improvement of nutrition. This measure would assure physical growth, the social and mental development of children, and academic achievement. Moreover, at least 25 to 35% of under-five mortality has been attributed to PEM in Nigeria and sub-Saharan Africa.

The WHO defined Severe Acute Malnutrition (SAM) by a very low weight for height, visible severe wasting or the presence of nutrition related edema. The overall reported mortality in one study was 40.1%. This was lower than the WHO estimated 60%, but it was still very high. In addition, other studies conducted in various parts of Africa have documented high mortality rates among children admitted for PEM. In Oshogbo, South West Nigeria, the average mortality rate was 22% over a five-year period among 803 children admitted for PEM in a Nutritional Rehabilitation Center [19]. Similarly, in a hospital based study in north-eastern Zambia, the overall mortality rate was 25.8% for children below the age of five years among 288 children admitted for various types of severe/complicated malnutrition. Approximately 50% of the 10 million deaths each year in developing countries occur because of malnutrition in children younger than 5 years [20]. Nearly 870 million people of the 7.1 billion people in the world, one in eight, suffered from chronic undernourishment in 2010-2012 according to the UN estimates. The main and principal cause of malnutrition is poverty, but malnutrition is also associated with war and conflict, and climate change.

Malnutrition of Children of Rural China

Chinese children in rural villages have a very high rate of poverty. The challenges that these children of rural China face are nonexistent in the cities. The struggle against malnutrition is most notable. It was reported that the prevalence of under nutrition in children less than 5 years of age was highest in poor rural areas in a study of nutrition in children under age 5 in China [21]. The overall prevalence of under nutrition has declined by 74% for underweight and 70% for stunting. There were significant downward trends in the prevalence of both underweight and stunting was observed for all areas ($P < 0.001$). However, in poor rural areas the prevalence

of underweight and stunting was still high in 2010, at 8.0% and 20.3% [22]. UNICEF estimates that in China there are 12.7 million stunted children [22,23]. In addition to malnutrition, the rate of anemia is high on rural Chinese children [24]. Stanford University conducted at least on 1824 babies in China's Shaanxi Province [25]. While forty nine percent of the babies tested were anemic and another 28 percent were near anemic, forty percent of these children also displayed cognitive or motor problems. This is because of inadequate intake of many micronutrients, such as iron, as well as fresh fruits and vegetables. In 2006, prevalence of overweight children was as high as 16.8%, while that of stunting was 57.6% among the children in the poor areas of China's mid-western provinces [22,23]. The coexistence of stunting and overweight in the same child is a result of protein and energy malnutrition, which retards height despite increased body weight, and Chinese rural children have a lower daily protein intake than urban children.

Malnutrition in United States

A study of low-income areas of the United States found that 22-35% of children aged 2-6 years were below the 15th percentile for weight [26]. Another survey found that 11% of children in low-income areas had height-for-age measurements below the 5th percentile. It has been noted that 10% of children in rural populations experience poor growth. On the other end of the age spectrum, up to 55% of hospitalized elderly people are undernourished and up to 85% of institutionalized elderly people are undernourished.

References

1. Protein-energy malnutrition. Wikipedia.
2. Sardesai V (2017) Introduction to Clinical Nutrition. In: (3rd Edition), CRC Press, USA. Pg No: 1-655.
3. Wade K, Flett M (2013) Which 'nutritional models-of-care' improve energy and protein intake, clinical outcomes and malnutrition in hospitalised patients?. *Nutrition and Dietetics* 70: 7-15.
4. Under nutrition contributes to nearly half of all deaths in children under 5 and is widespread in Asia and Africa. UNICEF/WHO/World Bank Joint Child Malnutrition Estimates, May 2017 edition.
5. Worley H (2014) Water, Sanitation, Hygiene, and Malnutrition in India. Population Reference Bureau. Population Reference Bureau.
6. Chan TH. Harvard School of Public Health. The Nutrition Source.
7. WHO, Clean Water and Sanitation Reduce Childhood Malnutrition and Diarrhea. Water and Sanitation Program.
8. Ngure FM, Reid BM, Humphrey JH, Mbuya MN, Pelto G, et al. (2014) Water, Sanitation, and Hygiene (WASH), Environmental Enteropathy, Nutrition, and Early Childhood Development: Making the Links. *Ann N Y Acad Sci* 1308: 118-128.
9. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, et al. (2013) Maternal and Child Nutrition Study Group. Maternal and child under nutrition and overweight in low-income and middle-income countries. *Lancet* 382: 427-451.
10. Black RE, Morris SS, Bryce J (2003) Where and why are 10 million children dying every year? *Lancet* 361: 2226-2234.
11. Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, et al. (2008) Maternal and Child Undernutrition Study Group Maternal and child under nutrition: global and regional exposures and health consequences. *The Lancet* 371: 340-357.
12. WHO (2000) Turning the tide of malnutrition: responding to the challenge of the 21st century. Geneva: WHO, (WHO/NHD/00.7).
13. FAO. The state of food insecurity in the world 2000 (FAO, Rome).
14. Caulfield LE, de Onis M, Blössner M, Black RE (2004) Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. *Am J Clin Nutrition* 80: 193-198.
15. UNICEF-WHO-The World Bank Joint Child Malnutrition Estimates.
16. Harris G (2014) Poor sanitation in India may afflict well fed children with malnutrition. New York.
17. What numbers tell us about Open Defecation in India. *The Hindu* 2016 Nov 1.
18. Duru CO, Peterside O, Adeyemi OO (2014) A 5 year review of childhood measles at the Niger Delta University Teaching Hospital, Bayelsa state, Nigeria. *J Med MedSci* 5: 78-86.
19. Ubesie AC, Ibeziako NS, Ndiokwelu CI, Uzoka CM, Nwafor CA (2012) Under-five Protein Energy Malnutrition Admitted at the University of In Nigeria Teaching Hospital, Enugu: a 10 year retrospective review. *Nutrition J* 11: 43.
20. Rice AL, Sacco L, Hyder A, Black RE (2000) Malnutrition as an underlying cause of childhood deaths associated with infectious diseases in developing countries. *Bulletin of the World Health Organization* 78: 1207-1221.
21. Cham H (2014) UN (FAO) report on the number of hungry people in the world.
22. Zong XN, Li H (2014) Physical growth of children and adolescents in China over the past 35 years. *Bulletin of the World Health Organization* 92: 555-564.
23. Li H, Zong X, Zhang J, Zhu Z (2011) Physical growth of children in urban, suburban and rural mainland China: a study of 20 years change. *Biomed Environ Sci* 24: 1-11.
24. Malnutrition Plagues Children of Rural China. The Borgen Project.
25. Seaman L (2014) Tackling Malnutrition among China's Rural Babies. Stanford University Center on Food Security and the Environment.
26. Scheinfeld NS (2016) Protein-Energy Malnutrition. Medscape.