INTRODUCTION

Good nutrition is the bedrock of human well-being. Before birth and throughout infancy, good nutrition allows brain functioning to evolve without impairment and immune systems to develop more strongly. For young children, good nutritional status averts death and prepares the body to grow and develop to its full potential, good nutrition leads to more effective learning at school, and better nourished mothers give birth to better nourished children. Without good nutrition, people's lives and livelihoods are built on quicksand **(GNR, 2014).**

Malnutrition is a broad term, commonly used as an alternative to under nutrition but technically, it also refers to over nutrition. People are malnourished if their diet does not provide adequate calories, protein, and micronutrients for growth and maintenance or they are unable to fully utilize the food they eat due to illness; this is what is known as under nutrition. Individuals are also considered malnourished if they consume too many calories than their daily requirements and in this case, individuals suffer from signs and symptoms of over nutrition **(UNICEF, 2006).**

Populations in numerous countries suffer from both these conditions in what is globally known as the double burden of malnutrition **(FAO, 2006).**

The effects of under nutrition in infancy and early childhood are irreversible and affect the quality of life of individuals and nations. Under nutrition is responsible directly or indirectly for 60% of the 10.9 million deaths occurring annually among children under five worldwide.Well over two-thirds of these deaths are often associated with inappropriate feeding practices, occurring during the first year of life.Malnourished children have aweakened immune system with a greater risk of developing preventable illnesses like pneumonia and diarrhea, they are more frequently sick and suffer the life-long consequences of impaired development both physical and cognitive **(WHO, 2003).**

At the other end of the nutritional spectrum over nutrition presenting as overweight and obesity, is a rising pandemic worldwide and a major contributor to the increased prevalence of non-communicable diseases in adulthood with its debilitating effects and increased cost of care between the elder population **(GNR, 2014).**

Anthropometry is defined as the study of the measurement of the human body, the WHO has identified it to provide the single most portable, universally applicable, inexpensive and non-invasive technique for assessing the size, proportions and composition of the human body. It reflects both health and nutritional status and can be used to predict performance, health and survival. **(WHO, 1995)**

The United Nations standing committee on nutrition endorsed the WHO Child Growth Standards in 2006. These standards were developed as a result of the WHO Multicenter Growth Reference Study (MGRS) conducted between 1997 and 2003 in six countries around the world (Brazil, Ghana, India, Norway, Oman, and the United States). The study followed a group of full term babies from birth to 2 years of age, and another group of children aged 18 to71 months was measured once, data from the two samples were combined to create the new WHO growth standards from birth to 5 years of age **(WHO, 2008).**

A key characteristic of the new growth standards is that they explicitly identify breastfeeding as the biological norm and establish the breastfed child as the normative model for growth and development. The growth standards and curves establish guidelines for the healthy growth and development of all infants and young children in all countries around the world **(WHO, 2006).**

The Government of Egypt and the Ministry of Health and Population (MOHP) have endorsed the WHO growth standards, the MOHP has also adopted the weight for age and height for age curves as the standard upon which the growth of its children is measured and monitored.

In the 2008 Lancet special series on maternal and child under nutrition (**Black R. et. al 2008**), Egypt was identified as one of the 36 high burden countries suffering from stunting; stunting is one of the main indicators of chronic child malnutrition.

The Egyptian Demographic and Health Surveyof 2008, also found that 29% of children under five years of age were stunted of those 14% were severely stunted these levels are higher from those recorded in the 2000 and 2005 DHS surveys where stunting levels were 23% nationwide.**(EL-Zanatyand Ann Way, 2009)**

Based on this information the MOHP has launched a Nutrition Unit within the Maternal and Child Health Department to combat this health threat. This unit has chosen two Governorates in Lower Egypt to set up a pilot of interventions to overcome the problems of malnutrition with a special emphasis on under nutrition.

This study aims to establish a current baseline on nutritional status of children under 5 years of age; (0-60 month old) through anthropometry in one district in each of the two selected Governorates. This baseline will act as a reference point for comparison with future assessments after the different interventions are implemented.

OBJECTIVES

Objectives

- To determine the prevalence of malnutrition detected by basic anthropometric assessment (weight and height) in children 0-60 month of age in selected rural areas of two districts in the governorates of Qalyubia and Gharbia.
- Explore the possible underlying factors of malnutrition in the selected areas.

Section 1:

MALNUTRITION IN CHILDREN

Every child has the right to good nutrition according to the convention on the Rights of the Child. Good nutrition is an essential component to achieve almost all of the eight Millennium Development Goals, and the Copenhagen consensus concluded that nutrition interventions generate more returns than the 17 highest potential development investments above those related to trade liberalization and water sanitation.

Poor nutrition is a challenge that casts a long shadow, its consequences flow throughout the life cycle and cascade down the generations affecting everyone especially children, adolescent girls and women, these consequences include mortality, infections, cognitive impairment, lower work productivity, early onset and higher risks of developing non-communicable diseases (NCDs), stigma, and depression**.(GNR, 2014)**

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food they eat due to illness this is what is known as under nutrition. Individuals are also malnourished if they consume too many calories above that of their daily requirements and in this case, individuals are suffering from signs and symptoms of over nutrition **(UNICEF, 2006).**Under nutrition and over nutrition coexist in numerous countries in what is globally known as the double burden of malnutrition **(FAO, 2006).**

I. Why is under nutrition a health problem

Malnutrition has been responsible, directly or indirectly, for 60% of the 10.9 million deaths occurring annually among children under five. Well over two-thirds of these deaths are often associated with inappropriate feeding practices occur during the first year of life **(WHO, 2003).**

Studies have demonstrated that the more undernourished children are, the sicker they are and the higher their risk of early death. Severe malnutrition leads to not only increased morbidity (incidence and severity) and mortality, but can also lead to impaired psychological and intellectual development. Growth retardation in early childhood, for example, has been linked to the delayed acquisition of motor skills and delayed mental development. These outcomes can have severe consequences in adult life, such as significant functional impairment that can affect a person's economic productivity **(Blössner M, de Onis M, 2005).**

A small adult may have a lower physical work capacity than a larger adult, thus reducing his economic potential, and small women in particular are more prone to having obstetric complications during child labour. The nutritional status of women is particularly important when discussing child growth because it is through mothers that children are first subjected to this health threat, and malnutrition is propagated to future generations. This only further undermines the economic development of the families and societies, and continues the cycle of poverty and malnutrition **(Blössner M, de Onis M, 2005).**

Even though it has long been recognized that under nutrition is associated with mortality among children a formal assessment of the impact of malnutrition as a risk factor was only carried out in the early 1990s. Results of the first epidemiological study on malnutrition showed that under nutrition potentiated the effects of infectious diseases on children and increased mortality rates at population level a result that up until then had only been observed clinically **(Pelletier, FrongilloandHabicht, 1993).**

Although many still refer to under nutrition and growth failure as ‘protein-energy malnutrition , it is now recognized that poor growth in children results not only from a deficiency of protein and energy but also from an inadequate intake of vital minerals (such as iron, zinc and

iodine) and vitamins (such as vitamin A), and often essential fatty acids as well. These elements are needed in small quantities in the order of a few thousandths of a gram or less each day, they are thus collectively referred to as micronutrients **(UNICEF, 1998).**

Micronutrients are needed for the production of enzymes, hormones and other substances that are required to regulate biological processes leading to growth, activity, development and the functioning of the immune and reproductive systems. All of the minerals that the body needs; calcium, phosphorous, iron, zinc, iodine, sodium, potassium and magnesium, have to come either from the food a person eats or from supplements. While the body manufactures many of the complex organic molecules it needs from simpler building blocks, vitamins A, the B complex, vitamin C among others are not synthesized in the human body; Vitamin D is the only exception in that it can be made in the skin, provided a person has sufficient exposure to direct sunlight. While micronutrients are needed at all ages, the effects of inadequate intake are particularly serious during periods of rapid growth such as during pregnancy and lactation (for both the mother and the child) and during early childhood **(UNICEF, 1998).**

Nutrition has increasingly been recognized as a basic pillar for social and economic development. The reduction of

infant and young child malnutrition is essential for the achievement of almost all the Millennium Development Goals (MDGs); these are eight international development goals that were established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. All United Nations member states, and at least 23 international organizations, committed to help achieve the MDGs by 2015 of these 2 are directly related to under nutrition the eradication of extreme poverty and hunger MDG 1 and child survival MDG 4. Given the effect of early childhood nutrition on health and cognitive development, improving nutrition also impacts other MDGs related to universal primary education, improvements of maternal health, combating HIV/AIDS, the promotion of gender equality and empowerment of women (**WHO, UNICEF and WB, 2012).**

Since the MDGs deadline was approaching and the problems of malnutrition appeared to persist and continue, and with the recognition of the need to address the rising problem of the double burden of malnutrition. In 2012 the World Health Assembly Resolution 65.6 endorsed a Comprehensive implementation plan on maternal, infant and young child nutrition, which specified *a set of six global nutrition targets that should be achieved by 2025 these targets aim to***(WHO, 2014):**

1. Achieve a 40% reduction in the number of children under-5 who are stunted.
2. Achieve a 50% reduction of anemia in women of reproductive age.
3. Achieve a 30% reduction in low birth weight.
4. Ensure that there is no increase in childhood overweight.
5. Increase the rate of exclusive breastfeeding in the first 6 months up to at least 50%.
6. Reduce and maintain childhood wasting to less than 5%.

II. Underlying causes of under nutrition

A child's organs and tissues, blood, brain and bones are formed and intellectual and physical potentials shaped, during the period from conception through age three. Since human development is particularly rapidly during the first 18 months of life, the nutritional status of pregnant and lactating mothers and young children is of paramount importance for a child's later physical, mental and social development. Growth during the fetal stage depends on how well nourished a woman was before pregnancy, as well as how much weight she gains while she is pregnant. Gains in weight are essential for the development of new maternal and fetal tissues, and for maternal body maintenance and energy. Since the fetus relies entirely on the mother for nutrients, pregnant women not only

need to gain weight but also must maintain an optimal intake of essential nutrients such as iron and iodine for the fetus to grow properly **(UNICEF, 1998).**

About 24 million low birth weight babies are born every year, which is about 17% of all live births. Most are born in developing countries, where the main cause of low birth weight is not premature birth, as it is in the industrialized world, but poor fetal growth during pregnancy. Low birth weight babies, defined as weighing less than 2.5 kilograms, are at greater risk of dying than infants of average weight. If they survive, they will have more episodes of illness, their cognitive development may be impaired, and they are more likely to become malnourished. Evidence is also mounting that low birth weight predisposes children to a higher risk of diabetes, heart disease and other chronic conditions later in life **(UNICEF, 1998).**

A well balanced diet that provides ample energy, protein, vitamins, minerals and essential fatty acids is also important when a woman is breastfeeding her child. Breastfeeding perfectly combines the three fundamentals of sound nutritious food, health and care; it is the next critical window of nutritional opportunity after pregnancy. Not all children are breastfed let alone exclusively breast fed for six month as recommended despite its importance **(WHO, 2003)**, breast milk contains all the nutrients, antibodies, hormones and

antioxidants an infant needs to thrive, it also plays a pivotal role in promoting the mental and physical development of children. Breastfed infants not only show better immune responses to immunizations, but their intake of breast milk also protects the mucous membranes that line their gastrointestinal and respiratory tracts, thus shielding them against diarrhea and upper respiratory tract infections **(Hanson,Lars A et al, 1996).** Breastfeeding also has cognitive benefits; in a study breastfed, subjects generally had IQs that were about 8 points higher than children who were bottle-fed as well as higher achievement scores. **(Glick and Daniel, 1997).**

After six month of exclusive breast feeding an infant must be introduced to appropriate complementary food with continued breastfeeding up to two years or beyond. Appropriate complementary feeding depends on accurate information and skilled support from the family, community and health care system. The WHO introduced complementary feeding Guiding principles in 2003 these include **10 principles**. (1) Age of introduction. (2) Importance of maintaining breast-feeding. (3) Practicing responsive feeding. (4) The safe preparation and storage of complementary food. (5) Providing the correct amount, (6) in the correct consistency, (7) in the correct frequency, (8) the content of which provides all the needs of the growing infant. (9)

Withoutneglecting the importance of supplements for both the mother and the baby to provided important micronutrients and finally (10) managing feeding during and after times of illness **(Dewey K et al, 2001)**. It is thus clear that inadequate knowledge about appropriate foods and feeding practices is often a greater determinant of malnutrition than the lack of food **(WHO, 2003).**

Malnutrition cannot be tackled without understanding its causes, which are complex, multiple and interrelated, and include the broad determinants of poverty, healthcare and caring practices **(UNICEF/WHO, 1989).**

UNICEF developed a **conceptual framework** to explain the underlying root causes of malnutrition in 1990. This framework can be applied in different contexts including different cultures, geographic and economic situations to analyze the causes of malnutrition and in each application the particular causes of malnutrition will be local and specific which is where the frameworks strength lies. However, as with any tool it is only as useful as the user allows it to be. The more specific and truthful the researchers are about identifying the causes; the more useful it is in forming subsequent strategies to improve the nutritional status of the focus community **(Swart et al, 2005).**

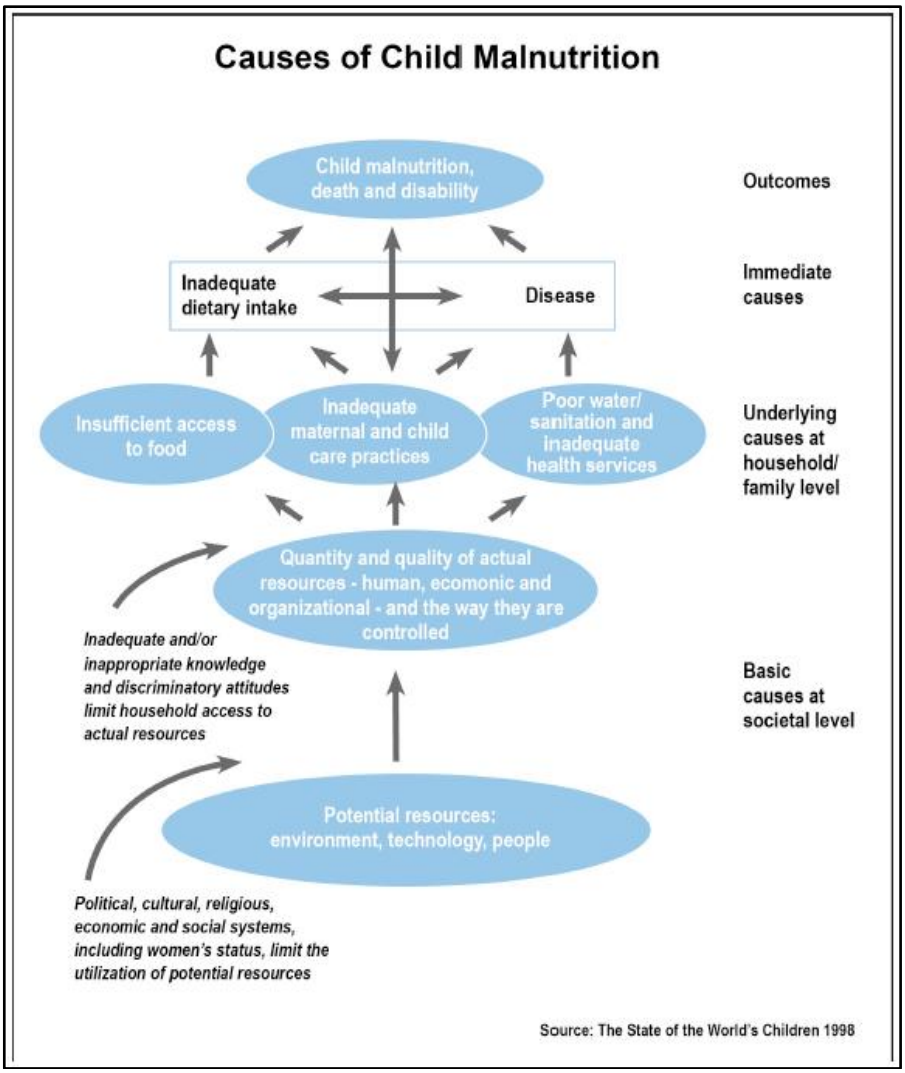

Fig. (1): UNICEF's Conceptual Framework of Causes of Child Malnutrition.

In the framework malnutrition and child death are considered the end result and a manifestations of a multi-sectoral development problem that should be analyzed in terms of the immediate, underlying and basic causes. The immediate causes are inadequate dietary intake and infectious disease; the underlying causes are household food insecurity, inadequate