

# IMPACT OF CURRENTLY ADOPTED NUTRITIONAL TRENDS ON SUDANESE HEALTH



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## ABSTRACT

Food items reflect the culture and tradition of any nation and respond to national and global demographic, social and economic changes.

Sudanese as old African nation has rich and distinct nutritional heritage represent the traditional Sudanese diets which able to serve the nutritional requirement of linear growth of body and the brain for centuries.

The present century has witnessed unprecedented globalization in term of mobilization of individuals and commodities with dramatic cultural changes. As direct result of such events, as elsewhere, western style of energy dense refined food items replaced the centuries' long traditional nutrients and fibers dense diets.

The aim of this article is to evaluate effects of shifting from traditional diets to the modern adopted food items on Sudanese health, as there are increasing discrepancy of neonatal physical parameters and rising incidence of obesity and non-communicable diseases.

The study concluded that increasing urbanization and shifting from the traditional diets has grave consequences on human health in Sudan, with increasing incidence of low birth weight, obesity, diabetes, and hypertension as detail in the main text of this article.

## 1. INTRODUCTION

Most of contemporary Sudan is relatively dry land with short strip on the west coast of the Red Sea. The current adopted food style in urban settings is high in carbohydrates and poor in proteins and fats. There is also a shortage of essential fats and other trace elements like iodine and selenium that is found in marine foods chain web, which are less represented in land foods spectrum. (Nyuar KB, et al. 2010; Nyuar KB, et al.2013).

In Sudan, as in other countries, there is obvious shifting from the traditional style of diets based on green leaves, whole grains, milk and household butter to Western type, based on manufactured, refined, processed food and dry seeds, high in carbohydrates, and low fat content. There is also total dependency on processed plant oils for domestic catering.

There is also less access to food diversity for some population groups such as children and women especially married house wives ones at child bearing age. Food diversity is supposed to provide essential fatty acids and other trace elements for optimum development of the fetus, especially the brain and nervous system.

## Impact of Currently Adopted Nutritional Trends on Sudanese Health

Nutrition during pregnancy is of special concern, since poor nutrition, with anemia and failure to gain weight during pregnancy, results in morbidity and mortality for both mothers and offspring. Newborn mortality and morbidity increase sharply at birth weights below (2.5 kg). Many neurodevelopmental disorders, like deafness, autism and mental retardation, are observed more frequently in association with low birth weight deliveries (Crawford.MA.1992).

The association of poor maternal nutrition, with low birth weight and small head circumference, suggesting that low maternal nutrients intake as a risk factor for mental retardation (Litt J et al. 2005).

It is obvious that nutrients intake during pregnancy and the type of routine diets independently correlated with birth weight and head circumference. Optimal outcomes of pregnancy have been related to improved health of the offspring later in adult life (Crawford MA. 2012). It is believed that contemporary style of life promoting low fat diets, as way to be lean and stylish and deficiency of trace elements in the habitual diets has negative impaction on the mothers' health and outcomes of pregnancy, as regard to the birth weight and sound neurological development of neonates (Rees G et al. 2005).

It is suggested that certain prenatal factors affecting the intrauterine environment influence not only the fetal and neonatal growth, but also the prospect to develop diseases in later life. This hypothesis is the basis of many epidemiologic birth cohort studies throughout the world, and marks the accepted relevance of birth weight not only as an outcome measure, reflecting health in pregnancy, but rather as a strong risk indicator of children's future health (Barker DJ. 1995: Barker DJ & Osmond. 2000: Jackson AA, et al. 2003).

Nutrients can change the expression of genes of the fetus. It occurs when nutrients affect the DNA during fetal development and alters the fetus' genetic make-up. There are sensitive periods in development characterized by rapid growth and differentiation in which environmental stimuli exert a strong influence modulating the organism's further adaptation and the risk for developing chronic diseases later in life (Hussain. A, 2013).

Under this concept, metabolic changes may be induced in early life, modulating the risk of obesity and chronic diseases during adulthood (López SAR, 2001).

It has been assumed that children born by obese and underweight mothers are at higher risk of developing an adverse metabolic profile, latter in adult life. Restricted fetal growth caused by intrauterine conditions is linked to chronic diseases later in life. It is believed that maternal health during pregnancy could affect the fetus' genes and thereby have an impact on the offspring's future health, especially their risk of developing non-communicable diseases such as diabetes mellitus type two, and cardiovascular diseases, later in life. Fetal programming might be caused by nutrients affecting the fetus' genetic makeup by DNA-methylation, histone modification and non-coding RNAs (López SAR, 2001).

## 2. TRADITIONAL SUDANESE DIETS AND NUTRITION

The traditional Sudanese farming system responds very well to the nutritional need of the people with production of all types of green vegetables, fruits and seeds which constitutes the food menu of the Sudanese, with the milk and its products, such as house hold butter, yogurt, and cheese at the heart of that menu. Until the fifties of the last century, different organic fertilizers were used exclusively in the farming of domestic crops and vegetables. Nitrogenous fertilizers and pesticides were persevered only for the cotton, the Sudan major commercial corp. That simply means pristine purely organic vegetables rich in trace elements such as iodine, zinc, and magnesium.

Sudanese used to eat what they have produced, and the sorghum (Dura) was the main staple in rural as well as in few urban areas. The main cooking oils were sesame and peanut oils. Bread from wheat flour was a luxury for the elite class.

The main characteristics observed in traditional Sudanese recipes and cuisine were the adoption of fermentation method in processing of food items and preparation of local beverage. In addition to the frequent addition of fresh or dried okra powder (ladies' fingers or ochro, *Abelmoschus esculentus*) as a soup thickener and to give lubricant texture with more dietary fibers. Sudanese used to cook fresh and fermented milk. More over okra and jute mallow or nalta jute ("molokhia", *Corchorus olitorius*) were main green vegetable items in Sudanese rural and urban cuisine, beside pumpkins and sweet potatoes

Many food items such vegetables, red meat, and fishes can be eaten either fresh in their production seasons or dried, which can be stored for latter consumption.

A mixture of vegetables, beans, and porridge (*Assida* and *Kessra*) from sorghum (*Dura*) were usually eaten together, such that they complement the nutritional values of each other's, especially in essential amino acids as an example.

The rich farms and nearby small forests, provided opportunity for children to gather wild fruits and Gum Arabic, as well as hunting of birds.

The Nile fish were good source of saturated fatty acids (31 to 65%) as well as unsaturated fatty acids (35 to 69%). Nile fish as other tropical freshwater fish are good source of polyunsaturated fatty acids (Elagba H. A. Mohamed and Gamal. N. Al-Sabahi.2011). Dryness of fish meat as well salting are methods for preservation and storage of fish meat in Sudan.

Therefore, the Sudanese traditional foods, with its dense nutrients support the optimum linear growth of body and brain, providing the mosaic arena of nutritionally essential and nonessential amino acids, fatty acids, as well as vitamins, trace elements, and dietary fibers essential for healthy normal bowel function.

### 3. THE CHALLENGING CHANGE IN SUDANESE NUTRITION

The eighties of the last century in Sudan witnessed major environmental, political turmoil, that lead to severe drought and famine in many parts of Sudan as the case in many other countries in African horn, such as Ethiopia and Somalia. The famine leads to massive internal displacement in Sudan, with the appearance of refugees' camps around major cities. There was also unprecedented migration from rural areas to nearby towns. At the same time civil unrest dominate the pictures. With armed looting in the Darfur in the west and civil war in the Southern and eastern Sudan, Nuba Mountains, and the Blue Nile. These changes led to disruption of the peaceful traditional Sudanese life and the traditional system of farming and production of food. Then there was influx of wheat flour, as international emergency respond to famine, to feed millions of hungry people in the camps and undernourished children elsewhere. Moreover, the different governments tend to adopt generous subsidizing policy of what they refer to as strategic commodities, including wheat flour and sugar, to earn the calm and loyalty of the urban population, which is a vicious cycle with devastating economic consequences. The direct effect of all these events is the dramatic change in the pattern of consumption as more families turn to consume subsidized cheap bread as the main food staple. The open markets and globalization also flooded the local markets with hydrogenated oils, energy dense sweets and biscuits. The farmers have adopted the utilization of nitrogenous fertilizers and chemical pesticides to enhance productivity of vegetables. As direct consequence of increasing urbanization and loss of household animals, milk and its products disappeared from the menu of many Sudanese middle class families. The culminating result of those unprecedented changes is obvious shifting to refined caloric dense food items, instead of nutrients and fiber rich diets.

In Sudan, there is predominant iodine deficiency, which is highly likely is associated with an  $\omega$ -3 fatty acids deficiency, especially Docosahexaenoic acid (DHA) (all-cis-docosa-4,7,10,13,16,19-hexaenoic acid, C22:6,  $\omega$ -3). Nyuar et al (2010) reported the lowest levels of DHA in the milk of Sudanese mother. There is also high prevalence of iodine deficiency as reported by (Izzeldin et al 2009; Elmanssury A E. (2013); Mahfouz MS et al.2012). Parallel with the increased consumption of bread as main staple, is increasing consumption of cane sugar and fructose use in foods and drinks, with great concern for obesity and diabetes.

In the 2016, the Federal Ministry of Health has adopted the (10) in (5) Strategy for Reproductive, Mother, Neonates, Child Health and Adolescent (RMNCHA) as Strategic plan 2016-2020, that is built on the successes and lessons learned to complete the unfinished Millennium Development Goals agenda and further pursue efforts for women, children and adolescents through Sustainable Development Goals. It recognizes the major challenging of nutritional issues as the micronutrient deficiencies for mothers and children, focusing on increased house hold consumption of iodized salt along with free fefol (iron and folic acid combined) supplement for pregnant women and encourage production of local food. (Sudan Federal Ministry of Health.2016). This goes well with the Copenhagen Consensus, the international forum looks at a variety of development proposals, and ranked micronutrients supplements as number one global priority and the most cost-effective solutions to the world's problems, in 2012 conference. The (10) in (5) strategy is highly appreciated ambitious effort, to complete that effort, recognition of the significance of the brain specific nutrition, the essential fats, to prosperity, should be clearly stated and adopted also. This reflects the wide gap at the level of health policy designers in understanding of nutritional science, epigenetics, and the nutritional needs for the maternal health and the future health and sound cognitive ability of the newborn

#### 4. THE CURRENT SUDANESE HEALTH CHALLENGE

El-Samani et al in (2016) published study revealed that in Khartoum, the capital city, the mean birth weight and prevalence of LBW were (3100) grams and (9.2%) respectively. Babies born to younger mothers were lighter and prime-para gave birth to babies less heavy compared to babies of multiparous mothers. Both prime-parous and younger than (20) years of age mothers gave birth to a significantly higher proportion of LBW babies. Poverty, indicated by a monthly income of less than US\$ 120.00 was associated with a significant reduction in the mean birth weight and a higher risk of LBW (El-Samani et al. 2016).

Similar findings from other study conducted in Shendi area about (170) kilometer North of Khartoum, which revealed low perception of iodine importance for fetal development with (66%) of participants considered it as unimportant and (13%) of them had grade (I) thyroid goiter. The arithmetic mean of neonatal weight, length and head circumference at term were (3.1 kg), (45.6 cm), (34.3 cm) respectively. The study demonstrated the grave impact of mild iodine deficiency on neonatal parameters with decreasing arithmetic mean of neonatal length of (45.57±3.92 cm) compared to the international (90th Centiles) for neonatal length, at (37th weeks) of gestation, which was (50.14cm) (Allzain et al.2019).

The multi indicators cluster survey (MICS) in Sudan for the years 2010 and 2014 showed that the percentage of children under five with under nutrition were (32.2%) and (33%) respectively (Sudan Health Observatory)

Other study revealed that the prevalence of protein energy malnutrition (PEM) in children under five (5) years of age in Shendi area in North Sudan in 2017 was (10.2%), (Omran M. Ahmed, et al .2020).

High alarming prevalence of acute and chronic malnutrition in children under five (5) years of age of (25.4%) and (36.6%) was observed by (Ahmed, M. Hussein, et al 2015) in South Darfur State in internal displacement camps in both Nyala and Kass Locality.

Today, there are more wasted and stunted children in Sudan than there were 20 years ago (Sibanda et al, 2014: Jamal Eldeen.2018).

The STEPS wise survey of chronic diseases risk factors in Khartoum, the capital city was carried out in December 2005 to January 2006 for adults aged (25 to 64) years, revealed that the percentage who are overweight, obese were (53.9%, & 22.9%) with higher percentage among female of (62.5% & 30.7%) respectively. Also (23.6 %) had raised blood pressure  $\geq 140/90$  mm Hg., (19.2%) had raised blood glucose  $\geq 7.0$  mmol/L, and (19.8%) has raised total cholesterol  $\geq 5.2$  mmol/L (WHO.2006). These results were alarming.

Ten years later the same situation persist with (23.0 %) of adults aged (18-69) years still obese in Khartoum, with (11.6%) had raised blood glucose and (24.2%) had raised total cholesterol (WHO.2016). The same survey revealed lower level of fruits and vegetables consumption in different regions of Sudan with (94.7%) ate less than five (5) servings of fruit and/or vegetables on average per day.

The population-based study of the prevalence of diabetes mellitus and its risk factors in adult urban communities in River Nile State in North Sudan, which included (954) adults (518 females; 54.3%; mean [ $\pm$ SD] age 39.5  $\pm$  16.7 years; range 18-90 years) , revealed that the overall prevalence of diabetes Mellitus (DM) of 19.1% (182/954), whereas that of impaired glucose test (IGT) was 9.5% (91/954), Increasing age, a family history of diabetes, central obesity, abnormal body mass index, and hypertension were significant risk factors for DM (Elmadhoun WM. et al.2016).

#### 5. CONCLUSION

The dramatic change in dietary habits in Sudan, with abandoning of traditional style and adoption of western one lead to serious consequences on Sudanese population health as witness by these alarming prevalence of low birth weight, malnutrition, diabetes and hypertension. Other developing nations are more likely to face the same challenge and change as globalization has no exemption.

The logical solution to the most of these health risk nutritional issues needs responsible policy to enhance peace and social stability of local communities, and encourage of local farming and food production.

Better utilization of available water resources of River Nile, Red sea, and lakes of old and newly established dams, which can be used for fishes farming as well as marine plants to provide food rich in both iodine and essential fats. Gap can be narrowed between bright ideas and harsh reality.

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## CONFLICT OF INTEREST

The author have declared that no competing interests exist.

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