TheRepublic of Sudan

Federal Ministry of Health

Basic Health Care General Directorate

Mother and Child Health Directorate

NATIONAL NUTRITION PROGRAMME

National Micronutrients Strategy, 2018-2025

Forward

FMOH continues its commitment to coordinate the universal call to scale up nutrition actions, despite all efforts being made, micronutrient deficiencies remain a serious public health problem in Sudan. Goal 3 of the 17 SDGs is “to ensure healthy lives and promote well-being for all at all ages.” This broad goal embraces the unfinished agenda of the MDGs and goes beyond—to virtually end preventable maternal, newborn, and child deaths. Working for this goal will enhance the health protection and well-being of Sudanese population.

The National micronutrient Strategy 2017-2025has been developed and enriched by multidisciplinary task force of stakeholder’s. The strategy was built on the nutrition policy 2008, the National.(NHSS) 2012-2016 and the National Nutrition Strategic plan 2014-2018. This Strategy has four main sub-strategies; fortification, supplementation, dietary diversification and other complementary public health measures. Each sub-strategy has an action plan map that outlines the steps needed for scaling up a harmonized implementation over the next five years. The strategy, financing, and delivery of services will be guided by the best available scientific knowledge on the efficacy of interventions and the effectiveness of programs. It is designed to be a living document that has the flexibility for continuous revision in response to health changes and operation context.in response to shifts in operating context.

This strategy is the governmental document that guides the micronutrients plans at national level, states level as well as at bilateral, national and non-governmental organizations. This strategy could be used as a tool of communication with stakeholders and as a foundation to combat micronutrient deficiencies in Sudan with optimum impact on the target population.

Mr. BaharIdris Abo Garda
Federal Minister of Health

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Glossary

DALYs	Disability-Adjusted Life Years
EPI	Expanded Programme of Immunization
FFE	Food for Education
FMOH	Federal Ministry of Health
GDP	Gross Domestics Product
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome).
IDA	Iron Deficiency Anemia
IDD	Iodine Deficiency Disorder
IMCI	Integrated Management of Childhood Diseases
MDGs	Millennium Development Goals
MDIS	Monitoring and Evaluation
MNM	Micronutrient Malnutrition
MNP	Micronutrient Powder
MOF	Ministry of Finance
NFA	National Food Alliance
NHSSP	National Health Sector Strategic Plan
NMS	National Micronutrient Strategy
NNP	National Nutrition Programme
NNSP	National Nutrition Strategic Plan

REACH Renewed Efforts Against Child Hunger

SBCC Social Behavior Change Communication

SDGs Sustainable Development Goals

SFS Supplementary Feeding

SHHSSudan House Hold Survey

SMoH State Ministry of Health

SOPsStandard Operating Procedures

SUNScalingUp Nutrition

SWOTStrength, Weakness, Opportunities, Threats

UN United Nations

UNICEFUnited Nations Children's Fund

USIUniversal Salt Iodization

VAD Vitamin A Deficiency

VASVitamin A Supplementation

VMD Vitamin and Mineral Deficiencies

WFPWorld Food Program

WHOWorld Health Organization

Executive Summary

Sudan continues its commitment to coordinate its national call to scale up nutrition actions by increasing multilateral work on technical and policy agendas at the country level. The National Micronutrient Strategy (NMS) provides evidence informed strategies for effective micronutrients interventions that aim to guide public health practices and achieve better health outcomes in Sudan.

The nutritional requirements of individuals vary at different stages of life and depend on a number of factors including age, sex and current health status of the individual. *Micronutrients* which compose of vitamins and minerals are essential to our health, development and to ensure the healthy functioning of organs and body processes. Micronutrient deficiencies often referred to as "hidden hunger," is a serious public health problem affecting over two billion people worldwide. According to WHO mortality data, around 0.8 million deaths (1.5% of the total) can be attributed to iron deficiency each year, and a similar number to vitamin A deficiency.Most of the people live in low income countries are typically deficient in more than one micronutrient, particularly vitamin A, iodine, iron and zinc. Micronutrients deficiencies remain a major public health problem in Sudan especially among the vulnerable segments of population.

Prevalence of anemia among under-five children in Sudan is (60.3%),while (30.6%) were found to be severely anemic. Prevalence of moderate Anemia among women 15-49 years of age is approximately (76%), while (23%) were found to be severely anemic in Sudan. The WHO target is a 50% reduction of anemia in women of reproductive age by 2025.

Vitamin A deficiency is quiet prevalent in the developing world, particularly in countries with the highest burden of under five deaths as Sudan. Federal Ministry of Health has adopted vitamin A supplementation strategy for under five children and lactating mothers as a reliable and effective way to combat vitamin A deficiency.

Iodine Deficiency Disorders (IDD) is the world's leading cause of preventable mental retardation and impaired psychomotor development in young children. It is most commonly and visibly associated with goiter. The prevalence of goiter in Sudan is found to be **22%**.The salt iodization programme targeting universal coverage was started in 1994. However, as evidenced by the findings of the SHHS2, a very small proportion of households (9.4%) were found to be using iodized salt.

There exist effective strategies and interventions against micronutrient deficiencies, these are, dietary diversification, food fortification, supplementation with vitamin and minerals and the public health measures.

For developing this strategy a through situation, and SWAT analysis was done, the main problems were identified. The main goals of this strategy are guided by fundamental principles which are **equity, evidence based policy & planning, collaboration, accountability and stability & sustainability.**

Sudan free of hidden hunger is the vision of the strategy. The mission is to achieve better equitable health and nutritional status for Sudanese population through collaborative and evidence-based micronutrients needs.

In line with the Eastern Mediterranean regional strategy on nutrition 2010-2019, this Strategy Goal is to reduce the prevalence of Micronutrient deficiency disorders (in particular iron, iodine, vitamin A and zinc) and enhance consumption of diverse nutritious and fortified food throughout the country.

Building on a detailed situation analysis, literature search and other countries experiences, the following four objectives were developed to achieve the goal and reach the required outcomes.

- To create enabling political environment with strong in-country leadership and a shared multi-stakeholder platform and partnership to take a joint responsibility to enhance micronutrients legislations, effective policies, information monitoring and evaluation systems
- To scale up proven effective nutrition interventions to improve micronutrient malnutrition status of the targeted population through food fortification
- To Implement micronutrients sensitive sectoral strategies by improving coverage of micronutrients supplementation and promote the consumption of micronutrient-rich foods and food diversification.
- To build capacity for emergency preparedness in nutrition and micronutrients deficiencies

The implementation of this strategy will be through the same mechanism of the implementation of the National Nutrition Strategic plan. Improvement in nutrition and micronutrients require collaboration among multiple sectors. Coordination, harmonization of implementation, monitoring and evaluation of the MN Strategy is a major function of the National Nutrition Programme.

The strategy has adopted the WHO Global Monitoring Framework to measure the short term achievements as well as the long term impact of the strategy interventions. The monitoring framework will include indicators for all levels of the outcome chain. Evaluation will be conducted at the midterm and at the end of the last year of the strategy to measure achievement of the strategy goals and outcomes and the overall impact on health and nutrition status in Sudan.

Joint planning and implementation will facilitate effective resource mobilization, and streamline aid effectiveness. At this point all stakeholders identified for the nutrition investment programme launched recently, are potential sources for funding the strategy.

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Chapter (1)

INTRODUCTION AND BACKGROUND

1.0: Introduction

The nutritional requirements of individuals vary at different stages of life and depend on a number of factors including age, sex and current health status of the individual. Two categories of nutrients are needed by the body to ensure healthy functioning

1. *Macronutrients* - that provide the energy required for growth and replacement of cells, which are required in large amounts and include proteins, carbohydrates and fats.

2. *Micronutrients* - which ensure the healthy functioning of organs and body processes which required in much smaller amounts and include vitamins and minerals.

Micronutrients compose of vitamins and minerals that are essential to our health, development, and growth. Micronutrients are found naturally in a variety of plant- and animal-based foods. Although they can now be synthesized in the laboratory, a varied diet typically provides all of the vitamins and minerals necessary for human health. In many settings, however, such foods are not available and provide a major threat to the health and development of populations around the globe. Proper intake of vitamins and minerals can mean the difference between a healthy, productive life, and a life fraught with illness.

Although improvements in nutrition have taken place, as a result of the considerable efforts made by the health and nutrition sector, malnutrition remains a major health problem with a consequences are too grave to be ignored. Micronutrients deficiencies are still a major health problem globally, regionally and nationally, it is the single biggest contributor to child mortality. Most of the people live in low income countries are

typically deficient in more than one micronutrient, particularly vitamin A, iodine, iron and zinc. Deficiencies occurs when people do not have access to micronutrient-rich foods such as fruits, vegetables animal products and fortified foods, usually because they are either too expensive to buy or unavailable locally for consumption. Micronutrients deficiencies increase the general risk of infectious illness and of dying from diarrhea, pneumonia, malaria and measles. These conditions are among the 10 leading causes of diseases in the world and Sudan (1).

1.1: The Global Impact

Micronutrient deficiencies often referred to as "hidden hunger," is a serious public health problem affecting over two billion people worldwide. In developing countries, micronutrient deficiencies are a leading cause of preventable blindness, neural tube defects (the second most prevalent class of birth defects in the world), intellectual / developmental disabilities, and death during childbirth and it play a significant role in reducing the most common form of birth defects (cardiac) (2).A person's chances of dying from measles or diarrhea are between 30 – 50%, this number can be significantly lowered with sufficient micronutrient intake due, and to the effects vitamins and minerals have on bolster the immune system (2).

Table (1):Impact of Micronutrient deficiencies (2)

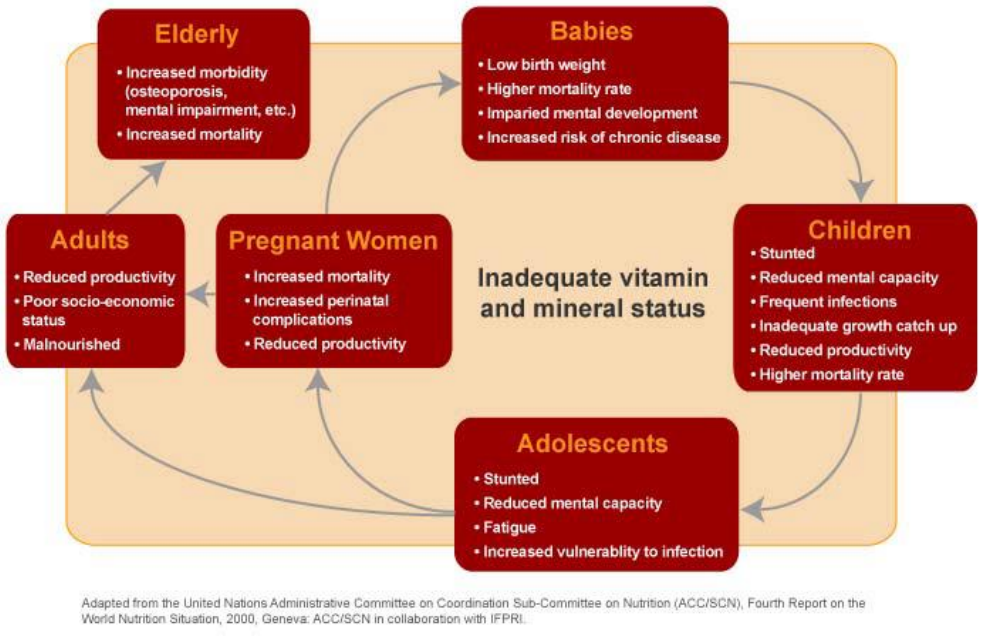
Nutrient	Impact of deficiency
Folic acid	•150,000 babies are born annually with severe birth defects due to maternal folate deficiency •Deficiency is associated with 1 in every 10 adult deaths from heart disease
Iodine	•Annually, 18 million babies are born mentally impaired due to maternal iodine deficiency •Deficiency is the leading cause of preventable retardation •Deficiency decreases IQ by as much as 15 points
Iron	•Deficiency causes the deaths of 136,000 women and infants per year •Leading cause of death in childbirth •1.6 billion people suffer reduced productive capacity due to anemia •Impairs the mental development of 40-60% of children in the developing world
Vitamin A	•Deficiency causes 1 million premature child deaths a year •Leading cause of preventable blindness among children •Compromises the immune systems of approximately 40-60% of the developing world's children under 5
Zinc	•Deficiency causes the deaths of 450,000 children under 5 annually •Addressing zinc deficiency in children can reduce the incidence of diarrhea, which kills 9 million children a year, by 27%, acute respiratory infection by 15%, and overall child mortality by 6%

Source: http://projecthealthychildren.org/why-food-fortification

1.2: Micronutrients are Vital

Micronutrients are required for the adequate functioning of the body as they regulate hormonal, immunological, biochemical and other bodily processes. Deficiencies of key nutrients such as iron, iodine, zinc and vitamin A can cause major illness and increased risk of mortality. The groups most vulnerable to micronutrient deficiencies are pregnant women, lactating women and young children mainly because they have a relatively greater need for vitamins and minerals and are more susceptible to the harmful consequences of deficiencies. For a pregnant woman these include a greater risk of dying during childbirth, or of giving birth to underweight or mentally impaired baby. For a lactating mother, micronutrient status determines the health and development of her breast-fed infant, especially during the first six months of life. For a young child the micronutrients deficiencies increases the risk of dying due to infectious disease and contribute to impaired physical and mental development (2)

Figure (1): Effects of inadequate vitamin and mineral status during life cycle



Adapted from the United Nations Administrative Committee and Coordination Sub Committee on Nutrition, forth report on the world nutrition situation, 200, Geneva: ACC/SCN in collaboration with IFPRI

1.3: Micronutrients in Emergencies

Micronutrient deficiencies can easily develop during an emergency or be made worse if they are already present. This happens because livelihoods and food crops are lost, food supplies are interrupted, diarrheal diseases breakout, resulting in mal-absorption and nutrient losses, and infectious diseases increases the need for micronutrients to help fight illness. For these reasons it is essential to ensure that micronutrient needs of people affected by disaster are adequately met through general food- aid rations and supplementation to meet the nutrient needs. UNICEF and WHO have developed a daily multiple micronutrients formula to meet the recommended nutrients intake for nutritionally vulnerable subgroups such as pregnant, lactating women and young children (3).

One way to meet the recommended daily intake of micronutrients, is to provide foods fortified with micro nutrients, the aim is to avert the micronutrient deficiencies or prevent them from getting worse among the affected population(4).

1.4: Values and principles

The strategy shares the following values and principles

Equity: Nutrition and micronutrient services give more attention to vulnerable populations and focus on aspects with potential for immediate benefit to the greatest number of people to promote health and nutrition wellbeing.

Evidence based policy & planning: Interventions prioritization while informed by country needs is important to ensure that services are directed towards existing problems and contributing to ongoing efforts for improvement of health in the country. Strengthen research in nutrition and micronutrients to inform policy and programming.

Collaboration: collaboration among Sudanese with international nutrition communities, where the capacity of different partners with relevant skills and expertise should be recognized and maximized through collaborative actions.

Accountability: policy makers, decision makers and managers will be accountable. The criteria for accountability will not only relate to monetary matters, but include translation of this strategy into actions.

Stability & Sustainability: It is recognized that investment in micronutrients strategies contributes to social and economic development of the country. Nutritional interventions must be sustained through stable funding with clear and specific objectives for investment.

1.5: Vision, Mission, and Strategic Goal

Vision
Sudan free of hidden hunger

Mission
To achieve better equitable health and nutrition status for Sudanese population through collaborative and evidence-based micronutrients actions.

The Strategy Goal
To reduce the prevalence of Micronutrient deficiency disorders (in particular iron, iodine, vitamin A and zinc) and enhance consumption of diverse nutritious and fortified food throughout the country.

1.6: Strategic Objectives

Building on a detailed situation analysis, literature search and other countries experiences, the following four objectives were developed to achieve the goal and reach the required outcomes.

1. **To create enabling political environment with strong in-country leadership and a shared multi-stakeholder platform and partnership to take a joint responsibility to enhance micronutrients legislations, effective policies, information monitoring and evaluation systems**
    - **a.** Develop and approve related laws and legislations
    - **b.** Strengthen technical and managerial capacity for nutrition programme at all levels in the health sector
    - **c.** Engage all national and international stake holders keeping a strong public health leadership
    - **d.** Strengthen micronutrient information system, data base and monitoring and evaluation systems
    - **e.** Allocate adequate funding for the prevention and control of micronutrients deficiencies

2. **To scale up proven effective nutrition interventions to improve micronutrient malnutrition status of the population through food fortification**

a. Enforce and implement national food fortification programmes to improve their nutritional content
b. Implement home fortification of food

3. **To Implement micronutrients sensitive sectoral strategies by improving coverage of micronutrients supplementation to the targeted population and promote the consumption of micronutrient-rich foods and food diversification.**
    a. Vitamin A supplementation for lactating women and under five children through national health days and routine services
    b. Iron and folic acid supplementation for targeted groups
    c. Zinc supplementation for diarrhoea management.
    d. Strengthen active community initiatives and school nutrition programmes
    e. Nutrition education programme and demand creation (provide information on food preparation, nutritional value and other factors that affect micronutrient status).
4. **To build capacity for emergency preparedness in nutrition and micronutrients deficiencies**
    a. Improve access and quality of nutrition services and appropriate micronutrients interventions in emergency settings

1.7: Targets and outcomes (outputs/ outcome Indicators)

b. Prevalence of iron deficiency anaemia among children less than 5 years, school –aged children, and pregnant women reduced by **26%**.
c. Prevalence of vitamin A deficiency among less than five years of age children is reduced by **50%.**
d. Iodine deficiency disorder reduced by **50%**.

1.8: Process of Strategy Development

National micronutrients strategy **2017-2025**, was developed by Federal Ministry of Health in collaboration with a national consultant and other related sectors including, WHO, UNICEF, and WFP. Two committees were working on the strategy. The first is the technical working group committee who collect the required information, brainstorm and prepare the strategy through the followings steps:

Step (1): Micronutrient Situation analysis: A situation analysis developed based on a review of nutrition system barriers, successes and promising practices, as well as identifying the strengths and weaknesses of the micronutrient interventions and disease control measures.

Step (2): Objectives, milestones and priority-setting: National goals, objectives and strategies were set for five years based on the situation analysis and priority- setting.

Step (3): Planning strategies: The outlines of means and how to achieve the MN objectives were pointed out.

Step (4): Links to national health plans and global goals and targets: The MN strategy was linked to national nutrition strategy, goals and targets, and to regional targets and the Global MN Action Plan.

Step (5): Setting an activity timeline, monitoring and evaluation framework: This step established a timeline for main activities and milestone achievements, monitoring and evaluation framework for all MN components.

Step (6): Costs and financing: Costing and financing assessment were included, linked to the planning and budgeting cycles of the Ministry of Health (MoH). **Step (7): Putting the MN strategy into action:** This step outlined the implementation arrangements and the detailed annual work plans.It was linked to the national planning and budgeting cycles at national and sub- national levels of the health system. The step also involves annual, midterm and final review of the MN strategy, for the adjustment of the strategy based on lessons learned.

The second is the reviewer committee, it is composed of all the relevant stakeholders who reviewed the final document of the strategy. The strategy was finally approved by the Minister of health and disseminated to all related stake holders at national and international level.

Chapter (2)

COUNTRY CONTEXT

2.0 Sudanese Context

Sudan's area covers over 1.8 million square kilometers of land, including desert, semi-arid, tropical and urban areas, with a population estimated at approximately 38,435,252 million people (Central Statistics Bureau, projection for 2015). Sudan is a country of farmers, agro-pastoralists and pastoralists, the majority of whom rely on rain for both cultivation and pasture / grazing. As part of the Sahel belt, Sudan suffers from years of recurring droughts and poor harvests. The rainfall in 2011 was sub optimal in terms of timing and quantity, resulting in a 50 per cent of average harvest at the end of 2011 (FAO, 2012). However, in 2012 the rains were very good, resulting in an above average harvest and improved food security in conflict-free parts of the country. There is on-going insecurity affecting some states, which negatively impacts livelihoods and coping strategies. In South Kordofan, Blue Nile and Darfur regions, improvements in food security are predicted to be minimal due to on-going conflict and displacement (Sudan Food Security Outlook, 2012).

The succession of South Sudan from the Republic of Sudan in 2011 resulted in a reduction of 30 per cent of the government budget due to the loss of oil revenue (World Bank, 2011). Instability of the economy has seen double digit inflation, affecting prices of all basic commodities and causing a devaluation of the currency. This means that more families are falling into poverty and have decreased peoples' purchasing power - which resulted in a decline in household food purchase. Currently Sudan comprises of 18 states each divided into localities, making up a total of 184 localities. Sudan with its multipart system is federated republic with powers devolved to state under federal system act 1999. Accordingly legislative and organizational arrangement may vary from state to state.

It is estimated that the overall coverage of basic health services to the population is between 45-60%. There are substantial inequalities, both geographic and socio-economic, in terms of access to health services. Coverage of services is biased to urban environments, leaving rural populations underserved and with existing services skewed towards hospital and tertiary services, as opposed to preventive public health services.

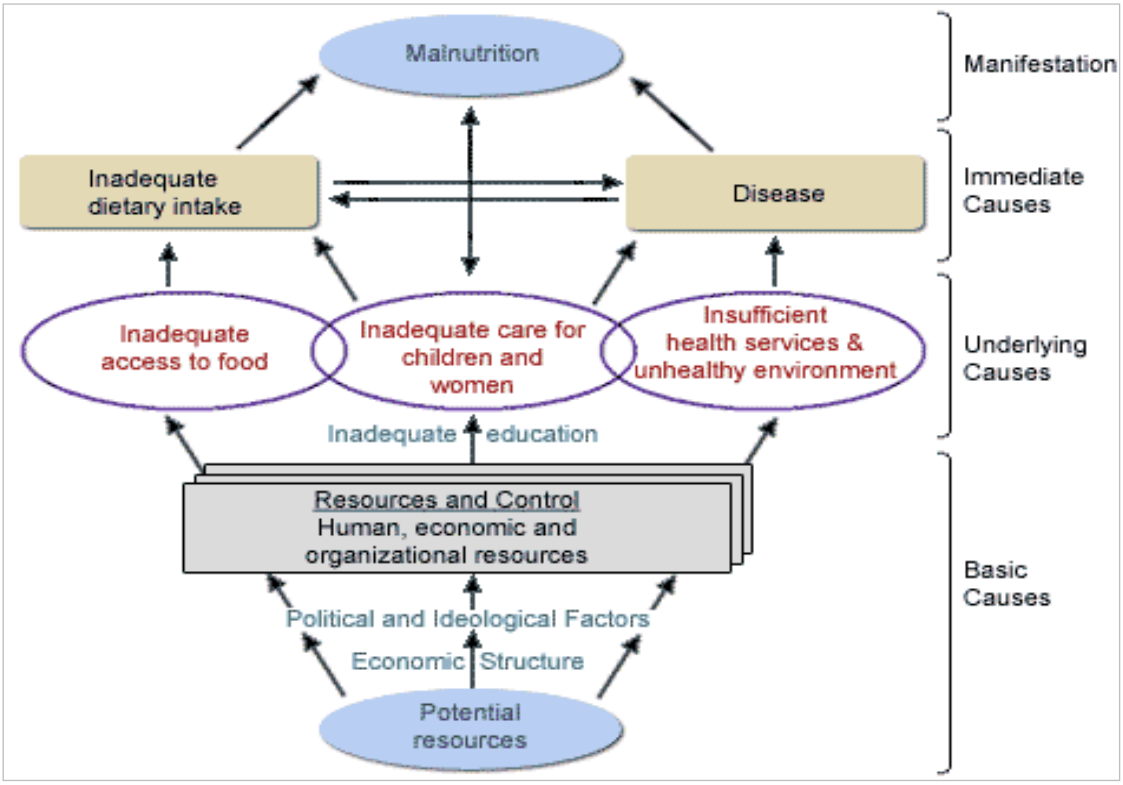
2.1: Impact of current Sudanese context

The above factors directly or indirectly undermine the population's well-being and their resilience to shock due to serious nutrition situation exists in Sudan. The country indicators show nutrition poor situation; the under-five mortality in Sudan stand at 78/1000 (2010 SHHS) while the maternal mortality rates are at 216/1000 and there is poor antenatal care practice. Only less than 30% of Sudan population use sanitation

facilities while only 60.5%are drinking appropriately treated water. This increases the risk for diarrhoea. The measles vaccination coverage was about two third of the target group and 39% of the children had received the full immunization doses as per the 2010 SHHS. Given that malnutrition is estimated to underpin a third of all the under-five mortality (Lancet, 2008), the risk for high child mortality in Sudan persists if the nutrition situation and the aggravating factors are not addressed (Sudan policy Brief, 2013).

Factors influencing nutrition status in Sudan have been identified by the UNICEF Conceptual Framework for Malnutrition. The framework identifies the various inter-related factors that determine the population's nutrition wellbeing to be broadly categorized as immediate, underlying and basic causes.

Figure (1): Conceptual framework of causes of malnutrition



2.2: Current nutrition situation in Sudan

Sudan has high level of acute and chronic malnutrition indicators. Acute malnutrition measured as global acute malnutrition GAM is 16.4%, which is above the international 'emergency' thresholds of 15%. Severe Acute Malnutrition (SAM) rates are also worryingly high at 5.3% which translates into half a million children suffering from SAM i.e. 1 in 20 Sudanese children are severely malnourished, with a greatly increased risk of death while close to 2 million children are stunted annually (SHHS, 2010). About 35% of children under-fives were moderately or severely stunted (too short for their age). The proportion of children who are stunted is higher in rural areas (38.7 %) than in urban areas (25.3 %). Some difference exists among boys (37.4%) and girls (32.6%). In this regard, stunting is currently the

most challenging nutrition problem in Sudan. It has permanent negative effect that hampers child's growth, wellbeing and eventually nation productivity. Stunting and other forms of under nutrition reduce a child's chance of survival, while also hindering optimal health and growth (National Nutrition Strategy 2014 – Nutrition Policy Brief 2013). On the other hand the underling factors and indicators for child morbidity and mortality based on SHHS2010 were: - under five with diarrhea in the last two weeks preceding the survey 25%, use of oral rehydration solution 22%, use of Zinc for under five with diarrhea 0.7%, under-fives with suspected pneumonia in the last two weeks preceding the survey 18%, Knowledge of the two danger signs of pneumonia 4.5 % antibiotic treatment of suspected pneumonia 66.1%.

2.3: National Nutrition Program in Sudan

In Sudan; the National Nutrition directorate (NND) was launched in 1967 as a department at the Ministry of health. The mission and vision of the NDD was and still to "Maintain, Promote, nutrition status of Sudanese population with focus on vulnerable groups, contribute to reduction of overall morbidity, and mortality and contribute to overall country development" and "Commitment to promoting nutritional well-being for all our people becomes an integral part of all humanitarian and development policies, plans and programs in Sudan" respectively.

Currently the National Nutrition Program (NNP) is under the Primary Health Care General Directorate together with Integrated Management of Child Illness (IMCI), Reproductive Health (RH), Expanded Program of Immunization (EPI), Health Promotion (HP), Food Quality and Control etc. The NNP mandate is to address nutrition issues, through providing overall leadership to nutrition and nutrition related interventions (IYCF, Micronutrients, Community Management of Acute Malnutrition (CMAM), Nutrition Surveillance System and Growth Monitoring) that ensures the provision of high quality nutrition interventions, by defining technical standards for health and nutrition work, facilitating inter-sectoral coordination, as well as monitoring the overall quality of nutrition services.

The literature provided evidence based that improving the infants and young child feeding services will contributes to productivity, economic, growth and development, by improving physical work capacity, cognitive development, school performance, and health by reducing morbidity and mortality. In addition the latest National Nutrition Strategy endorsed in 2014 stated five strategic objectives; the third objective mainly states "To promote prevention of malnutrition through improving infant and young child feeding practices and services and increase micronutrient uptake" and consequently the need of infant and young child feeding strategy raised.

The global Strategy was based on the evidence of nutrition's significance in the early months and years of life, and of the crucial role that appropriate feeding practices play in achieving optimal health outcomes. Lacks of breastfeeding – and especially lack of exclusive breastfeeding during the first half-year of life – are important risk factors for infant and childhood morbidity and mortality that are only compounded by inappropriate complementary feeding. The life-long impact includes poor school

performance, reduced productivity, and impaired intellectual and social development. This exercise provided an exceptional opportunity to re-examine critically, in the light of the latest scientific and epidemiological evidence, the fundamental factors affecting feeding practices for infants and young children. At the same time, it renewed commitment to continuing joint action consistent with the Baby-friendly Hospital Initiative, the International Code of Marketing of Breast-milk Substitutes, and the Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding. All Governments including Sudan has agreed and ratified the recommendation of the declaration.

Chapter (3)

Situation of Micronutrients in Sudan

3.1: Situation of micronutrients

Micronutrient deficiency, particularly iron deficiency anaemia (IDA), vitamin A deficiency (VAD), and iodine deficiency disorders (IDD), poses a serious threat to the health of vulnerable segments of population.Available information suggests that the micronutrient status of the population in Sudan is unsatisfactory.

Dietary inadequacy is the primary cause of IDA and VAD. A large proportion of the population is moderately or severely anemic due to iron deficiency. Although vitamin A deficiency has declined significantly due to repeated supplementation during National polio days, localized surveys have reported night blindness in some parts of Sudan, due to vitamin A deficiency.Poor iodine content of soil and water due to environmental iodine deficiency is the main determinant of IDD. Intake of iodized salt by the households, which is a key intervention to prevent iodine deficiency disorders, remains very low.

3.1.1: Iron Deficiency Anaemia

Iron deficiency is the most common and widespread nutritional disorder in the world. As well as affecting a large number of children and women in developing countries, it is the only nutrient deficiency which is also significantly prevalent in Industrialized Countries. The numbers are staggering, 2 billion people – over 30% of the world's population are anemic, many due to iron deficiency and in resource-poor areas, and this is frequently exacerbated by infectious diseases. Malaria, HIV/AIDS, hookworm infestation, schistosomiasis, and other infections such as tuberculosis are particularly important factors contributing to the high prevalence of anemia in Sudan. Iron deficiency affects more people than any other condition, constituting a public health condition of epidemic proportions.

Iron deficiency and anemia reduce the work capacity of individuals and entire populations, bringing serious economic consequences and obstacles to national development. Overall, it is the most vulnerable, the poorest and the least educated who are disproportionately affected by iron deficiency, and it is they who stand to gain the most by its reduction.

In 2012, the World Health Assembly Resolution 65.6 endorsed Comprehensive implementation plan on maternal, infant and young child nutrition, which specified six global nutrition targets for 2025. The second target is a 50% reduction of anemia in women of reproductive age. Anemia impairs health and well-being in women and increases the risk of maternal and neonatal adverse outcomes. Anemia affects half a billion women of reproductive age worldwide. In 2011, 29% (496 million) of non-pregnant women and 38% (32.4 million) of pregnant women aged 15-49 years were anemic. The prevalence of anemia was highest in south Asia and central and west Africa. While the causes of anemia are variable, it is estimated that half of cases are due to iron deficiency. In some settings, considerable reductions in the prevalence of anemia have been achieved; however, overall, progress has been insufficient. Further actions are required to reach the World Health Assembly target of a 50% reduction of anemia in women of reproductive age by 2025. (5)

In Sudan prevalence of Anemia among under-five children: Almost six out of ten children (60.3%) under age five were found to be moderately anemic while four out of ten children (30.6%) were found to be severely anemic.

The proportion of severely anemic children was higher among boys (39.9%) than among girls (36.8.2 %), more over SHHS2 indicated higher proportion of severely anemic children in rural areas compared to urban areas. The percentage of children classified as severely anemic was higher among children from households in the poorest quintile (39.0%) than those belonging to households in the richest quintile (26.8%), the severity of anemic ranged from 19.2% in North Darfur to 87.4% in Red Sea State.

Prevalence of Anemia among women age 15-49 years: Approximately three-quarters (76%) of women age 15-49 years in Sudan were found to be moderately anemic while one out of four (23%) were found to be severely anemic. The percentage of severely anemic women was lower among pregnant women (14%) than women who were not pregnant (24%) at the time of the assessment. The proportion of women age 15-49 years who were severely anemic ranged from 13 % in West Darfur State to 38% in Gadarif State.

3.1.2: Vitamin A

Vitamin A is essential for eye health and proper functioning of the immune system. It is found in food such as milk, liver, eggs, red and orange fruits and green leafy vegetables, although the amount of vitamin A readily available to the body from these sources varies widely. In developing areas of the world where vitamin A is largely consumed in the form of vegetables and fruits, daily per capita intake is often insufficient to meet

dietary requirements. This is further compromised by increased requirements of vitamin A as children grow or during periods of illness, as well as increased losses during infections. As a result Vitamin A deficiency is quiet prevalent in the developing world, particularly in countries with the highest burden of under five deaths.

For countries with vitamin A deficiency problems, current international recommendations call for high-dose Vitamin A supplementation every four to six months, targeted to all children between the ages of 6 to 59 months living in affected areas.Improving the vitamin A status of deficient children has been shown repeatedly to enhance their disease resistance capacity and hence reduce mortality and illness from infectious disease significantly and at low cost. Providing young children with two high-dose Vitamin A capsules a year is a safe, cost-effective, efficient strategy for eliminating Vitamin A deficiency and improving child survival. Giving Vitamin A to new mothers who are breastfeeding helps protect their children during the first months of life and helps to replenish the mother's stores of Vitamin A, which are depleted during pregnancy and lactation.

Vitamin A is important for the immune system. Bhutta et al report pooled analyses of trialsof Vitamin A sup plementation, showed that mortality in children 6to 59 months declinesy 24 percent; however, there is no i mpact on anthropometric measures.(6)

The elimination of vitamin A deficiency as a public health problem is a central element for improving the survival, growth and development of the children. (All persons have a right to vitamin A intake) Vitamin A deficiency is a major contributor to child mortality, and there is increasing evidence that it also raises significantly the risk of maternal death. Elimination of vitamin A deficiency as a public health problem must be principal element of child and maternal survival programmes. The central place and stature of vitamin A in child and maternal survival programmes need to be elevated beyond that of vitamin A for prevention of blindness only. (7)

Federal Ministry of Health has adopted the supplementation strategy as a reliable and effective way to combat vitamin A deficiency, and recommended that children aged 6-59 months be given a high dose Vitamin A capsules every six months. Since 2007, Vitamin A capsule supplementation has been provided to children aged 6-59 months in Sudan during the polio eradication campaigns or as a part of the child health week previously referred to as accelerated child survival days organised on a six-monthly basis .It is also

recommended that mothers take a vitamin A supplement within six weeks of giving birth due to increased vitamin A requirements during pregnancy and lactation.

Within the six months prior to the SHHS2 in 2010, 61 percent of children aged 6-23 months received a high dose Vitamin A supplement. The SHHS findings indicated that the mother's level of education has an influence on the likelihood of Vitamin A supplementation in Sudan, For instant percentage of children aged 6-23 months who received a Vitamin A supplement in the last six months increases from 55.8% among children whose mothers had no education to 64.5% of those whose mothers have primary education and 69.2% among children of mothers with secondary or higher levels of education. The economic status of the households was found to have some influence on the likelihood of Vitamin A supplementation. The percentage of children aged 6-23 months who received Vitamin A supplement in the last six months as indicated in the survey showed an increasing trend from 50.1% among children from the poorest households to 66.2% among children from the richest households. Urgent actions are needed to accelerate progress and put this disorder under control.

3.1.3: Iodine

Iodine Deficiency Disorders (IDD) is the world's leading cause of preventable mental retardation and impaired psychomotor development in young children. In its most extreme form, iodine deficiency causes cretinism. It also increases the risks of stillbirth and miscarriage in pregnant women. Iodine deficiency is most commonly and visibly associated with goiter. IDD takes its greatest toll in impaired mental growth and development, contributing in turn to poor school performance, reduced intellectual ability and impaired work performance. Iodine Deficiency Disorder National Survey conducted in 1997, showed prevalence of IDD at a rate of 22%.

In Sudan the salt iodization programme targeting universal coverage was started in 1994. The programme has been reviewed in order to identify the gaps and to initiate affirmative actions in terms of legislative measures, salt production and social mobilization. Based on international standards the country is committed to achieve the use of iodized salt by 90 percent of households; process of iodized salt production from the main sources was initiated to cover 100 percent of households and the banning of production of non-iodized salt after a six-month grace period. The machines and materials (including potassium iodate)

required for the production of iodized salt havealready been procured and iodized salt production commenced in June 2007.

However, as evidenced by the findings of the SHHS2, a very small proportion of households (15 percent) were found to be using iodized salt. But in only 9.5% of the households, salt was found to contain 15 parts per million (ppm) or more of iodine, while in the case of 5 percent of household's salt was inadequately iodized and found to contain less than the required 15 parts per million.

About 11 percent of urban households were found to be consuming adequately iodized salt as compared to 9 percent in rural areas. The consumption of adequately iodized salt was higher among the poorest households (18 %) than among the richest households (7 %). States consumption of adequately iodized salt was lower in BlueNile and GazieraStates (0.2%) and highest in South Darfur State (43.2%).

3.2: Achievements in Micronutrients

Three major intervention strategies are available for the control and prevention of micronutrient malnutrition. The first is the short term strategy of **Supplementation** of specific micronutrients, the second is the midterm strategy of **Nutrition Education** to ensure regular consumption of micronutrient rich foods and the third is the long term strategy of **Fortification** of foods with micronutrients.

Micronutrient supplementation is also provided to the children through other means. Vitamin A supplementation is distributed during polio vaccination campaigns and during the Child Health Week which was the Accelerated Child Survival Days. Polio vaccination campaigns are biannual events that reported more than 90% coverage of the target under five year's children population.

Maternal micronutrient supplementation is provided through the health care services delivery system through the provision of iron folate (coverage estimated at 23%), while post-partum VAS with very low coverage estimated at 15% only.

Micronutrient supplementation is also provided to the children through other means. Vitamin A supplementation is distributed during polio vaccination campaigns and during the Child Health Week which was the Accelerated Child Survival Days. Polio vaccination campaigns are biannual events that reported more than 90% coverage of the target under five year's children population.

Great efforts have been made to fortify all salt produced in Sudan with potassium iodate. However; the problems with machinery problems and quality control have proven to be major bottlenecks for achieving Universal Salt Iodisation (USI). Only 10 states are currently having the legislations that regulate the distribution of iodized salt to achieve USI. In 2016; the Red Sea State Governor declared that, by end of 2018, all salt plants must have factories for iodization of salt with high quality of purification and refining for human and animal's consumption.

Steps taken by FMOH towards achieving the fortification strategy were:

- The development of high level Ministerial steering and technical committees in 2006 to support the national fortification strategy and to ensure government commitments to achieving USI.
- Scale upofnutrition***educational*** approach of dietary diversity to address multiple micronutrient deficiencies that often co-exist.
- Federal Ministry of health in partnership with WFP has introduced Micronutrient Powder (MNP) for home fortification of complementary food in a pilot project in Red Sea State in 2013, and through schools in Kassala state in 2014. Consequently the approach is extended through:
    - Free distribution to the most vulnerable families through the community-based nutrition platforms mostly in rural areas and in IDP settlements
    - A market-based approach using social marketing to increase coverage in urban areas to ensure the sustainability approach.
    - Through the food for education (FFE) programme, to improve the micronutrient content of school meals provided at Kassala state.

In regard to iron and folic acid fortification, the first and the only company in Sudan up to date fortifies flour with micronutrients (iron and folic acid) is Wheata industrial company which started voluntary in December 2005, leading a successful experience of bread wheat flour fortification.

More efforts need to be done with Vitamin A fortification.

Federal Ministry of Health believes that adopting and enforcing fortification legislation is an important perquisite for sustainability.Advocacy for development of national laws and regulation of food fortification (flour fortification, iodized salt, sugar etc.) is needed. Legislation could be effected by amending the existing food control law or enacting separate legislation for food fortification.

FMOH in partnership with UNICEF and WFP paid efforts to implement horticulture intervention and strengthen **nutrition education** in order to ensure regular consumption of micronutrient rich foods, by scaling up nutrition ***education*** approach of dietary diversity to address multiple micronutrient deficiencies that often co-exist. The approach was built on existing health education and promotion of nutrition coupled with comprehensive Social Behavior Change communication (SBCC) strategy that consider being the vehicle to deliver educational messages promoting dietary diversity, although the intervention is at early stages but expected to have remarkable changes at community level.

The main goals of this strategy will be guided by fundamental principles to improve health and nutritional status and health equity of Sudanese population. The quality proposed interventions' are essential to achieve the objective of "the attainment by all peoples of the highest possible level of health". Nutrition and micronutrients are critical elements for improving global health and health equity, as well as economic development. Concerted and focused efforts are needed to combat micronutrient deficiency. Mixes of affordable interventions are available which, when appropriately adapted to resource availability and context, are proven to be effective.

The first step in developing this national strategy, was conducting a situation analysis by a national taskforce in collaboration with the related sectors and partners using the available information from previous surveys, reports and assessments (bottle neck analysis). In-depth analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) was done by the technical working group on the micronutrient strategy.

.3: Micronutrients Strengths, Weaknesses, Opportunities, and Threats (SWOT)

3.4: The Purpose of this Strategy

Sudan continues its commitment to coordinate its national call to scale up nutrition actions by increasing multilateral work on technical and policy agendas at the country level.

The National Micronutrient Strategy has two great ambitions. First aims to reduce the prevalence of micronutrients deficiency disorders (in particular iron, iodine, and vitamin A). Second is to enhance the consumption of diverse nutritious fortified food throughout the country.

With these two great ambitions, the National Micronutrient Strategy (NMS) provides evidence informed strategies for effective micronutrients interventions that aim to guide public health practices and achieve better health outcomes in Sudan.

This strategy proposes approaches to address the major micronutrient deficiencies in the country during the next five years with focus on three priority areas.

- It aims to support establishing and implementing actions in accordance with the current national situation and resources.
- Improve the nutritional status of the people throughout the life cycle.
- It provides a framework for the appropriate nutrition actions in accordance to the most prevalent micronutrients health problems in the country.

The strategic approaches target the prevention, control and elimination of vitamin A deficiency, Iodine deficiency, and Iron and folic acid deficiencies, although zinc is mentioned, its related interventions will be addressed in coordination with the Integrated Management of Childhood Illness Programme(IMCI). In addition the strategy supports the Government leadership, agencies, the international community, and donors to contribute to micronutrients strategies and interventions.

3.5: Strategy Context

The national micronutrient strategy (NMS) 2017 - 2020, is based on the premise that policies and practices in support of nutrition should be grounded on the best scientific base. The evidence is clear that micronutrient strategy needs to come from addressing vitamins and minerals deficiencies through different existing health and nutrition programmes as well as empowerment of sector linkages between the Ministry of Health and

other stakeholders, such as Agriculture, Education, Social Welfare, etc. Oversight and leadership across the development landscape is guided by government commitment through current policies and practices to ensure maximum return on investments. National food security and nutrition council and existing legislations create a supportive environment and ensure that the current global interest in micronutrients initiatives is addressed.

Much is already being done by Federal Ministry of Health to reduce and prevent not only malnutrition and deficiencies but contribution to overall health of Sudan population. The different tents of this strategy are guided by the National health policy 2007, the 25years National Health Strategy 2007, the National Nutrition policy 2008, the National Health Sector Strategy (NHSS) **2017-2020,** the National Nutrition Policy Brief Report, the National Nutrition Strategic Plan (NNSP) 2014-2018, and the Nutrition investment programme 2016.

These national policies and strategies recognize the improvement of the nutrition status of Sudanese population as a key component of the essential health care package with special focus on maternal and children. The NMS is meant to translate the nutrition policy and the overall national health sector strategy into a clear guiding document that will facilitate operational planning and resource mobilization, taking into account the Sudan context and its commitment to the Global Nutrition targets and Sustainable Development Goals (SMDGs).

Chapter (4)
Strategic Directions

4.0: Strategies to Overcome Micronutrient Deficiencies

There exists a "tool chest" of effective interventions against micronutrient deficiency; these interventions are adopted globally to control/eliminate the micronutrient deficiencies, it should be emphasized that each has its strengths and limitations and domain of applicability providing a powerful options for improving micronutrient status in a population over varying periods of time. Careful consideration and application of design and management strategies suited to local conditions and needs are critical to success. The main strategies are:

- Dietary diversification
- Supplementation with vitamin and minerals
- Food fortification
- Public health measures

4.1: Dietary Diversification

Changes in meal composition require individuals, families and communities to change eating behaviour in their unique cultural context. Nutrition education programmes promote the consumption of micronutrient-rich foods and provide information on food preparation, nutritional value and other factors that affect micronutrient status. Below are priority actions needs to be undertaken

- Comprehensive SBCC approach and health/nutrition promotion and educations to adopt healthy and diversified food habits
- Encourage home and school gardening programme and cash transfer projects to support in availing different type of food and access at Household level.

4.2: Micronutrient Supplementation

It is a short-term basis strategy, to reinforce dietary approaches in severely deficient populations; it is the method of choice when therapeutic treatment is necessary. Supplementation is also an appropriate tool for

preventive programmes as long as the distribution system can be maintained, to date most of the efforts to control vitamin A and Iron deficiencies have focused on supplementation. it should be directed at women of reproductive age, infants and young children, the elderly, refugees and displaced persons and should be phased out as soon as food-based strategies enable adequate consumption of micronutrients. Supplementation has been shown to be highly cost-effective in achieving its nutritional goals and health impact (9

Vitamins and minerals are vital components of human health, advancing physical and intellectual development of specific groups such as children, adolescents and women of child bearing age, the supplementation strategies and actions could be either by introducing a single or multiple micronutrient supplements as following:

Multiple Micronutrient Supplements

- Scale up availability of multiple micronutrient supplements for in-home use, such as MNPs and Sprinkles for children, pregnant and lactating women.
- Explore the feasibility of providing women with multiple vitamin and mineral supplements.
- Direct research efforts to find safe and cost-effective ways to improve MNPs intake

Single Micronutrient Supplements

Vitamin A supplementation and strategic actions

- Scale up the delivery of integrated package of health services, including twice yearly vitamin A supplementation for children aged between 6 months and five years, to achieve at least **90 %** coverage.
- Target un-reached children and women at hard-to-reach areas through complementary strategies such as special outreach programmes
- Improve programme sustainability by mobilizing resources in national budget to cover costs pertaining to vitamin A supply and local distribution.
- Establish integrated delivery strategies, monitoring of programmes, and tracking of progress.

Iron supplementation and strategic actions

- Expand and scale up iron and folic acid supplementation for children and all women of childbearing age, with special focus on pregnant women.
- Strengthen the supply system to ensure availability of adequate supplies.
- Bring increased focus on improving the intake of iron-based food, through community outreach, counselling, and related efforts.

Zinc Supplementation for Diarrhea Management

- Ensure sufficient zinc supply in coordination with child health programme to maintain the national zinc supplementation for diarrhoea management policy.
- Identify public and private delivery strategies.
- Create demand through social marketing campaigns to increase its utilization for diarrhoea management.
- Provide adequate financing.

4.3: Food fortification

4.3.1: General Food Fortification: Is a safe, effective way to improve public health that has been used around the world since the 1920s. Fortification is the practice of adding essential vitamins and minerals (e.g. iron, vitamin A, folic acid, iodine) to staple foods to improve their nutritional content, commonly fortified foods include staple products such as salt, maize flour, wheat flour, sugar, vegetable oil, and rice. Food fortification requires the active participation of the food industry.

4.3.2: Home fortification of foods: With multiple micronutrient powders containing at least Iron, Zinc and Vitamin A is recommended by WHO to improve micronutrient intakes. This intervention consists of the addition of a mixture of micronutrients in powder form to any semi-solid food. This intervention seemed to be equally efficacious among infant and young children 6-23 months of age living in setting with different prevalence of anaemia and malaria endemicity (8)

Fortification offers one of the most cost-effective and sustainable approaches to addressing micronutrient malnutrition. To make sure all individuals receive appropriate amounts of micronutrients, however, it is best

implemented together with other strategies, including supplementation, dietary diversification, education, bio fortification, and other public health measures.

Food fortifications depend on below priority actions to be undertaken by national government, industry and international organizations

- Set and monitor national standards for food fortification programmes and ensure that national law and standards are enforceable, so that all producers have equal financial obligations.
- Identify and train fortification champions from both public and private sectors to build on success to date and help rapidly expand fortification efforts.
- Launch communication and public education initiatives to create a market demand for products and support for government investment.

4.4: Public health measures

In addition to the specific interventions outlined above, public health measures of more general nature are often required to help prevent and correct Micronutrients Malnutrition (MNM), because MNM is often associated with overall poor nutritional status and with a high prevalence of infection.
Such measures include infection control (e.g. immunization, malaria and parasite control), and improvement of water and sanitation. Other factors, such as the quality of child care and maternal education, also need to be taken into consideration when developing public health responses to MNM.

Table (2): Common Elements for Successful Micronutrient Interventions

Element	Description
Political will/stability	Consistent signals from a broad spectrum of leadership; key actors in this process are political and administrative leaders, those from the business community, nongovernment organizations, and, when involved in such programs, international agencies.
Strategic and program planning	Strategic planning results in a clear set of impact objectives to be reached over a specific time frame and the choice of interventions and the necessary scale of operations to achieve them within available resources; program planning involves formulation of process objectives and work plans.
Community involvement, participation, and consumer demand	Experience has demonstrated that involvement of the community in all program phases, from initial design to evaluation, helps to generate appropriate levels of consumer demand for interventions.
Physical and administrative infrastructure	Presence of a competent physical infrastructure, strategy and program design capability, scaling-up skills (i.e., ability to move to national levels from smaller-scale, local endeavors), managerial capability, budgetary resources, and human resources.
Communications strategies	Ability to generate consumer demand for improved micronutrient status, to remove barriers to adoption of specific micronutrient-enhancing practices. Such strategies are critical to long-term program sustainability and effectiveness.
Use of appropriate food vehicle	Choice should take into account bioavailability, safety, side effects, and public acceptance; the technology should be consistent with best practice as determined by comparison with similar programs or well-documented research in pilot or clinical programs.
Sustainability	Three key factors include efficacy, appropriateness, and demonstrated feasibility.
Information systems, monitoring, and evaluation	Process and outcome indicators, including biological indicators, appropriate to monitor intervention impact will vary in accordance with the intervention objective.

Ref .Prevention of Micronutrient Deficiencies: Tools for Policymakers and Public Health Workers. Institute of Medicine (US) Committee on Micronutrient Deficiencies; Howson CP, Kennedy ET, Horwitz A, editors .Washington (DC): National Academies Press (US); 1998.

Sudan has made considerable efforts for combating hunger, working with MOH, related sectors and partners to address under-nutrition, in order to reach the MDG target of halving the number of people suffering from hunger by 2015. Nutrition is emphasized within the current NHSS 2012-2016 as part of the basic package of

PHC service. Nevertheless, nutrition is among the core programs addressed through maternal and child health acceleration plan in consideration of the benefits of intervening during the gestational period and children under-5 years old. The plan developed by FMOH and partners aimed to close the gap towards SMDGs.

Chapter (5)

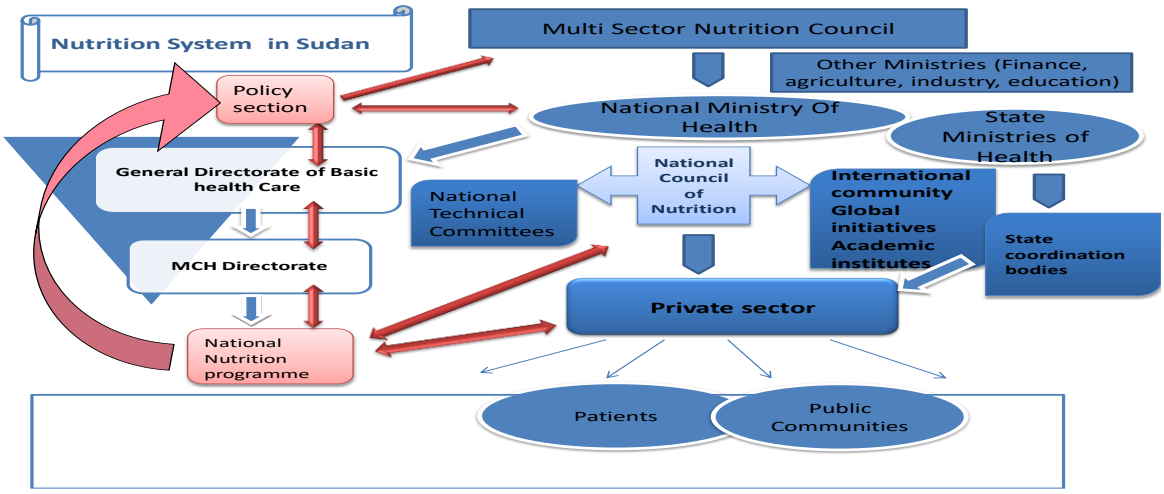
Implementation arrangement, Coordination &Planning

5.1: Implementation Arrangements: Coordination

The implementation of this strategic plan will be through the same mechanism of the implementation of the National Nutrition Strategic plan. Partnership-based action with Federal, state, related sectors, local authorities, communities, NGOs, private sector, civil societies and development and humanitarian actors. Partnership is mainly to describe collaboration mechanisms and integration of strategies with FMOH informed by the stakeholders and bottle neck analysis.

Due to the significance of micronutrients, the food fortification alliance has been formulated. The alliance works as a guiding committee under the leadership of the Federal Ministry of Health undersecretary. Accordingly, four committees have been created; iodine fortification committee, iron fortification committee, community mobilisation committee, and laws and legislation committee. The objective isto work together to achieve the goals of improving micronutrient actions outcomes. The approved national strategic plan will be shared and communicated to relevant partners. Stakeholders will be required to submit their implementation plans of relevant interventions to the NMS.

Figure (4): Actors of the National Micronutrient Strategy



5.2: Implementation planning

To implement the plan and achieve the targets five main actions are required to support the implementation, these are (10)

- Create a supportive environment for the implementation of comprehensive food and nutrition policies.
- Include all required effective health interventions with an impact on nutrition in national nutrition plans.
- Stimulate development policies and programmes outside the health sector that recognize and include nutrition.
- Provide sufficient human and financial resources for the implementation of nutrition interventions.
- Monitor and evaluate the implementation of policies and programmes.

Improvement in nutrition and micronutrients require collaboration among multiple sectors. Coordination, harmonization of implementation, monitoring and evaluation of the MN Strategy is a major function of the NNP. Similarly, it will work through the national nutrition coordination committee under The National Food & Nutrition Security Council, to ensure micronutrients actions and community developments are addressed by other related sectors.

In coordination with technical related sectors the MN strategy will be translated into annual operational plans, other related parties will develop their own sub-plans in harmony with the national plan, this will as well include definition of clear roles and responsibilities for each sector at all levels. Some activities will be conducted directly by the NNP, implementation of other activities will be monitored by the NNP and reported to the National Coordination Council.

5.3 A summary of the roles and responsibilities of the MOH and other partners:

Table 1: Nutrition Directorate collaboration within the FMoH

Institution	Areas of collaboration
Ministry of Health Child and Adolescent Health Directorate	• Pilot and scale up of essential actions to address malnutrition • Vitamin A supplementation • Prevention & treatment of major childhood diseases (e.g. diarrhoea, ARI, malaria) • Nutritional counselling and education at facility and community level • Screening, referral and treatment of Acute Malnutrition • Emergency nutrition response/preparedness • Nutrition information systems for planning / M&E • School health and nutrition (including school feeding) • Institutional feeding • Adolescent nutrition • Capacity building of health staff in nutrition • Collaboration between health and nutrition staff • Research • Advocacy • Food safety
Ministry of Health- EPI Directorate	• Vitamin A supplementation • Social mobilisation • Research • Advocacy
Ministry of Health- Reproductive Health Directorate	• Pilot and scale up of essential actions to prevent malnutrition • Nutritional counselling and education at facility and community level • Ante-natal and post-natal care (iron/foliate supplementation) • Postpartum vitamin A supplementation
Ministry of Health- Curative Department	• Procurement of quality materials for prevention and treatment of acute malnutrition and MDDs • Food quality monitoring systems
Ministry of Health- Communication Department	• Nutrition education • Social mobilization
Ministry of Health Training Department	• Capacity development of staff pre-service and in-service
Sudan National AIDS Programme	• Nutrition support in the case of people living with HIV/AIDS • Community nutrition education
MoH food control & lab	• Food safety (including food aid and nutrition commodities) • Food quality monitoring systems

testing	
Ministry of Health- International Health	• Emergency nutrition response/preparedness • Nutrition information systems for planning/M&E
Ministry of Health General Planning	• Coordinating nutrition measures • Planning, monitoring & evaluation of nutrition programmes

Collaboration between ministries

The FMoH will take the lead in lobbying and advocacy between ministries; in order to ensure coordinated action, and the inclusion of nutrition related programming in other ministry budgets where appropriate. A multi-sector coordination mechanism will be established to facilitate cross sector information sharing, coordination and collaboration on nutrition related activities.

Table 2: Areas of collaboration between FMoH and other ministries

Institution	Areas of collaboration
Ministry of Social Welfare and Women and Children Affairs	• Income generation activities • Support nutrition programmes related to maternal & child nutrition
Ministry of Industry	• USI • Fortified complementary foods • Food control & standard • Food quality monitoring & control systems
Ministry of Agriculture and Forestry	• Training of agricultural extension staff. • Research • Food production • Early warning system • School gardens • Nutrition information systems for planning / M&E • Small scale food processing • Food safety
Ministry of Justice	• USI • Legislation for all fortified foods
Ministry of Education Including School Gardening and Nutrition	• Incorporation of nutrition and micronutrients education in curriculum for primary, secondary schools • Teacher training in nutrition concepts • Curriculum for nutritionists • School health and nutrition

Education Department	• School gardens
Ministry of Higher Education and Scientific Research	• Incorporation of nutrition education in curriculum for university students • Curriculum for non-nutrition (but nutrition related) sectors, e.g. Agriculture and Health
Ministry of Irrigation and Water Resources National State Water Corporation	• Improve safe water and sanitation (resources and practice) (defining areas or priorities, and give services in particular urban and peri-urban IDP settlements) • Emergency nutrition response/preparedness • Nutrition information systems for planning/M&E
Ministry of Environment and Physical Development	• Improved shelter (availability and access) • Food safety, e.g. genetically modified foods
HAC	• Emergency nutrition response/preparedness • Nutrition information systems for planning/M&E • Coordination of the NGOs working in the area of nutrition (according to the National polices & guidelines)
SSMO	• Food quality monitoring systems
Ministry of Finance	• Food subsidies • Poverty reduction • Support nutrition programmes
Ministry of trade	• Control of imported food, mainly iodized salt
Ministry of Information & Culture.	• Nutrition awareness through mass media

International community

The Nutrition Directorate will also liaise with UN agencies, NGOs, and donors in order to define the technical direction of work in nutrition, as well as mobilization of adequate human and financial resources to support this work.

Table 3: Areas of collaboration between Nutrition Directorate & International organizations

Institution	Areas of collaboration
WHO	• ENA/MNP • Community nutrition education • Development of training manuals & modules • Planning • Technical support • Nutrition information systems for planning/M&E • Emergency nutrition response/preparedness • Capacity building • Research • Food safety • Food quality monitoring systems.
UNICEF	• ENA/MNP • Community nutrition education • Nutrition information systems for planning/M&E • Emergency nutrition response/preparedness • Capacity building • Research • Food safety
WFP	• USI • Emergency nutrition response/preparedness • School health and nutrition (including school feeding)
FAO	• Food based strategies to prevent malnutrition (including MDDs) • Small scale food processing • Curriculum for nutritionists • Research • Nutrition information systems for planning/M&E • Food safety
NGOs	• Community nutrition education • Emergency nutrition response/preparedness • Nutrition information systems for planning/M&E

Private sector

The Nutrition Directorate will engage with the private sector in efforts to develop services and products which promote the nutritional health of the population and where appropriate formal partnerships will be developed.

Table 4: Areas of collaboration between FMoH and the private sector

Institution	Areas of collaboration
Iodized salt producers and traders	• Community nutrition education • USI • Food safety • Food quality monitoring systems
Millers	• Flour fortification food safety • Food quality monitoring systems
Schools	• Incorporation of nutrition education in curriculum for primary secondary and university students
Universities	• Teacher training in nutrition concepts • Curriculum for nutritionists • Curriculum for health staff • Curriculum for other nutrition related sectors e.g. water, agriculture

Federal to State collaboration and responsibility

National level Nutrition Directorate will be expected to advise on, coordinate, monitor and evaluate nutrition and nutrition related efforts at State level under the direction and support of the MCH Director.

At State level the Nutrition Director, within the SMoH is the official responsible for overall nutrition programming in the State. Within the context of decentralization and reform, roles and responsibilities of State level Nutrition Directors, will be further defined; as will Federal/State level communication channels.

The state Nutrition Director under the SMoH is also responsible for multi-sector coordination at State level; and establishment of a multi-sector committee /coordination mechanism at State level is encouraged.

Nutrition educators will be expected to raise awareness of positive nutrition practice as well as encourage behaviour change to promote optimal use of available resources for individuals and communities in caring for their own health and well-being.

In addition, nutrition related activities, counselling and nutrition education will be carried out by nutrition and health workers at all levels of health facilities (see Table 2).

5.3: Resource mobilization

Joint planning and implementation will facilitate effective resource mobilization, not only from government resources but will streamline aid effectiveness. It is perceived to attract

international development partners. UN agencies and donors as the strategy will serve as a platform to guide united nation development assistance framework.

The advocacy and communication strategy proposed to be developed will detail means and ways for resource mobilization. At this point all stakeholders identified for the nutrition investment programme launched recently, are potential sources for funding the strategy. One obvious limitation is lack of details on costing each element of service package due to the overlap between all components.

5.4: Sustainability

Sustainability here refers to both the continuity of a successful intervention and a continuation of a significant, positive impact on the intended beneficiary. The first kind of sustainability thus relates to process, the other to outcomes.

Three factors are essential for sustainability: efficacy, appropriateness, and demonstrated feasibility. Clearly one would only want to sustain an intervention that has "worked." The assumption is that a policy or program has been implemented that addresses the micronutrient need of a particular population. In order to continue to effectively operate the intervention, an institutional structure is needed that will allow for ongoing capacity for management.

Cost is clearly a factor that influences sustainability. Programs based on a permanent reliance on external funding are usually not viable in the long term. At the same time, precipitous withdrawal of external funding may also doom projects. A consistently agreed upon gradualist approach may be optimal. There are now examples of the effective transition from total donor funding to total support by financing at the national level. The Indonesia vitamin A program is an excellent example of an intervention that evolved over a 20-year period from 100 percent donor support to the current program, which is entirely funded by government monies. The time period is also critical. For most countries, it is unrealistic to expect this transition to occur in a 3- to 5-year period. There should be

country plan for this transition from the initial stages of Micronutrient interventions to ensure sustainability.

Micronutrient interventions that continue to achieve a significant impact on the target individuals are projects that are flexible enough to respond to the changing needs of the client. Typically this involves a combination of approaches to address a particular micronutrient. For vitamin A, as an example, a combination of strategies is most effective in reducing vitamin A deficiency in a given area. The country must determine the most cost-effective mix of interventions. (11)

CHAPTER (6)

MONITORING AND EVALUATION AND ACTION PLAN

6.1: Monitoring and Evaluation and Action

Monitoring and evaluation are essential program elements. They are vital for ensuring and improving efficiency of program operations—reaching the target group in a cost-effective fashion. Monitoring may provide early warning signs that either program operations are faltering or that prevalence of micronutrient malnutrition is rising in one or more groups. Protocols for monitoring and evaluation must be developed as part of the overall program design and implemented as part of the program. Indicators appropriate to monitor intervention impact will vary in accord with the intervention objective. The appropriate intervention-specific *impact* indicator(s) for each of these objectives will differ; in some cases process indicators will be appropriate, and in other cases biological indicators will be the most useful. If the desired *outcome* of the intervention is to document a change in the vitamin A status of the recipient population, biological indicators are ideal. Resource availability can limit the feasibility of direct biological evaluations because these indicators are usually more costly to obtain and evaluate than indirect indicator data. (11)

The purpose of monitoring and evaluating the MN Strategy is to measure the short -term achievements as well as the long- term impact of the strategy interventions on the overall health and nutrition status in Sudan. However, the fouryears period is too short to see significant changes in trends of micronutrient status indicators according to the global targets, It is recognized that the strategy operates in a complex context where many factors interact to influence achievement of sustainable change and impact is therefore difficult to measure. It is also noted that collection of needed information is challenged by many issues including the multiplicity of partners, inadequate reporting information systems and low institutional capacity for information management. To overcome the above challenges, monitoring of the strategy will rely on:

- Existing national monitoring frameworks such as the M&E framework of National Health sector Strategy to measure health outcomes and impact of micronutrients on health outcomes and equity.
- Define the information gap and work towards setting nutrition surveillance and reporting systems that regularly and systematically update essential indicators
- Use existing information tools such as the national health information system, health system observatory and others.
- Contribute to build the national capacity in M&E and act as a basic tool to feed into developing an institutionalized M&E system for the National Nutrition Directorate.

The strategy monitoring framework will adopt the WHO Global Monitoring Framework on Maternal, Infant and Young Child Nutrition as feasible which include four types of indicator that allow to monitor the results' pathway towards the global nutrition targets:

(1) Primary outcome indicators that measure the progress towards the main micronutrient targets.

(2) Intermediate outcome indicators that monitor how specific diseases and conditions on the causal pathways affect the trend towards the targets

(3) Process indicators that monitor programme and situation specific progress.

(4) Policy environment and capacity indicators that measure the political commitments and capacity within the country. (10)

The monitoring framework include indicators for all levels of the outcome chain; key activities and outputs, outcome and impact indicators. The M&E matrix on pages (54 - 56) summarizes the set of indicators needed to monitor and evaluate the strategy, their periodicity and responsible entity.

An annual monitoring report will be developed to assess progress towards strategy goals, based on the preset monitoring indicators. Progress will be discussed at annual meetings for the National Nutrition Coordination Council. Other meetings and monitoring activities will

be conducted with individual or group partner organizations. Reports on progress will be disseminated to donors, national and implementation partners on an annual basis

6.1.1: Data sources for M&E of the NM Strategy

The mapping of data sources for each indicator as well as data collection frequency is critical to this exercise. Some of the proposed indicators, while representative of important areas to monitor, have not yet been measured or validated, or do not have reliable data sources. Of the revised indicators, sources of data are available that can be used for surveillance. Data will need to be collected through various mechanisms including repeated sample surveys, facility based surveys and community based sentinel sites. Data flow, aggregation and archiving will also be an important process that will need to be establish and strengthened. The indictor's framework also includes possible data sources for each of the proposed indicators as well as the recommended frequency of data collection. It will be important to develop better data collection and nutrition assessments tools and skills for interpretation.
National multi indicator surveys and the Sudan Household Health Survey will be the source of information of assessing the impact of the strategy on the health status of the Sudanese people. Other existing nutrition information and nutrition surveillance systems, available nutrition information system reports including the annual health statistical report, the Health system Observatory and National Registries' will provide other sources of information. Reporting at stakeholder periodic meetings will be used to measure some output indicators. Special reporting systems will be established based on the need and feasibility. Ad-hoc surveys, reviews and other reports will also be used.

6.1.2: Monitoring Indicators

Indicators are a set of core indicators and sub-set of extended indicators developed for the NMS. They address each stage of the results chain as set out in the framework above. These indicators can be used for in depth analysis and for performance management. They are proposed in a way to give an overview of progress against the strategy. The strategy monitoring framework will include indicators for all levels of the outcome chain: key activities and outputs, outcome and impact indicators.

6.1.3: Evaluation of the NM Strategy

Evaluation will be conducted at the midterm and at the end of the last year of the strategy to measure achievement of the strategy goals and outcomes and discuss its impact on the sustainable health and development and equity national goals. The evaluation will be based on the present goals and outcome indictors and will provide a base for the development of the new MN strategy for the next five years. It will also aim at identifying successful interventions and their impact, opportunities for further development and implementation challenges.

6.2: Strategic Plan of Action

STRATEGIC OBJECTIVE (1): To create enabling political environment with strong in-country leadership and a shared multi-stakeholder platform and partnership to take a joint responsibility to enhance micronutrients legislations, effective policies, information monitoring and evaluation systems			
Expected result	**Products**	**Interventions**	**Indicator**
Strengthen political commitment legislations and multi-sectoral approaches	National laws and regulations for food fortification developed and endorsed.	Advocacy and sensitization for political leaders to endorse and enact the fortification supporting laws.	Number of policies and laws supporting micronutrient deficiencies prevention and control.
	USI laws issuance and enact supported at state level.		
Align actions around supporting micronutrient deficiencies prevention and control measures	All national and international stake holders engaged keeping a strong public health leadership	Regular advocacy and coordination activities conducted to promote support to micronutrients internationally, nationally, state and down to community level.	- Number of sectors/partners engaged actively in micronutrient deficiencies prevention, control and management
	Sudan joining the Global initiatives like Scaling Up Nutrition (SUN), (1000 days initiative) and approaches e.g (REACH),Sustainable Food Systems (SFS) Programme of the UN	Development of the overall guiding frame for the multi-sectoral approach to address micronutrients.	
	Harmonization and coordination among nutrition partners and other sectors' improved and multi-sectoral plans to jointly address micronutrients prevention and	Collaborate and coordinate with other sectors (health, environment, social, protection, labor, water and sanitation, education, and	

	management developed	energy) and programs through jointstrategies with common goals, to address concurrently the multiple underlying causes of Micronutrient malnutrition.	
		Function the National Food Fortification Alliance(NFA) to coordinate micronutrient deficiency control activities, with authority, legislation and infrastructure	
	Technical and managerial capacity for nutrition programme at all levels strengthened	Develop sustainable institutional capacities and human resources for the control and prevention of micronutrient deficiencies, including the training of professionals, non-professionals and community leaders	- Number of specific micronutrients training workshops conducted/ personnel trained
	Micronutrient information, data base, monitoring and evaluation systems strengthened	Establish Micronutrients Database, as known by WHO as Micronutrient Deficiency Information System (MDIS) to	- Availability of integrated, accurate and complete micronutrients data - Number of researches/assessments on micronutrients conducted

		determine the micronutrient status of the population	
		Revise and activate the current nutrition routine information systems to timely avail required quality information on micronutrients.	
		Identify and conduct priority researches and assessments on micronutrients	
		Support research on the role of micronutrients in health and disease	
		Develop protocols for monitoring and evaluation of the system for micronutrients interventions.	
	Budget line for micronutrients interventions developed at national level.	Meetings and working groups with MOF, council of ministers and related partners for allocation of specific budgets for micronutrients and identify the area of financial support for each partner and related sector.	-% of increase in government budget for nutrition -% of partners support allocated for micronutrients

STRATEGIC OBJECTIVE (2) :To scale up proven effective nutrition interventions to improve micronutrient malnutrition status of the population			
Expected result	**Products**	**Interventions**	**Indicator**
Enforced and implemented food fortification actions to cover micronutrients malnutrition gap and improved health and nutritional status	50% of households consume iodize Salt with level of potassium iodate 25 - 35 ppm	-Assure all required political, financial, technical, managerial and social strategies for general food fortification are in place -Activate National Fortification Alliance (NFA) -Strengthen and monitor quality control measures to ensure high quality consistent production of fortified foods -Enforce and implement universal salt iodization (USI) -Encourage uptake of iodized salt	% of household consume iodize Salt
	Prevalence of vitamin A deficiency decreased	Enforce and implement fortification of sugar with Vit A Activate and strengthen nutrition education activities Strengthen monitoring and evaluation and	Prevalence of vitamin A deficiency among under five years of age children and lactating women is reduced by 50% or eliminated

		quality control systems	
	95% children receive vitamin A supplementation twice annually.		% of children receive vitamin A supplementation
	50% of lactating mothers receive vitamin A supplementation within 6 weeks from delivery.	Ensure sustainable supply of vitamin A capsule	% of lactating mothers who receive vitamin A supplementation within 6 weeks from delivery
	50% of Pregnant women receive Fefol tablet from first trimester up to one month after delivery	Ensure sustainable supply of Fefol tablet.	% of pregnant women receive Fefol tablet from first trimester up to one month after delivery
	50%preschool -aged, children receive fortified food.	Enforce and implement fortification of wheat flour with iron and folic acid	% preschool -aged, school –aged children receive fortified food.
	Prevalence of neural tube defects spina bifida and anencephaly reduced	Advocate for the use of folic acid supplementation and consumption of fortified flour. Ensure sustainable supply of folic acid tablets for women in pre-conception period Enforce mandatory fortification of flours with folic acid.	Reduction of neural tube defects spina bifida and anencephaly prevalence.
	Patterns of consumption of potential food vehicles among	Adopt this strategy to the local context. Identify the	Number / % of beneficiaries from home fortification of foods

	key target groups Identified. Home fortification of food is adopted and implemented	population in need for home fortification strategy. Provide the multiple micronutrient powders. Implement Monitoring and evaluation actions.	
STRATEGIC OBJECTIVE (3): To Implement micronutrients sensitive sectoral strategies by improving coverage of micronutrients supplementation to the targeted population and promote consumption of micronutrient-rich foods and food diversification.			
Expected result	**Products**	**Interventions**	**Indicator**
Reduced Prevalence of vitamin A deficiency among under five years of age children, and lactating women	Coverage of vitamin A supplementation for lactating women and under five children through national health days and routine services improved.	Detect vitamin A deficiency cases. Examine delivery models, especially in light of the phasing-out of polio campaigns, and Identify ways to better integrate VAS into existing healthcare delivery systems, including, but not limited to, EPI Cover the targeted population (women and children) with the recommended doses of vitamin A.	Prevalence of vitamin A deficiency among less than five years of age children, and lactating women. Or % Coverage of vitamin A among under five years of age children, and lactating women

		Identify the at risk population (refugees and displaced). Avail and distribute vitamin A supplies	
Reduced Prevalence of iron deficiency anemia among preschool -aged, school –aged children, and pregnant women of reproductive age	Iron and folic acid supplementations to the targeted groups through national health days and routine services institutionalized	Identify the magnitude of the anemia and at risk population Develop strategies to increase support and institutionalize iron and folic acid supplementation as an important component of nutrition package Supply forecasting and advocate with government and partners to avail the required supplies Emphasize Child Health Days and other community outreach strategies to distribute iron and folic acid to children and women Cover the targeted population (women and	Prevalence of iron deficiency anemia among preschool -aged, school –aged children, and pregnant women.

		children) with the recommended doses of iron and folic acid	
Increase access to and use of diverse and fortified nutritious foods at household level	Nutrition promotion and education on food and sustainable food systems that builds on existing local knowledge, attitudes and practices Incorporated Community level initiatives encouraged and home based agricultural activities promoted	Develop Communication strategy that help to convey information, help people to develop necessary skills, and motivate people to make lifestyle changes Implement appropriate nutrition education programme and demand creation (provide information on food preparation, nutritional value and other factors that affect micronutrient status). Encourage community initiatives, such as home gardens, to increase dietary diversity Ensure Zinc supplementation and ORS provided for the home management of	% of communities covered with nutrition behavioral change practices % of households who adopt home garden approach for food diversification

		diarrhea. Advocacy conducted for de-worming, provided through population based delivery mechanisms, e.g. Child health days, EPI outreach, MCH services, school health programmes, etc. Empower women by ensuring access to productive resources, income opportunities, extension services and information, labor- and time-saving technologies and listen to women's voices in decisions concerning the household and farming. livestock	
	Production and consumption of indigenous foods to enhance dietary diversification promoted	Facilitate production diversification, and increase production of nutrient-dense crops and small-scale Advocacy conducted for integrating efforts towards monitoring the	

		quality of locally produced foods and engage other related sectors	
STRATEGIC OBJECTIVE (4) :To build capacity for emergency preparedness in nutrition and micronutrients deficiencies			
Expected result	**Products**	**Interventions**	**Indicator**
Improve access and quality of nutrition services and appropriate micronutrients interventions in emergency settings	Nutrient content of food used for emergency food aid meets micronutrient standards, feasible, and culturally acceptable	Ensure availability of required supplies Implement micronutrients specific interventions coordinated with other nutrition activities during emergency	% of health facilities that provide complete nutrition and micronutrient services package in emergency settings. % of population covered by emergency micronutrients
	Capacity among health system nutrition service providers, communities and families developed	Develop required guidelines and training modules to reduce micronutrient deficiencies during an emergency Develop package of micronutrients supplementation during emergency	% of health workers who are trained on management of malnutrition including micronutrients deficiencies in emergency.

6.3: Costing and cost benefit of Food Fortification:

While the social and humanitarian case for reducing vitamin and mineral deficiencies (VMD) is enormous, the economic benefits are equally compelling. The Micronutrient Initiative and the United Nations estimate that VMDs rob countries of 2% of their Gross Domestic Product (GDP) through decreased productivity and unnecessary burdens on the health care system.

According to WHO mortality data, around 0.8 million deaths (1.5% of the total) can be attributed to iron deficiency each year, and a similar number to vitamin A deficiency. In terms of the loss of healthy life, expressed in disability-adjusted life years (DALYs), iron-deficiency anaemia results in 25 million DALYs lost (or 2.4% of the global total), vitamin A deficiency in 18 million DALYs lost (or 1.8% of the global total) and iodine deficiency in 2.5 million DALYs lost (or 0.2% of the global total) .

Beyond the enormous health implications, micronutrient deficiencies have a significant economic impact. The Micronutrient Initiative and the World Bank estimate that the most affected countries may lose as much as 2 – 3 % of their Gross Domestic Product (GDP) per year. (2)

But there is a hard dollar benefit as well – because most fortification programs cost between one and thirty cents per year depending upon the levels of fortification, and the diseases they prevent are expensive to treat, there is an immediate payback to the nation's treasury. Folic acid fortification alone has a 24:1 first year payback in savings to the health care system. Bill Gates recognized the compelling economic case for micronutrients, and as a result The Bill and Melinda Gates Foundation strongly support micronutrient programs throughout the world.

When top economists, including five Nobel laureates, analyzed the costs and benefits of various public health interventions, their conclusion was that fortification is one of the most cost-effective options. Fortification costs only $0.26 per person per year, varying based on the food and the specific vitamins and minerals added. In addition to health improvements,

gains in productivity and savings to a nation's healthcare system are many times this cost. Every $1 spent directly on fortifying food results in a benefit to the country's economy of $9. PHC's overhead is 10.9% for administrative costs (keep in mind that the overhead ratio is not a direct measurement of charity effectiveness). Overhead costs have already been factored into the $0.26 price point per person per year of food fortification. The Copenhagen Consensus also estimates that every $1 spent on fortification results in $9 in benefits to the economy. An initial investment is required to purchase both the equipment and the vitamin and mineral premix, but overall the costs of fortification are extremely low. Even when all program costs are passed onto consumers, the price increase is roughly 1 – 2%, less than normal price variation.

Copenhagen Consensus estimates of the benefit: cost ratios associated with reducing Vitam in A, iodine, iron and zinc deficiencies was updated in 2012, Based on these estimates, an investment of $160 million dollars per year would eliminate anemia affecting approximately 40 million pregnant women in the world, assuming that supplements could be provided during ante-natal care visits (6).

Table (3): Cost versus Benefit of Food Fortification

Nutrient	Annual cost per person	Benefits
Folic Acid	US $ 0.04 – 0.05	• Shown to reduce neural tube defects by over70% resulting in 24:1 first year pay back. • Significantly reduce the cost of cleft lip and cleft palates which cost about $5000 per incident to repair. • Saving from surgery alone represent 3.5:1 pay back for the country
Iodine	US $ 0.01 – 0.10	• A lack of sufficient iodine is the number one preventable cause of mental retardation • Adequate iodine can increase children I Q by 10 – 15 %
Iron	US $ 0.10 – 0.22	• Iron deficiency affects 2 out of every 3 people in the developing world • Fortification has found to reduce anaemia rates by 9-15 percentage points • Can reduce perinatal and maternal mortality by one- third • Annual productivity per capita from iron decency are estimated at $ 0.32 per year

Source: http://projecthealthychildren.org/why-food-fortification

Table (4): Estimated Cost of the Strategy Interventions in US$

Nutrition	2017	2018	2019	2020	Total
Intervention Costs	7,095,547	57,435,768	106,781,889	25,805,703	197,118,907
Programme Costs	211,049	100,590	87,835	63,093	462,567
Total Costs	**7,306,596**	**57,536,359**	**106,869,724**	**25,868,796**	**197,581,474**

Detailed Programme Costs in US$

Programme Areas	2017	2018	2019	2020	Total
Capacity Building	37,113	37,113	37,113	12,371	123,711
Monitoring and Evaluation	38,041	12,755	0	0	50,796
Communication, Media and Outreach	36,082	30,928	30,928	30,928	128,866
Advocacy	79,194	19,794	19,794	19,794	138,575
Other (Development of laws and legislations)	20,619	0	0	0	20,619
Total Costs	**211,049**	**100,590**	**87,835**	**63,093**	**462,567**

Annex 1

Framework for M&E of Micronutrients Strategic Plan Indicators 2016-2020

Target	Indicator	Definition	Measure		Milestones 2017-2020	Data Source
			Baseline	Target		

Enabling Environment for micronutrients interventions	Number of policies and approved laws supporting Micronutrients	Number of developed policies, and laws out of the planed one			2017: 2018: 2019: 2020:	Nutrition Programme
	% of allocated budget for micronutrient	Percentage of budget allocated for micronutrient out of existing nutrition budget			2017: 2018: 2019: 2020:	MOH MOF Partners
	Number of sectors/partners engaged in for micronutrient prevention and management	Number of sectors/partners join actively and regularly micronutrient prevention and management out of the targeted ones			2017: 2018: 2019: 2020:	MOH and Sectors' records
	Availability of Micronutrient Deficiency Information System (MDIS)	Availability of MN data base			2017: 2018: 2019: 2020:	Nutrition Programme
	Number of specific micronutrients training workshops conducted/ personnel trained Number of trained nutrition professionals per 100,000 population	Number of the trained personnel on micronutrients out of the targeted personnel			2017: 2018: 2019: 2020:	Nutrition Programme
	Number of conducted micronutrient studies	Number of implemented studies out of the list of research priorities			2017: 2018: 2019: 2020:	Nutrition Programme
Reduction of Anemia	Prevalence of iron deficiency anaemia among children less than 5 years and school –aged children	Number of the under-five and school aged children who have moderate or severe anemia		Reduction by 26%	2017: 2018: 2019: 2020:	Sudan household survey/ school health programme.
	Prevalence of iron deficiency anemia among pregnant women of reproductive age	Number of the pregnant women who have moderate or severe anemia			2017: 2018: 2019: 2020:	Sudan household survey/ RH programme.
	Proportion of	Number of pregnant			2017:	Nutrition & RH

	pregnant women receiving iron supplements	women who received iron supplements out of the targeted women			2018: 2019: 2020:	Programmes
	Number of manufactures fortify flour with iron and folic acid	Number of the flour manufactures implementing fortification of wheat flour with iron and folic acid out of the targeted manufactures			2017: 2018: 2019: 2020:	Nutrition Programme& MOI
	Number of beneficiaries from home fortification of foods	Number of households using home fortification strategy out of the targeted population			2017: 2018: 2019: 2020:	Nutrition Programme
	% of communities covered with nutrition behavioral change practices	Number of communities engaged in nutrition behavioural change activities out of targeted			2017: 2018: 2019: 2020:	Nutrition Programme& health promotion
Elimination/ reduction of Vitamin A deficiency	Prevalence of vitamin A deficiency among under five children,	% of under five children with VAD (night blindness)		Reduced by 50%	2017: 2018: 2019: 2020:	Sudan household survey
	Prevalence of vitamin A deficiency among lactating women	% of lactating women with VAD		Reduced by 50%	2017: 2018: 2019: 2020:	Sudan household survey
	% Coverage of vitamin A among under five children	Number of under five children who received vit A twice annually out of the targeted under five children		95%	2017: 2018: 2019: 2020:	Nutrition Programme
	% Coverage of vitamin A among lactating women	Number of lactating mothers who receive vitamin A supplementation within 6 weeks from delivery out of the targeted lactating women	22%	80%	2017: 2018: 2019: 2020:	Nutrition Programme
	Number of manufactures fortify sugar / oil with vit A	Number of the sugar manufactures implementing vitamin A fortification out of the targeted manufactures			2017: 2018: 2019: 2020:	Nutrition Programme& MOI
Reduction of Iodine deficiency disorder	Prevalence of Iodine deficiency disorder (Goiter rate)	Number of people with goiter		Reduced by 50%	2017: 2018: 2019: 2020:	Sudan household survey/ Nutrition Programme

	% of salt plants that fortify salt with potassium iodate	Number of the salt plants implementing salt fortification with potassium iodate out of the targeted plants			2017: 2018: 2019: 2020:	Nutrition Programme& MOI
	Number of states that having fortification laws in place	Number of states that approved the fortification laws out of all states			2017: 2018: 2019: 2020:	Nutrition Programme
	% of household consume iodize Salt	household consume iodize Salt with level of potassium iodate more than 35 ppm	9.5%	50%	2017: 2018: 2019: 2020:	Sudan household survey
Improvement of micronutrient interventions in emergency settings	% of population covered by emergency micronutrients	Number of beneficiaries covered by emergency micronutrients during emergencies out of the targeted population			2017: 2018: 2019: 2020:	Nutrition Programme , partners &EHA
	% of health facilities that provide complete nutrition and micronutrient services package in emergency settings.	Number of the health facilities that provide micronutrient services package during emergency out of the targeted ones			2017: 2018: 2019: 2020:	Nutrition Programme , partners &EHA
	% of health workers who are trained on management of malnutrition including micronutrients deficiencies in emergency.	Number of health workers who are trained on integrated package of management of malnutrition and micronutrient deficiencies during emergency out of targeted ones			2017: 2018: 2019: 2020:	Nutrition Programme , partners &EHA

Annex (2)

Working Group on Micronutrient strategy

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