

## Review Article

## Review of Proposed Strategies to Improve Nutrition in Different Communities

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### ARTICLE INFO

#### Article history

Submitted: 2022-01-12

Revised: 2022-02-23

Accepted: 2022-03-20

Available online: 2022-04-02

Manuscript ID: PCBR-2203-1216

DOI: 10.22034/pcbr.2022.334123.1216

### KEYWORDS

Pi Community,  
Nutrition,  
Health,  
Pregnant women.

### ABSTRACT

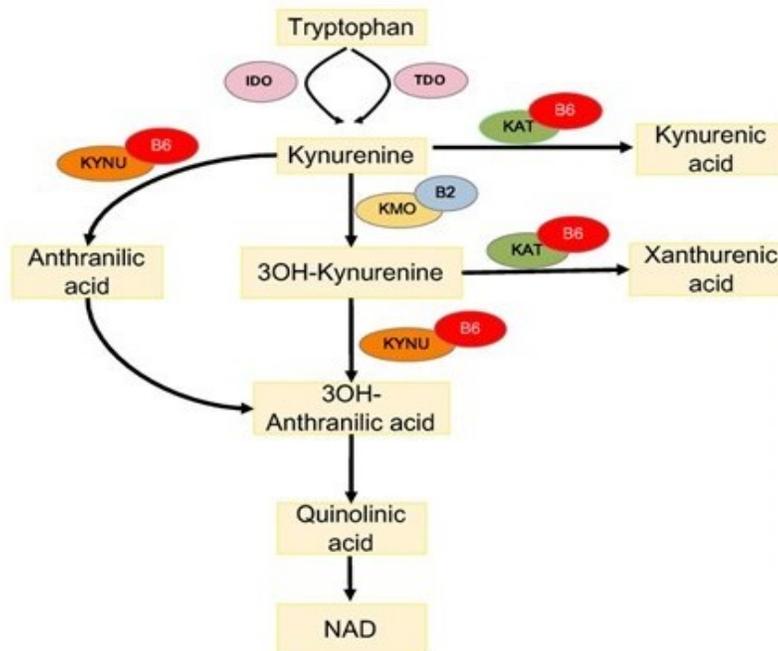
The evidence suggests that Iranian society is rapidly moving towards a double problem in an accelerated nutritional transition. This means that on the one hand, energy protein malnutrition in children less than 5 years of age and deficiency of micronutrients (iron, iodine, zinc, calcium, and vitamins A and D) are observed in a large share of the country's population. According to ANIS study by the Office of Community Nutrition Improvement in the Ministry of Health in 1998, 800,000 children under 5 years (15.4%) suffer from moderate to severe nutritional shortness, which indicates chronic and long-term malnutrition. The National Survey of Micronutrients in 2002 also indicated that 15 to 40% of children, adolescents, and pregnant women are deficient in iron and there is zinc deficiency in about 30% of children and adolescents and 44% of the pregnant women in the country. On the other hand, warning signs of the spread of metabolic diseases such as cardiovascular disease, diabetes, obesity, and various cancers can be seen in cities, especially large cities. According to the available statistics, out of every 800 deaths per day, 300 deaths are due to cardiovascular diseases, and one of the main reasons is a change in food consumption pattern

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## GRAPHICAL ABSTRACT



### Introduction

According to the latest definition of food security provided by the World Health Organization and FAO, “the access for all people at all times and places to adequate and healthy food for a healthy and active life” if current trends of food insecurity and malnutrition continue; if there is no effective intervention to change and correct them, the harmful and unfavorable economic, and also health consequences will be more tangible in the coming years. It should be noted that the risk of metabolic diseases is not necessarily limited to the high-income classes, but the low-income classes are also highly vulnerable. The mother is fat and at the same time suffers from a lack of micronutrients [1-3].

There is no doubt that further expansion of the two phenomena discussed together threatens, on the one hand, the return on investment in the education sector and the quality of human resources, and on the other hand, will drastically increase the treatment cost in the ongoing years [4-6]. Eventually, the disease and

economic burden of the aforementioned problem will increase in the accelerated nutritional transition. Although the problems are wide-ranging and complex, the opportunities are also attractive and promising. On the one hand, low-cost and effective technology for combating malnutrition is available in the form of targeted intervention at the neighborhood level, and on the other hand, before metabolic diseases become a costly and ineffective health problem, it can be done in one go [7].

Maintaining nutritional health and ensuring food security at the household level depends on four factors: 1) income and prices as one of the most significant factors in choosing and buying food, 2) access to food in the market and place of residence, 3) family knowledge regarding food and nutrition in terms of purchase, storage, cooking, and distribution of food in the household, 4) access to health care services for the prevention and timely treatment of diseases and health of individuals for the optimal cellular utilization of the consumed nutrients. The office

of community nutrition improvement in health department has taken various measures to reduce child malnutrition, reduce micronutrient deficiencies, identify the current situation, promote the culture and nutritional literacy of the community, and increase the knowledge and skills of health workers in proper nutrition for different age groups [8-10]. The role of nutrition in human health and efficiency and learning and its relationship with economic development has been proven through extensive global research and it has been evidenced that investing in food security and nutritional health is not only economical, but also a non-essential necessity [11-13]. It is considered nationally avoidable. Although many efforts have been made worldwide to improve the health of the community and these measures have reduced mortality, especially in children, and increased life expectancy in most countries of the universe, but protein energy malnutrition in children under the age of 5. And the lack of micronutrients (iodine, iron, zinc, and vitamin A, etc.) is still the most important nutritional problems in most developing countries, including our country. However, there is sufficient knowledge and experience in the field of malnutrition prevention. According to data available in 1995, about 200 million children, or in other words, 30% of all children under the age of 5 in the world are malnourished. Currently, 79% of the world's malnourished children are in Asia, 17% in Africa, and 3% in Latin America [14].

According to the statistics provided by the WHO global database, the prevalence of malnutrition has been declining in recent decades. Energy protein malnutrition is one of the most common nutritional problems in children under 5 years of age. According to the results of the latest national survey conducted in

November 1998, 13.7% of children under 5 years in rural areas and 9.6% in urban areas based on weight index for age are moderately and severely malnourished, and short stature.

Nutrition, which indicates chronic and prolonged malnutrition, is presented in 21.8% of rural children and 11% of the urban ones. In addition to malnutrition due to poverty, the available evidence suggests that the Iranian society is rapidly overcoming the transition period of nutrition and warning signs of the spread of metabolic diseases such as cardiovascular disease, diabetes, various cancers, and obesity in cities, especially large cities can be visible [15-17]. According to the available statistics, out of 800 daily deaths, 300 are related to cardiovascular diseases, one of the main reasons for which is a change in food consumption patterns and increasing consumption of sugars and fats in the country. Statistics indicate that 30% of people consume more fat than the recommended daily amount of fat and sugar consumption is 40% more than the recommended daily amount. Causes of malnutrition include parental illiteracy, nutritional ignorance, incorrect methods of feeding children (sooner or later starting complementary foods, and use of improper complementary foods, etc.), inadequate access to health services, and he mentioned healthy drinking water, lack of food, low household income, increasing household size, non-observance of hygienic principles, and the child involvement in the chain of infection and malnutrition [18-20].

The growing trend of urbanization and the resulting lifestyle changes, especially economically, reduced physical activity, major changes in diet, and obesity are among the causes which increase the risk of metabolic diseases. Control of these diseases, which can

be prevented by modifying the pattern of food consumption and lifestyle, requires investment and basic planning. In this regard, formulating macro policies and executive programs are essential in the field of promoting culture and nutrition literacy at national and provincial levels, implementing cross-sectoral interventions to increase people's access to food, implementing job creation projects, literacy especially for women, strengthen maternal and child health programs including family planning, nutrition during pregnancy and lactation, promotion of breastfeeding, practical education of mothers in the field of complementary nutrition, child nutrition during illness and recovery, observance of balance, the variety in daily diet emphasizing and strengthening the monitoring of children's growth, improving drinking water, improving the environment and sanitation of toilets, setting up nutrition counseling units in health care networks to provide food, and medical assistance to children with malnutrition in cooperation with other departments. Various nutritional studies in recent years have demonstrated that malnutrition exists in different dimensions in various parts of the country [21].

Accordingly, the most prominent nutritional problems are protein-energy malnutrition, iron deficiency anemia and iron deficiency, disorders due to iodine, zinc, calcium, vitamin

A, B2, and vitamin D deficiency, considering the size of the country and the existence of four different from the six climates in the world, it seems that in order to decisively fight against these problems, basic planning is necessary to obtain the correct model of the problem and consequently, to create an efficient and purposeful executive system.

### **Protein-Energy Malnutrition (PEM)**

The latest study of the country conducted in 1998 (ANIS study) by the office of community nutrition improvement in the ministry of health declares that energy protein malnutrition is one of the most common nutritional problems in children under 5 years of age (Figure 1).

**Underweight:** According to the weight index for age, it is presented in 11% of children under 5 years old in the country. The highest prevalence of underweight in Sistan and Baluchestan province (15.8%) means one out of every 4 children and the lowest prevalence is in Golestan province (4%). Underweight can be caused by lack of access to food, recurrent illnesses, and lack of health care. This study also indicated that the prevalence of underweight in rural areas (13.7%) is significantly higher than the prevalence of underweight in cities (9.6%). However, there is no significant difference between the underweight prevalence in girls and boys.

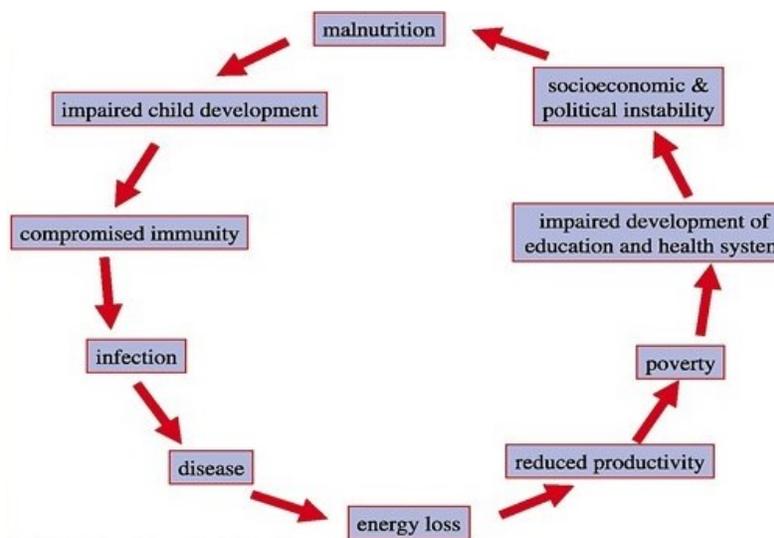


Figure 1: Protein-Energy Malnutrition (PEM)

**Nutritional short stature (Stunting):** 15.4% of children under 5 years of age in the country suffer from moderate and severe nutritional short stature (one in seven children). Restriction of access to food, frequency of access to certain types of food (due to seasonal changes), recurrent cases of diarrheal diseases, acute respiratory infections, and parasitic infections are the main causes of this problem. Nutritional short stature has the highest prevalence in Sistan and Baluchestan province, i.e. 38% (one in three children) and in Gilan province the lowest prevalence is 6.8% (one in 15 children). The prevalence of nutritional short stature is twice as high in rural areas as in cities. At the national level, there is no difference in the prevalence of short nutritional height between girls and boys.

In general, this study demonstrates that currently 800,000 children under the age of 5 in the country suffer from moderate to severe short stature, which indicates chronic and long-term malnutrition.

540 thousand children under the age of 5 suffer from severe moderate underweight. These

children suffer from present and past malnutrition [22-24].

### Micronutrient deficiency

**A) Iron:** A national study of women of reproductive age (15-49 years old) in urban and rural areas of the country showed that based on serum ferritin index, which indicates the body's iron stores, about 50% of women with mild to severe deficiency. They have iron deficiency and severe iron deficiency in 34.5% of them, which means severe depletion of the body's iron stores.

According to this study, the prevalence of iron deficiency in adolescent girls aged 15-19 years is higher than other age groups and anemia based on hemoglobin index is present in 33% of women of reproductive age and this rate is equal to 31% in adolescent girls [25].

This study shows that about half of women aged 15 to 49 in the country, enter pregnancy with depleted iron reserves, and this increases the prevalence and severity of anemia in pregnant women. This study indicated a prevalence of anemia in pregnant women of 40% and iron deficiency based on serum ferritin

up to 51%. Although these results are not statistically generalizable due to the small number of samples; however they confirm the results of studies that have been conducted in different parts of the country for many years.

Considering the prevalence of iron deficiency and anemia in adolescent girls, which has been shown during this national investigation, programs to prevent iron deficiency anemia in premarital women are important. The latest national study conducted in 2002 to determine the extent of iron, zinc, and vitamin A and D deficiency in different age groups in the country has demonstrated that about 20% of children aged 15 to 23 months, 30% of 6-year-old children, 21% of women pregnant and 18% of adolescent girls and boys suffer from anemia and severe iron deficiency based on serum ferritin is observed in 30 to 40% of the above groups and a detailed report of this study is being prepared.

Several factors are involved in the occurrence of iron deficiency and anemia in the country. These factors include low iron intake from the diet, low iron absorption, poor eating habits and patterns of the baby, as well as parasitic infections, especially in children, and recurrent infectious diseases such as diarrhea and respiratory infections. It is noteworthy that the most important source of iron in the diets of the people of the country is plant sources, especially cereals. No information is available on the iron ability to be absorbed from the diet in different parts of the country. This issue also needs to be investigated. Given that iron intake does not indicate a deficiency, the bioavailability of iron is likely to be very low due to the combination of different diets, or that more detailed research is needed to determine the actual daily iron intake of households. Food such as tea consumption immediately after

eating and giving tea to children under 5 years of age is another reason for the decrease in dietary iron absorption in different parts of the country [26].

Studies depict that about 80 to 90% of iron intake is from plant sources, which is strongly influenced by iron-lowering supplements in the given diet. One of the most important reducing agents is tannins, which are commonly found in tea and coffee. Based on the evidence, the tannins in tea reduce dietary iron absorption by up to 95%. Failure to follow the correct principles in baking bread and bakeries and, as a result, not fermenting bread due to the increase in the amount of baking soda that is done to speed up the processing of the dough will cause phytate to remain in the bread prepared from the dough which itself leads to a sharp decrease in iron absorption.

Failure to start complementary feeding on time in children is another reason for iron deficiency in children. According to a 1995 national survey conducted by the deputy minister of health, 72% of children have started complementary feeding on time, but the quality of iron intake needs to be studied. There is no information on the iron amount received from baby complementary foods. Due to the uncertainty of adequate intake of iron from the diet of children, it is recommended to prescribe iron drops at the same time as the start of complementary feeding until the age of two.

However, due to the unfavorable taste of iron drops, it seems that the acceptance rate of children in the field of iron drops is very low. A national ANIS study found that about 30% of children 6 to 24 months of age received iron drops regularly [27-29].

## **B) Iodine**

Iodine deficiency and its related disorders with a wide range of clinical manifestations has been

considered as one of the nutritional health problems in Iran and has long been considered as one of the most prevalent areas in terms of iodine deficiency disorders. Goiter is the least common disorder caused by iodine deficiency. A person with goiter gets tired quickly and is less active than normal people. In addition to goiter, iodine deficiency includes a wide range of complications: physical and mental retardation, neurological and mental disorders, stillbirth, loss of educability, inability to acquire complex skills, lazy eye, deafness, and dumbness in areas with severe iodine deficiency as being imposed on the society. Studies conducted in the country during the years 1983 to 1989 demonstrated that about 20 million people in our country are exposed to iodine deficiency and severe complications of iodine deficiency such as growth retardation, hearing impairment, and decreased IQ in children living in mountainous areas were observed. Measures taken over 10 years have reduced the prevalence of goiter in the country and achieve the goals set by 2000, i.e. consumption of iodized salt in at least 90% of households in the country by implementing an enrichment program and iodization of all dietary salts and integration of prevention program and control of iodine deficiency disorders has been achieved [30].

Besides, what is profound from now on is the monitoring of the program and control of dietary salts in terms of iodine content and maintenance of the obtained indicators. The existing reports from countries which have implemented a program to prevent and control iodine deficiency disorders by iodizing salts show that lack of accurate monitoring and evaluation of the program has led to a decline in

the indicators obtained and the return of the problem.

**C) Vitamin A:** The latest estimates from the World Health Organization show that 250 million children in preschool age suffer from subclinical vitamin A deficiency and three million children suffer from esophagitis. Approximately 50% of these children live in developing countries. On the other hand, approximately ten million pregnant women every year suffer from vitamin A deficiency and 5 million from retinal detachment [31-33].

In Iran, the results of a national study of health and disease conducted in 1999 have indicated that 2.5% of the population 2 years and older in the whole country are suffering from retinopathy.

This study reported a prevalence of retinitis in children aged 2-5 years, boys 1.1% and girls 0.8%, while according to the WHO, in a society in which 1% of children 2-5 years they suffer from retinal detachment, vitamin A deficiency is considered as a health problem in that community. In a study conducted in 2000 on primary school children in Tehran's 7<sup>th</sup> district of education, 5.6% of the children had serum retinol levels lower than 20 micrograms per deciliter. Vitamin A deficiency is associated with several complications, including ocular complications such as conjunctival membrane dryness, bitumen staining, dryness and corneal ulcers and blindness, increased risk of various infections, growth retardation, and disorders of the hematopoietic system (Figure 2).

The main causes of vitamin A deficiency are insufficient intake from the diet, low absorption of vitamin A, increased need due to growth, inadequate complementary nutrition, recurrent infections, and parasitic diseases [34].

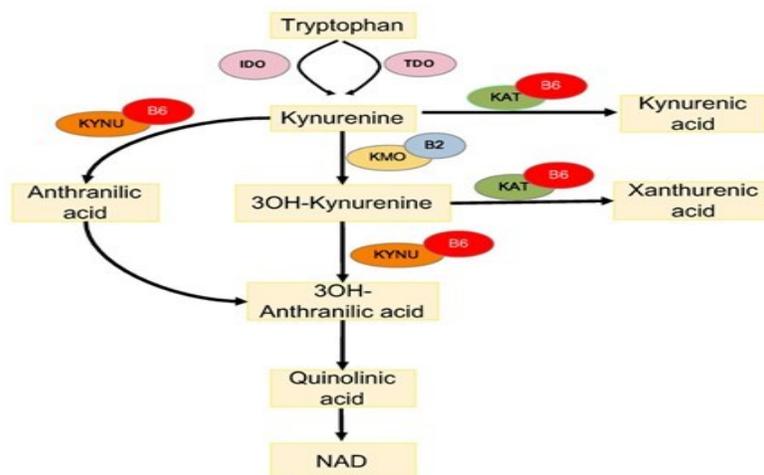


Figure 2- Vitamin A

#### D) Zinc

Research in the late 1950s and early 1960s indicated that growth retardation, skin lesions, and puberty in Iranian and Egyptian adolescents were associated with zinc deficiency. The reason for zinc deficiency in these communities has been attributed to the high intake of phytate-containing breads that inhibit zinc absorption. The most important sources of zinc with high absorption in animal meat, especially red meat are usually “low intake of this type of food among preschool children”. The reason for this is the lack of interest or poor economic status. In a study conducted in 1991 on children aged 24-60 months in Kerman villages, 15.5% of the studied children were zinc deficient in terms of plasma zinc status. In a study conducted on adolescents in Tehran in 1997, 22.1% of the subjects had zinc deficiency, and also 50% of the subjects had received less than 50% of the required amount of zinc [35].

#### Chronic nutrition-related diseases

**Obesity:** Following industrialization and machine life in many advanced societies, overweight and obesity are gradually

considered to be the main health problems of countries.

These people are at risk for high blood pressure, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, respiratory disorders, some cancers, and BMI (body mass index).

In the population aged 15 to 39 years, women depicted about 35% and men about 25%. In the population of 40 to 69 years old, the prevalence of overweight and obesity in men is about 35% and in women about 55%. And 60% of men were reported. In Tehran Lipid and Glucose Study (District 13), the prevalence of weight gains and obesity was reported in 70% of women and 60% of men. Approximately two thirds of men and four fifths of women over 45 years of age are overweight and obese. Recent studies in our country have demonstrated that weight gain and obesity are highly prevalent in urban and rural communities of Iran [36].

In people at the age of 30 and older in urban areas, this complication is up to 82%, in rural areas of Tehran up to 72%, and in remote villages where urban factors are not yet

influential; up to 44% of people are overweight or obese.

### **Diabetes**

Diabetes is the most common disease caused by metabolic disorders and the fifth leading cause of death in Western societies based on the epidemiological studies published in 1998 in 75 communities in 32 United Nations member states.

The world's adult population (over 20 years old) will increase by 64% from 1995 to 2025, and the prevalence of diabetes will increase from 4% in 1995 to 5.4% in 2025, and the total number of people with diabetes will increase by 123%. This means that from 135 million in 1995 to 300 million in 2025. The share of developing countries will be higher in this increase. The developed countries will see a 42% increase in the number of people with diabetes. The developing countries, on the other hand, will see a 170% increase in the number of people with diabetes from 84 million to 228 million. Thus, by 2025, more than 75% of the total population of diabetics will be in developing countries (compared to 62% in 1995). A study of 28,000 Tehranians over the age of 30 in 1995 showed a prevalence of diabetes and IGT of 15.5%. The first phase of Tehran Lipid and Glucose Study was performed from 1998 to 2000 in 15005 residents aged 30 to 69 in Tehran's 13th district. In this study, the prevalence of diabetes and impaired glucose tolerance (IGT) is 23% of people [37-39].

The prevalence of diabetes and IGT in people over the age of 30 is 15.25 to 27% in urban areas and 4% in rural ones. Therefore, in people over 30, one in five people has disorders of carbohydrate metabolism.

**Cancer:** Cancer is a complex set of diseases, and carcinogenesis is the transformation of a

normal cell into a cancer cell - a complex and multi-stage process which results from the abnormal expression of the gene. It is predicted that the incidence of cancer is almost increasing all over the world and the reason is more related to the increase of life expectancy and lifestyle changes and trends in the environment. Evidence shows that 52% of cancer cases are in developing countries and in 1996, according to the International Agency for Research on Cancer, more than 10 million new cases and 7 million deaths from cancer occurred and were predicted. This number will reach 15 million new cases and 9 million deaths in 2015. At present, cancers are one of the most prominent and major health issues in Iran and all over the world.

In our country, the importance of this disease is increasing and is the third leading cause of death and the second largest group of chronic and non-communicable diseases. Numerous studies and observations have indicated that cancers of the skin, lymphatic system, upper gastrointestinal tract, and breast cancer in women are common in our country and the incidence of new cases of this type of disease is increasing. Rapid spread of smoking among adolescents and young people and other groups, changes in eating habits and lifestyle, environmental pollution and adverse conditions in the human environment, the prevalence of some infectious diseases such as viral hepatitis C, B among others are major reasons for the increase in cancer in our society. There is evidence linking diet to several types of human cancer. In Iran, despite the lack of current access to comprehensive statistics, based on studies conducted so far, significant differences in cancer incidence and its rate have been observed in different geographical areas of the country. These differences in upper

gastrointestinal cancers, especially esophageal cancer, have been emphasized more in previous studies [40].

Esophageal cancer has been evidenced to be prevalent not only on the Caspian Sea, but also in the northern half of Iran. In the same study, the frequency of gastric cancer cases was emphasized in the northern half of the country. In general, cancer abundance in the northern and northwestern regions of the country is higher than the southern and southeastern regions. In the central regions of the country, the incidence of new cases of cancer is lower than in the northern and western regions. The main reasons for the difference in the incidence of various types of cancer in our country are still not well understood and like the main issue remain obscure. In examining these reasons, sufficient attention should be paid to the two main groups of causes leading to cancer in our country and studies should be done in the following areas.

A) The importance and hereditary causes of cancer in Iran.

B) The significance and environmental causes of cancer in Iran.

### **Methods (ongoing plans and programs)**

**1- Pilot implementation of tuberculosis nutrition project:** This project from 1994 to 1995 in Sibak village in Borujen city of Chaharmahal and Bakhtiari province in order to reduce malnutrition of children under the age of 5 in a rural area and in the form of a health plan was conducted for all till 2000. Nutritional interventions were carried out including practical education of mothers in the field of child nutrition, strengthening growth monitoring, promotion of home vegetable gardens, improving the environment, sanitation

of drinking water, and treatment of children with parasitic infections. Measurement of height and weight of children before and after the intervention showed that the prevalence of malnutrition (based on weight for height) decreased from 6.5% to 1.8%.

2- Implementing an intervention plan to reduce child malnutrition in rural areas of the three provinces of Ilam, Bushehr and Kerman during the years 1996 to 1999 with the focus on the governor and cooperation of agricultural jihad, education, literacy movement, welfare, Imam Relief Committee, and the other relevant sectors. In this plan, a set of measures called health problems was implemented in homes including improving the environment, breastfeeding, using the growth card, supplementary nutrition education, family planning, training diversity and balance in the diet and consumption of vegetables, fruits and dairy products, and promoting gardens greenery.

Three years after the intervention, a comparison of the prevalence of malnutrition in children under 3 years old before and after the intervention indicated that the rate of moderate and severe nutritional underweight and short stature had decreased by about 50% [41].

3- By conducting a national study to determine the prevalence of malnutrition in children under the age of 5 (ANIS survey) in 1998, for the first time, basic information on the prevalence of malnutrition was obtained by different provinces of the country.

In this study, 600 children in 50 urban clusters and 600 children in 50 rural clusters were studied by cluster sampling method in each province. Based on the results of this study and obtaining an inter-sectoral intervention model, a participatory plan to reduce child malnutrition

is currently being implemented in at least one of the 32 governors-centered medical universities.

4- The support plan for children with malnutrition in poor families has been implemented with the participation of the Imam Relief Committee in 12 cities from 12 provinces of the country.

In this plan, children who have been malnourished due to poverty will be introduced to the Imam Relief Committee through the provincial health center and will be covered by the food and medical assistance program for free.

5- Training of general practitioners, pediatricians, and faculty of universities in the field of nutrition and development of children under the age of 5 have been held by national workshops, training master trainers 5 national workshops, and the essential preparations and credit of provincial workshops is provided in the form of joint nutrition project with the World Bank.

6- Carrying out a national study to determine the deficiency of iron, zinc, vitamin A and D micronutrients in the age groups of 15-23 months, children 6 years old, girls and boys 14-20 years old, pregnant women, and men and women 40-60 years old separately 11. The climate of the country was done in 2002 by preparing blood samples from about 34,000 people in the country.

According to the report of this forthcoming study, appropriate interventions to prevent and control micronutrient deficiencies should be designed and implemented.

7- Implementing the weekly help plan for high school girls: Due to the high prevalence of iron deficiency and anemia in adolescent girls and the World Health Organization's recommendation on weekly iron supplementation and its effectiveness on body

iron stores, in 2001 the office of community nutrition improvement provided the weekly iron supplementation plan for girls. A high school student performed in the Savojbolagh area of Tehran province.

In this project, a weekly iron supplement in the amount of one ferrous sulfate tablet was administered once a week for 16 and 20 weeks in schools, and under the supervision of school officials, female students consumed one iron tablet per week.

Measurement of blood iron indices before and after the study indicated that the prevalence of iron deficiency decreased from about 57% to 5.6% in the girls. Based on the results of this study and the effectiveness of weekly iron supplementation for 16 weeks, this project is being implemented in at least one city of the country's medical universities in cooperation with the center for women's participation and the ministry of education. During the implementation of this project, in addition to helping the school, a nutrition education program has been implemented using the nutrition book for school-age children, which has been prepared and published by the community nutrition improvement office. The executive instructions of this plan and the educational books related to all the health centers of the provinces have been sent [42].

8- Iron supplement for the pregnant women from the end of the fourth month of pregnancy to three months after delivery in the daily amount of one tablet of ferrous sulfate (containing 50-60 mg of mental iron) and children from the end of the sixth month (180 days) or at the same time supplementary feeding up to 24 months of age with a daily amount of 15 drops of ferrous sulfate is implemented in the health care networks of the country. Despite the implementation of this

program for at least 15 years, iron deficiency anemia is still a common problem in children under 2 years and pregnant women, and one of the reasons for not taking supplements due to poor training, side effects of supplementation, lack of supply, and distribution is timely. For the other age groups, a comprehensive iron ore program has been developed and sent to all medical universities in the country.

9- The plan to make new supplements (sprinkle) which have a better acceptability in the form of powder packages for daily consumption of children is being implemented by the office of community nutrition improvement.

10- Enrichment of flour with iron and folic acid, enrichment of biscuits and cookies with iron and vitamin A for free nutrition of schools, pasta enrichment with iron and B vitamins are other major strategies to deal with iron and other micronutrient deficiencies which has been implemented as a pilot.

11- Vitamin D fortification of milk with a plan as a basic strategy to prevent and control vitamin D deficiency has been designed and implemented as a pilot.

Based on the results of this study, the amount of vitamin D required to add to milk, the executive mechanism and quality control methods of fortified milk have been obtained, and based on this, a vitamin D fortification program can be implemented in the country.

12- Enrichment plan of edible oil with vitamin A as a pilot project in Sistan and Baluchestan province, which has a high prevalence of vitamin A deficiency, is being designed and implemented. Adding vitamin A to the household oils has been implemented in many countries around the world as a major measure to reduce vitamin A deficiency.

13- Urine iodine monitoring of 8-10-years-old students has been performed once a year in all

medical universities of the country in order to ensure the adequacy of iodine intake in the region. In this project, 240 urine samples are collected from each university every year and sent to 20 selected laboratories in the country to measure the iodine amount in the urine.

14- Evaluation of consumed salts at the level of production, distribution, and consumption in order to control the amount of iodine in table salts, and also monitor the quality of salt according to the instructions is performed in all medical universities of the country [43].

15- Training and retraining of staff (nutrition experts, environmental health, food monitoring department, and food laboratory of the province) in the field of monitoring and evaluation of iodine deficiency disorders through training of master trainers at the national level in 2002 and the universities of medical sciences of the country should implement these courses in the province and the city.

16- Vitamin A and D supplementation for children under the age of 2 from the 15<sup>th</sup> day after birth to 24 months at a daily rate of 1,500 international units of vitamin A and 400 international units of vitamin D is done through the country's health care networks.

The ANIS study has indicated that only 35% of children in the country have taken A + D or multivitamin drops regularly, therefore, the emphasis is on educating healthcare workers and mothers about the importance of taking A + D or multivitamin drops. It is one of the basic measures which should be paid special attention at the university level.

17- Public nutrition education by implementing mobilization programs of public education in order to improve the pattern of food consumption, reduce the consumption of sugars, fats and salt with the cooperation of medical

universities, mass media, and radio and television of the province is one of the basic measures that should be implemented by an annual plan and schedule.

### Results and Findings

The results of nationwide studies indicate the problem of energy protein malnutrition in children less than 5 years, deficiency of micronutrients especially iron, zinc, vitamins A and D, as well as chronic nutrition-related diseases such as obesity, diabetes, cardiovascular disease, and increase in blood cholesterol. According to the latest definition of food security, “the access of all people at all times and places to adequate and healthy food for a healthy and active life” if the current trends of food insecurity and malnutrition continue and effective intervention is not made to change and correct them. Harmful economic and health benefits and the resulting health will become more tangible in the coming years. This argument can be well analyzed and illustrated in the context of nutritional transition concept in the country. All evidence suggests that the Iranian society in a rapid nutritional transition is rapidly moving towards a double problem. This means that on the one hand, energy protein malnutrition in children under the age of 5 and deficiency of micronutrients (iron, iodine, zinc, calcium, and vitamins A and D) are observed in a large share of the country’s population. According to ANIS study by the Office of Community Nutrition Improvement in the Ministry of Health in 1998, 800,000 children under 5 years (15.4%) suffer from moderate to severe nutritional shortness, which indicates chronic and long-term malnutrition.

In other countries of the world, child malnutrition is also a major problem, but a look at its universal trend demonstrates a rapid improvement in the situation of child

malnutrition. In Southeast Asia, especially in Indonesia and Thailand, a reduction in child malnutrition has been reported following economic growth and the implementation of community-based intervention programs. In Thailand, the prevalence of mild malnutrition decreased from 50.8% to 26.1% between 1982 and 1986, according to data from the Nutrition Survival System.

Moderate and severe malnutrition has increased from 26.1% to 18.6%. Severe malnutrition was eliminated during 1986-90 and moderate malnutrition was reduced to less than 1%. The integration of food and nutrition programs into the country’s development programs from 1981 to 1983 and government poverty alleviation programs have been a key to the success of nutrition programs in Thailand. In this country, the implementation of nutrition intervention programs with the full public participation, the provision of food aid to children with moderate and severe malnutrition for free as well as the provision of cheap local complementary foods for children by rural women volunteers are factors in the success of the program and reducing malnutrition.

In Brazil, underweight has risen from 18.4 percent in 1975 to 7.1 percent in 1989, and improved nutrition has been a message of economic growth and a reduction in the number of people below the poverty line. In Egypt, a comparison of national surveys in 1978 and 1988 indicates that the prevalence of underweight in children aged 6 to 36 months decreased from 21% to 14%, and in children aged 0 to 51 months from 16.6% in 1978 declined to 10% in 1988.

Implementing poverty alleviation programs in the form of land distribution among farmers, subsidizing agricultural inputs, and lending and food subsidies have undoubtedly had positive

effects on nutrition. In Iran, a comparison of the growth status of children in 1995 and 1998 through two national studies demonstrates that malnutrition has decreased. Applying the strategy of promoting breastfeeding, implementing CDD and ARI programs, improving environmental health, immunization and monitor the growth of children have been effective factors, but to solve the problem of malnutrition in children according to the experiences of other countries, design and implement programs an intervention with the full participation of the people as well as the community empowerment to its identification based on the cycle of evaluation, experience, analysis and action will improve nutrition.

Implementation of an intervention plan to reduce malnutrition in rural areas of Ilam, Bardsir and Borazjan counties with the cooperation of different sectors for 3 years led to a reduction in the rate of malnutrition in children under 3 years. This study, like similar studies conducted in other countries, illustrated that cross-sector cooperation and participation of all development sectors in reducing malnutrition is beneficial due to the multidimensional nature of the problem. Based on the approach proposed by UNICEF in 1989, the solutions were determined according to the factors influencing the occurrence of the problem. In this study, first, the current situation was identified and the effective factors were determined in malnutrition occurrence. In the practical phase, appropriate measures were implemented for 3 years, and in the evaluation phase, the effectiveness of the interventions was determined.

This study showed that the prevalence of malnutrition (underweight and short stature) has been reduced by about 50%. Studies in other countries, including Thailand, India, and the

Philippines, also provide considerable evidence of the usefulness of such interventions. In Thailand, with the implementation of the family nutrition improvement project (UPGK), multi-sectoral measures include monitoring the growth of children under the age of 5, practical nutrition education, creating home vegetable gardens, iron and vitamin A supplementation, and oral fluid therapy in diarrheal diseases with community participation and volunteers trained. Evaluation of the program revealed that positive changes have been made in the knowledge and practice of families in the field of child development. In this project, Thailand prioritized the available resources and facilities with maximum capacity to implement selective interventions.

In the 1975 ICDS project, India implemented integrated measures for children under the age of 5, pregnant and lactating women through the provision of nutritional assistance, supplementation, immunization, and nutrition education through health and social workers.

Evaluation of the program demonstrated that severe malnutrition was reduced in ICDS-covered centers. One of the main factors in the success of the program was staff training and continuous monitoring of environmental levels, which led to the improvement of their skills. In the Philippines, since 1974, PNP nutrition improvement programs have been implemented by volunteer rural liaisons to monitor the growth of children under the age of 5. In addition to weigh the children, volunteer liaisons provided nutrition education, family planning services, immunization, and the other health services. The program, which had strong political support, was able to take beneficial steps to improve the nutritional status of children, despite political instability. Similar to the current study in Iran, in 1997 in South

Africa the Integrated Nutrition Program (INP) in the PHC system was piloted in 4 provinces. In this study, by attracting inter-sectoral cooperation, teacher training, agricultural staff and volunteer groups in the field of food self-sufficiency, improving the health of women and children, exclusive breastfeeding and breastfeeding for up to 2 years, establishing nutritional rehabilitation centers (NRC) was one of the major activities. At the end of 1998, after evaluation, the program was implemented nationwide.

In the intervention plan to reduce child malnutrition, strengthening the growth monitoring program and sensitizing mothers to the child's growth card was considered as a major strategy which can have positive effects on improving the child's growth, among other measures. In a study in Indonesia called the family nutrition improvement program, monitoring child growth as an educational tool for early detection and control of child developmental disorders has illustrated its beneficial effects.

Regarding other nutritional problems, the National Survey of Micronutrients in 2002 indicated that 15 to 40% of children, adolescents, and pregnant women are deficient in iron and zinc deficiency in about 30% of children and adolescents and 44% of pregnant women in the country. The four main strategies for preventing and controlling micronutrient deficiencies are nutrition diversification, supplementation, food enrichment, and public health measures (including improving the environment, sanitizing drinking water, etc.) in order to prevent and control infectious and parasitic diseases). Supplementation with a variety of micronutrients as a single micronutrient or a combination of several micronutrients for vulnerable and at-risk groups

has been used as a major strategy in all countries of the world. In our country, the iron supplement program for all women and children aged 6 to 24 months under the auspices of the country's health care networks is implemented free of charge. Tanzania has been implemented this plan.

The World Health Organization (WHO) has conducted a meta-analysis of the results of the age of iron program for adolescent girls in various countries. Highly recommends weekly distribution of iron supplementation at certain times of the year during puberty.

Accordingly, the iron supplement program for high school girls has been implemented by distributing one ferrous sulfate tablet per week for 16 weeks in at least one of the country's medical universities. Food enrichment with various micronutrients has started at least 50 years ago in some countries of the world, and now in many countries enrichment of flour with iron and other micronutrients is mandatory.

In our country, flour enrichment with iron and folic acid has been started since 2001 in Bushehr province, which has a high prevalence of iron deficiency and anemia. Micronutrients done in 2002 and its report will be published soon, enrichment of foodstuffs such as flour with iron, folic acid and zinc, enrichment of milk with vitamin D and enrichment of edible oils with vitamin A is underway and its expansion in the country requires the support, cooperation and follow-up of medical universities. On the other hand, warning signs of the spread of metabolic diseases such as cardiovascular disease, diabetes, obesity, and various cancers can be seen in cities, especially large cities. According to available statistics, out of every 800 deaths per day, 300 ones are due to cardiovascular diseases, and one of the

main reasons is a change in food consumption pattern.

### Conclusion

Malnutrition due to economic poverty in Iran has been reported for 40 years and still exists. However, food consumption in the low-income classes has improved and the extent and severity of diseases has decreased with the expansion of health services.

As a rule, better food, disease control, improvement of environmental health, especially access to safe drinking water, and raise the level of literacy and public awareness in general have been able to reduce the prevalence of malnutrition. Unfortunately, due to the lack of food and nutrition monitoring system and the lack of information, there is no information about the changes in the nutritional status of the community. Studies have indicated that about 20% of the country's population are at risk of food and nutrition insecurity and do not receive the energy they need daily, unless the necessary intervention is taken to break this vicious circle. The probability of passing this malnutrition on to the next generation is very high. On the other hand, the continuation of current trends in food production, incomes, prices, inflation, and resource constraints in the ongoing years will increase the risk of food insecurity and malnutrition. It rises sharply in urban middle-aged society, especially among women.

It should be noted that the risk of metabolic diseases is not necessarily limited to the high-income classes, but the low-income classes are also highly vulnerable. The mother is fat and at the same time suffers from a lack of micronutrients.

For this, it is important to promote the culture and nutritional literacy of the community and public nutrition education with the cooperation

of all relevant agencies. There is no doubt that further expansion of the two phenomena discussed together threatens, on the one hand, the return on investment in the education sector and the quality of human resources.

On the other hand, it will greatly increase the cost of treatment in the coming years. Eventually, the disease and economic burden of the aforementioned problem in the accelerated nutritional transition will increase.

Although the problems are wide-ranging and complex, the opportunities are attractive and promising. On the one hand, low-cost and effective technology for combating malnutrition is available in the form of targeted intervention at the neighborhood level, and on the other hand, before metabolic diseases become a costly and ineffective health problem, it can be done in one go. Maintaining nutritional health and ensuring food security at the household level depends on four factors: 1) income and prices as one of the most important factors in choosing and buying food, 2) access to food in the market and place of residence, 3) family knowledge in the case of food and nutrition in terms of purchase, storage, cooking, and distribution of food in the household, 4) access to health care services for the prevention and timely treatment of diseases and health of individuals for optimal biological use of nutrients consumed by the cell.

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#### HOW TO CITE THIS ARTICLE

Mina Jafari, Review of Proposed Strategies to Improve Nutrition in Different Communities, *Prog. Chem. Biochem. Res.* 5(1) (2022) 77-96.

**DOI:** 10.22034/pcbr.2022.334123.1216

**URL:** [http://www.pcbiochemres.com/article\\_147383.html](http://www.pcbiochemres.com/article_147383.html)

