

Invited paper

Two decades of nutrition assessment in the Eastern Mediterranean Region: scope, methodologies and dissemination

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SUMMARY Different nutritional disorders prevail at different stages in the life cycle, e.g. growth retardation in the fetus, protein energy deficiency in children, noncommunicable conditions in adults. The scope of nutrition assessment has changed over the past 2 decades. The focus shifted from pregnant and lactating mothers and children, through functional consequences of malnutrition to deficiency disorders. Now the focus is on obesity. Clinical methods of assessment (usually indicators of late-stage malnutrition) have become less important recently although clinical indicators of iodine deficiency and vitamin A deficiency are still useful. The key method now is anthropomorphic measurement, such as weight-for-age or body mass index. All the countries of the Region have nutrition education programmes for dissemination of information and most have drawn up national dietary guidelines applying the strategies that were developed after the 1992 International Conference on Nutrition.

Introduction

According to the global burden of disease concept, the disability adjusted life year (DALY) expresses years of life lost due to premature death and years lived with a disability of a specified severity and duration. One DALY is thus 1 year of healthy life lost [1]. In the list of main risk factors contributing to the global burden of disease, malnutrition was top, contributing 15.9% of total DALYs [1]. The burden of disease (expressed as DALYs) by cause, sex and mortality stratum has been estimated by the World Health Organization for each region for the year 2002 [2]. The total for DALYs due to nutritional deficiencies in the Eastern Mediterranean Region was 631 in the low child low adult mortality stratum countries

and 3798 in the high child high adult mortality stratum countries [2].

Malnutrition was the direct or the underlying cause of death of 49% of children under 5 years in developing countries during 1995 [3]. The burden of mortality, morbidity and disability attributable to noncommunicable diseases now weighs heaviest in developing countries, where those affected are on average younger than in the industrialized countries. Unhealthy diets and physical inactivity were found to be the leading causes of the major noncommunicable diseases [4].

The negative impact of malnutrition on body functions has been extensively studied all over the world. In the Eastern Mediterranean Region, a prominent longitudinal study implemented in Egypt during 1982–

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1987 documented the effect of food intake on cognitive function, social behaviour, work performance, immunocompetence and reproductive health [5,6].

It is therefore important to assess nutritional status and establish the main determinants for both individuals and the community. This will provide tools for the prevention, early detection, management and control of nutrition disorders.

Key objectives of nutrition assessment in the Region can be summarized under 6 main topics:

- to identify high-risk groups and geographical areas with nutrition-related problems to facilitate implementation of public health intervention programmes;
- to recommend guidelines for the prevention, early detection and management of nutrition disorders;
- to study diet–health relationships and the impact of knowledge and attitudes toward dietary and health behaviour;
- to develop nutrition education and dietary guidance e.g. national food-based dietary guidelines [7];
- to assess progress toward achieving the nutrition and health objectives, e.g. the plan of action for nutrition promoted by the International Conference on Nutrition, Rome, 5–11 December 1992 [8];
- to monitor and evaluate nutrition intervention programmes.

Scope

Nutrition assessment done in the Region includes methodologies that deal with the nutritional disorders prevailing at different stages in the life cycle. These conditions can be summarized according to the life stage.

Fetal development within the maternal environment and neonatal period

- Intrauterine growth retardation leading to low birth weight of the neonate and growth retardation during infancy [9,10];
- iodine deficiency disorders, which may lead to developmental retardation and brain damage or stillbirths;
- folate deficiency among pregnant mothers may lead to neural tube defects on the neonate (in most countries of the Region, 400 µg/day folic acid is given as a supplement to pregnant mothers together with iron pills).

Recently, there has been considerable evidence, mostly from industrialized countries, that intrauterine growth retardation followed by very rapid postnatal catch-up growth is associated with an increased risk of coronary heart disease, stroke, diabetes and raised blood pressure [11–13]. On the other hand, large size at birth (macrosomia) is also associated with increased risk of diabetes and cardiovascular disease [14,15].

It is worth stating that as a result of industrialization, urbanization, economic development and market globalization in most countries of the Region, there have been changes in dietary and lifestyle patterns leading to the emergence of obesity and diet-related, chronic, noncommunicable diseases, which are taking over from the more traditional undernutrition and infectious diseases as causes of morbidity and mortality [16–21].

Infants and young children [22–28]

- Protein–energy malnutrition;
- iodine deficiency disorders;

- vitamin A deficiency and vitamin A deficiency disorders;
- iron deficiency anaemia.

These disorders may lead to stunting, developmental retardation, e.g. low cognitive performance, increased risk of infection and high risk of death.

Adolescents and preadolescents [16,18,19,29–34]

- Protein–energy malnutrition, iodine deficiency disorders and iron deficiency anaemia, with similar consequences to the previous stage;
- calcium deficiency, leading to inadequate bone mineralization with possible osteoporosis during adulthood;
- obesity, which may continue during adulthood with higher risk for all associated co-morbidities, particularly cardiovascular disease and type II diabetes.

Pregnant and lactating women [25, 35–38]

- Protein–energy malnutrition, iodine deficiency disorders, vitamin A deficiency and iron deficiency anaemia;
- folate deficiency;
- calcium deficiency.

Apart from the above-listed sequelae, these disorders may lead to insufficient weight gain during pregnancy, low-birth-weight babies and increased risk of maternal mortality.

Adults [18,19,39–43]

- Protein–energy malnutrition and iron deficiency anaemia;
- obesity;
- diet-related, chronic, noncommunicable diseases, e.g. coronary heart disease, hypertension/stroke, diabetes and osteoporosis.

Thinness and chronic energy deficiency among adults as a result of protein–energy malnutrition are very rare in the Region apart from a few countries in the high child high adult mortality stratum.

The elderly [44]

- Protein–energy malnutrition, iron deficiency anaemia, obesity, osteoporosis and diet-related chronic diseases.

Scope of assessment in the Region

The scope of nutrition assessment in the Region has changed within the last 2 decades. At the beginning of the 1980s, the focus was on pregnant and lactating mothers and children under 2 or under 5 years. Main problems assessed were protein–energy malnutrition, iron deficiency anaemia, breastfeeding and weaning practices. Functional consequences of malnutrition were investigated in Egypt during the 1980s.

Iodine deficiency disorders and vitamin A deficiency emerged as the focus of nutrition assessment in the Region in the 1990s [45,46]. The goals of the World Summit for Children, New York, 29–30 September 1990, and the plan of action from the International Conference on Nutrition, Rome, 5–11 December 1992 were the initiators to focusing on micronutrient malnutrition in the Region [47,48].

With the nutrition transition in most countries of the Region, the problem of obesity and comorbidities among adults and adolescents attracted the attention of the nutrition investigators in the 1990s and this has continued to the present. With the beginning of the third millennium, diet and lifestyle-related problems like osteoporosis among adults and the elderly were also investigated within the scope of nutrition assessment [19].

Nutrition assessment methodologies commonly used in the Eastern Mediterranean Region

Nutrition and health assessment of the individual and the community

These include:

- anthropometric measurements, mainly weight, stature, arm circumference, waist circumference, waist-to-hip ratio, skin fold thickness (commonly at triceps) [49,50];
- clinical assessment, mainly by signs of deficiency and medical history [51–55];
- laboratory investigations; measurements of nutrients or their metabolites in biological fluids and comparison with reference standards and cut-off points [52,54,56–59];
- biophysical investigations e.g. X-ray for rickets, and dual-energy X-ray absorptiometry for assessment of bone mass density used to determine prevalence of osteoporosis [60,19].

The dark adaptation test for vitamin A deficiency is not used in the Region.

Assessment of the main determinants of nutritional status of the individual and the community

These include:

- food availability at the national level measured by the food balance sheet (available through the Food and Agriculture Organization and national ministries of agriculture);
- household food security and food intake of the individual, measured by dietary assessment methods;
- breastfeeding, weaning practices and weaning foods, which are extensively studied in the Region [61–68];

- morbidity status e.g. infection, infestations or chronic noncommunicable diseases [69];
- social, economic and cultural factors such as education, occupation, income, habits, beliefs and lifestyle, e.g. physical activity;
- availability and utilization of health, nutrition and social services and caring capacity at the community and household level [70,71];
- biodemographic factors, mainly age, sex, family size, interpregnancy interval, physiological status, e.g. pregnant or lactating.

All these determinants are assessed through prestructured questionnaires or rapid assessment procedures and focus group discussions. Observation methods at the household level are not culturally accepted in the Region; for instance, observation and weighing methods for dietary assessment could not be applied in Egypt [72]. The most commonly used dietary assessment methods are food frequency, to describe dietary pattern, and 24-hour recall or 24-hour recall and sample weighing, to determine dietary adequacy. Food intake in household measures is converted to grams and then to energy, macronutrients and micronutrients, which are compared with recommended dietary allowances [72–75]. Caring capacity and physical activity are assessed by questionnaire for time allocation rather than observation [17,70].

In the Eastern Mediterranean Region, the key method for assessment of nutritional status is anthropometric measurement, mainly weight and stature of the individual in the community. At the beginning of the last 2 decades, the focus was on anthropometric measurement of children under 5 years as an indicator of the nutritional status of the whole community. In-

terpretation of weight and stature measurements was mainly based on the Gomez classification, then the Waterlow classification using reference standards for weight-for-age, weight-for-height and height-for-age [76,77].

In 1983, the World Health Organization recommended using standard deviation (SD) scores for classifying children under 18 years into underweight, normal or overweight, and stunted, normal or tall children according to certain cut-off points: < -2 SDs, -2 to $+2$ SDs and $> +2$ SDs respectively from the reference median [49].

In 1995, body mass index (BMI, weight (kg)/height² (m²)) was recommended for use in adults to differentiate between normal weight, 3 grades of chronic energy deficiency (or underweight) and 3 grades of obesity [50]. In 2000, the obesity classification was modified into pre-obese (BMI 25.0–29.9 kg/m²), obese class I (BMI 30.0–34.9 kg/m²), obese class II (BMI 35.0–39.9 kg/m²) and obese class III (BMI ≥ 40.0 kg/m²) [78]. The Garrow classification [79] was used to describe weight status of adults before 1995.

In 1995, the World Health Organization recommended the use of percentile BMI for age for adolescents 10–19 years to differentiate underweight (< 5 th percentile), normal (5th– < 85 th percentile), overweight (85th– < 95 th percentile) and obese (≥ 95 th percentile) [50].

Clinical assessment for nutrition disorders has almost lost its value in the last 2 decades. Clinical signs of malnutrition are usually late signs, thus identifying severe cases of malnutrition. In most countries of the Region, malnutrition is usually mild to moderate, thus mainly detected by anthropometric, biochemical or haematological methods. The clinical signs still of value are those for iodine deficiency disorders and vitamin A deficiency [52,54]. In most

countries of the Region, however, vitamin A deficiency is detected by serum retinol < 20 $\mu\text{g/dL}$ and rarely by night blindness or Bitot's spots [59]. For iodine deficiency disorders, grades of goitre and urinary iodine are the most commonly used signs [52]. For iron deficiency anaemia, haemoglobin determination, and to a lesser extent serum ferritin, are the indicators most commonly used [56].

Recently, with the problem of obesity and co-morbidities emerging in the Region, blood glucose, total serum cholesterol and low-density lipoprotein cholesterol are measured [80].

Some sophisticated biochemical measurements are carried out for study of certain specialized problems, such as osteoporosis in Egypt [19].

In the Eastern Mediterranean Region, the approach for assessment is nutrition surveys rather than nutrition surveillance. All 22 countries have had national surveys within the past 2 decades, covering all the nutrition problems detected in the Region along with their main determinants (as discussed under "Scope") [81–106].

There have been efforts to establish nutrition monitoring or nutrition surveillance systems in many countries of the Region [80,106]. Strengthening of these efforts is, however, still required. Surveillance efforts are based mainly on the primary health care system, using growth monitoring and promotion of children under-5 as the core of the system. Most of the growth charts used in the Region are based on the World Health Organization model using percentiles of the American National Center for Health Statistics reference standards. In Egypt, the national growth chart simply consists of 2 curves, $+2$ SDs and -2 SDs of the NCHS reference standard of weight-for-age for boys and girls under 6.

Dissemination

During the past 2 decades, extensive nutrition assessment studies have been conducted in all countries of the Region. The main nutrition problems and risk factors have been identified. Population groups and geographic areas most at risk for each nutrition disorder in each country were determined. The wealth of information generated from these studies was disseminated to policy-makers to formulate strategies for prevention and control. Information was also disseminated to the scientific community through workshops, seminars, conferences and published papers.

Dissemination of simplified information to the public is the cornerstone of the promotion of health and nutritional status and the prevention of malnutrition. All the countries of the Region had enthusiastic nutrition education programmes applying all possible methods and vehicles appropriate to local conditions.

Activities using the information generated from nutrition assessment reached their peak at the beginning of the 1990s during the preparations for the international conference in Rome. Almost all countries of the Region submitted papers describing in detail nutrition problems and the immediate, underlying and basic factors leading to these problems, along with intervention programmes that were operating [8,22].

National and Regional workshops were conducted during the preconference consultation process. After the conference in December 1992 [8], almost every country of the Region prepared a plan of action on nutrition based on 9 action-oriented strategies [107]. These strategies constitute the framework of nutrition information disseminated to the different sectors of the population in the Region. They are:

- incorporating nutritional objectives, considerations and components into development policies and programmes;
- improving household food security;
- protecting consumers through improved food quality and safety;
- preventing and managing infectious diseases;
- promoting breastfeeding;
- caring for the socioeconomically deprived and the nutritionally vulnerable;
- preventing and controlling specific micronutrient deficiencies;
- promoting appropriate diets and healthy lifestyles;
- assessing, analysing and monitoring nutrition situations.

Most countries of the Region have prepared, or are in the process of preparing, national food-based dietary guidelines applying these strategies through a simplified and practical approach for the public.

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