

## Dietary Patterns and Food Culture in the Middle East

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### Abstract

According to the WHO, the Middle East and North Africa (MENA) region is classified as a region in a nutritional transition stage, with high levels of overweight and obesity, and moderate under nutrition and micronutrient deficiencies in some population subgroups. The need for more information on the diets of at-risk populations has been identified, with the existing recommendation that dietary surveys for such groups be implemented in order to develop intervention strategies based on evidence. This review aims to identify the main dietary patterns in the MENA region. Dietary patterns identified tended to fall into three categories: 1) patterns considered favourable for health and wellness, usually called healthy, 2) patterns considered detrimental for health and wellness, identified as fats-food pattern, western pattern or unhealthy pattern and 3) patterns favouring the local food culture, referred to as traditional or ethnic food pattern. Other influential factors were also identified as determinants of dietary patterns in the MENA region including population dwelling (urban versus rural), income (advantageous versus disadvantageous) and by ethnic group when more than one ethnicity was present in the country of study. An Arab dietary pattern as such is yet to be ascertained as typical food selection and consumption practices present great variation from country to country. The present review brought to light the knowledge gap existing in descriptive studies addressing the dietary patterns of populations in the MENA. As shown by the limited literature found, the studies that have been carried out have a small sample size often not representative of the national population. Although quantitative studies reporting on nutrient intake do exist, dietary pattern methodology does not seem to be a popular method for dietary assessment in the region.

**Keywords:** MENA; eating habits; Arab food; nutrition; diet

### Introduction

In order to understand how diet is related to the increased risk of diet-related chronic diseases (DRCD) it is first necessary to obtain a clear picture of the composition of a population's diet. According to the WHO, the Middle East and North Africa (MENA) region is classified as a region in a nutritional transition stage, with high levels of overweight and obesity, and moderate under nutrition and micronutrient deficiencies in some population subgroups. In addition, excessive energy intake paired with sedentary lifestyles contributes to the rapidly growing numbers in obesity prevalence in the MENA region [1]. The need for more information on the diets of at-risk populations has been identified, with the existing recommendation that dietary surveys for such groups be implemented in order to develop intervention strategies based on evidence [2]. Because people do not eat isolated nutrients, it has been suggested that the best way to study diet/disease interaction and to encourage disease prevention through diet would be by means of a more holistic approach or dietary patterns. These patterns are currently being derived by multivariate techniques, including cluster, factor and principal component analysis. Principal component analysis can be used to identify groups that have not been set *a priori* thus facilitating a possible explanation of the relationship between diet and disease.

The prevalence of DRCD has been on constant rise among the MENA population. These conditions, including cardiovascular disease and type 2 diabetes, are greatly influenced by diet, turning the everyday food selection into an essential factor in the prevention and management of DRCD. This prevention and management process entails a holistic approach that requires attention to be given to eating habits, food choices, nutrient intake, food preferences and food manipulation through cooking, that is, dietary patterns. Due to the limited available data, this study aims to identify the main dietary patterns in the MENA region.

Described dietary patterns have included most frequently a “western” pattern and a “prudent” or “healthy” pattern. The former is usually described as including whole dairy products, processed cereals, fast food, red meat and sugars [3]; whereas the latter tends to include vegetables and fruits, fish, whole grains and chicken or eggs [4]. In addition, other patterns identified include Mediterranean, traditional [5] and mixed patterns [6]. Although several studies have used this methodology to establish different food patterns, only a handful have been carried out in the MENA region. Further, the knowledge gap remains in relation to the dietary patterns among specific populations such as Arabs. Most of the existing qualitative data on the dietary patterns of adults in the MENA up to 2012 was used to establish the Food Dome dietary guidelines for Arab countries [7]. These guidelines were developed to aid in the prevention of diet-related diseases and as a tool for nutrition education. As the first step in the development of these guidelines was a review of the existing nutrition-related health problems in Arab countries they were tailored to the needs of the Arab population. Further, the food groups mentioned as part of this tool include commonly consume foods in the region and are additionally employed in the pictorial representation of the guidelines. Although this tool was developed based on existing evidence and has been available since 2012 more testing in the target population is needed in order to evaluate the comprehension and usefulness of the message [8].

The data acquired from this review will allow for a better understanding of the dietary patterns of a population at risk of DRCD. Furthermore, it will provide information to be used as basis for devising nutrition education strategies as required by the population of the MENA region. Given the impact they have on decreasing the quality of life of those affected, the management and prevention of DRCD requires an immediate and holistic approach. It is therefore necessary to recognize and understand dietary patterns in order to find causes of illness and establish potential dietary interventions. The study of dietary patterns comprises not only food selection and consumption; it also covers preparation methods, portion sizes, cultural and religious food related aspects that will enable health researchers to understand the role of diet on the onset, prevention and treatment of disease. Furthermore, understanding of current dietary patterns will enable predictions to be made regarding future development of health conditions at a large scale and how these challenges can be faced [9-15].

### Methods

This review analyses data on the dietary patterns of Arab populations in the Middle East and North Africa region. Leading databases, including Web of Science, Medline, PubMed and Science Direct were consulted and manual searches for cited references in leading diet-related journals, were conducted. Papers were considered when written in English, published between the years 2004-2014 and reporting on original food intake data. Only work carried out on apparently healthy adult populations were included. Articles reporting on pregnant or lactating women were not included, nor were studies carried out in refugee populations, migrant populations or those reporting quantitative food intakes only.

The database search was built by using the following combination of terms: [Arab countries (Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Yemen, Middle East, North Africa, MENA, Arab; and their combination)] and [dietary pattern (diet, dietary assessment, eating, consumption, food groups, food habits, food preferences, food selection, intake, nutrient intake, nutrition assessment; and their combinations)] not [clinical trials or patients]. For each concept, the database-specific indexing terms (MeSH or Web of Science terms) were searched in addition to terms in the title or abstract. An additional manual search was performed by checking the reference lists of the key publications identified. The output tables captured key characteristics of the following: (a) study methodologies: the country and year of the study, the number of subjects and their gender, dietary assessment method and (b) primary (qualitative) study outcomes: dietary patterns identified and whether Food Dome guidelines for Arab countries were being met or not. Search methodology is schematized in Figure 1.

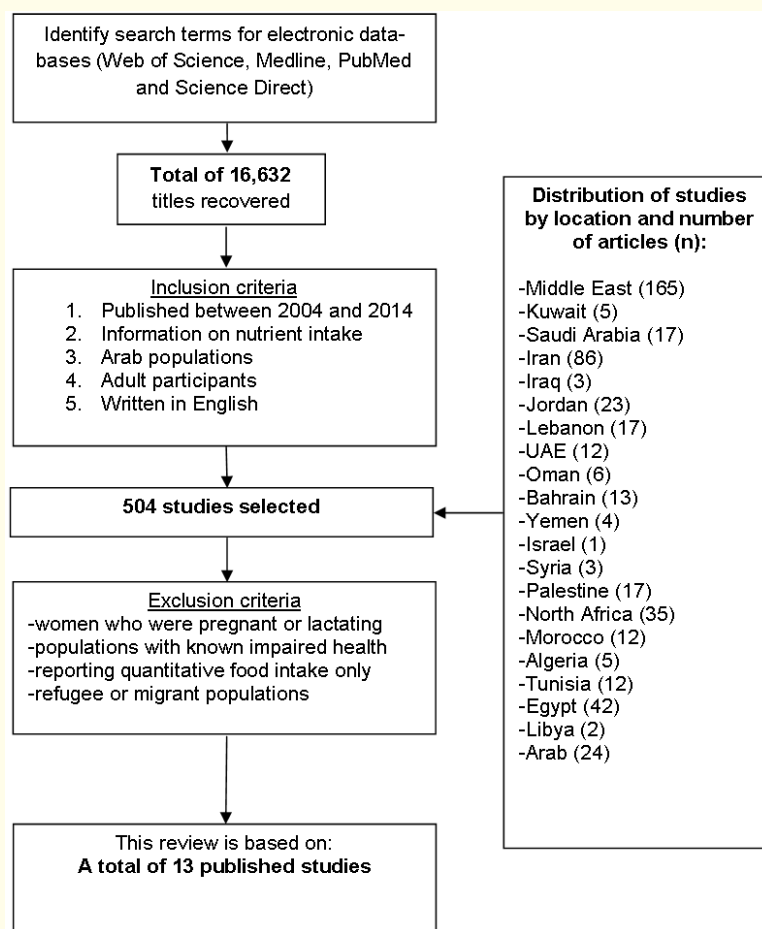


Figure 1: Search strategy.

**Findings**

In all, only 13 articles were found to meet the inclusion criteria and were comprised for the final assessment reported in this chapter (Table 1). Dietary patterns identified tended to fall into three categories: 1) patterns considered favourable for health and wellness, usually called healthy, 2) patterns considered detrimental for health and wellness, identified as fats-food pattern, western pattern or unhealthy pattern and 3) patterns favouring the local food culture, referred to as traditional or ethnic food pattern. Other influential factors were also identified as determinants of dietary patterns in the MENA region including population dwelling (urban versus rural), income (advantageous versus disadvantageous) and by ethnic group when more than one ethnicity was present in the country of study.

**Patterns considered favourable for health and wellness**

Dietary patterns high in fruit and vegetable content were generally found to be described as contributing to a healthy pattern. This pattern was also characterized by the inclusion of poultry and legumes as the main protein sources. Minimally processed foods, in particular cereals, were also found to be part of this pattern. Dairy products were generally consumed in their low-fat versions and drinks mentioned in this pattern included tea and fruit juice [16-19].

**Patterns considered detrimental for health and wellness**

Dietary patterns considered detrimental for health and wellness were characterized by a high content of refined grains, soft drinks, fast food sandwiches, sweets and desserts, and processed meat products. High-fat dairy products, soft drinks and processed juice, red meat and potatoes were also described as part of these patterns.

Country and Year	Sample Size and Gender	Dietary Assessment Method	Main Dietary Findings	Reference
Iran 2006	486 women	FFQ	Three major dietary patterns were described; healthy (high in fruits, vegetables, tomato, poultry, legumes, tea, fruit juices and whole grains), western (high in refined grains, red meat, butter, processed meat, high-fat dairy, sweets and desserts, pizza, potato, eggs, hydrogenated fats and soft drinks) and traditional (high in refined grains, potato, tea, whole grains, hydrogenated fats, legumes and casserole).	Esmailzadeh, <i>et al.</i> [8]
Iran 2009	984 women	FFQ	Five foods components were obtained: A healthful food pattern (heavily loaded on low-fat products such as fish, vegetables, legumes, cereals and fruits), a high glycemic index and high-fat pattern (red or white meat and meat products, potatoes), a pasta pattern, a dairy product and egg component, a sweets consumption component.	Delavar, <i>et al.</i> [9]
Iran 2009	82 women 49 men	24 HR on 12 occasions	Dietary patterns of urban (higher intake of vegetables, fruits, meat, fat, saturated fat, cholesterol, vitamins C, A and E; $\beta$ -carotene, fish, eggs, dairy products, sugar, MUFA, and less bread, cereal, and carbohydrates, legumes, condiments) and rural populations are described. Dietary differences by ethnicity are also presented for Turkmen (higher intake of tea, fat, SFA, MUFA, fruit, non-alcoholic beverages, PUFA, meat, fish, sugar, cholesterol and lower intake of $\beta$ -carotene, legumes, vegetables, carbohydrates) and non-Turkmen.	Islami, <i>et al.</i> [10]
Iran 2009	95 women 46 men	24 HR on two occasions	Five patterns were identified: Pattern 1 or traditional (refined carbohydrates, starchy and other vegetables, whole grains, red and processed meat, saturated and trans fats, eggs), pattern 2 (fiber and PUFA), pattern 3 (fiber and dairy), pattern 4 (dairy) and pattern 5 (egg, salty snacks and fruit).	Sherafat-Kazemzadeh, <i>et al.</i> [11]
Iran 2010	460 women	FFQ	Two major dietary patterns were identified: a healthy pattern (high in fruit, vegetables, low-fat dairy products and poultry) and an unhealthy pattern (high in processed meats, soft drinks, sweets, refined grains, snacks and processed juice).	Rezazadeh and Rashidkhani, <i>et al.</i> [12]
Israel (Bedouin Arabs) 2009	302 women 149 men	24 HR	Two patterns were identified: a predominantly white bread group (homemade white pita and unleavened bread, rolls and buns; rice, pasta) and a predominantly whole-wheat bread group (homemade whole-wheat pita and traditional unleavened bread; store-bought whole-wheat loaf bread, rolls and buns).	Abu-Saad, <i>et al.</i> [13]
Israel (Arabs) 2012	277 women 274 men	FFQ	Four dietary patterns were identified: an ethnic pattern (pita bread, olive oil, Arabic mixed meat or vegetable dishes, Arabic whole grains, Arabic full-fat dairy products, and Arabic non-starchy vegetables), a healthy pattern (high intake on non-starchy vegetables, fruits, low-fat dairy products, whole grain such as barley, oats and buckwheat), a fish and meat dishes pattern (fresh fish, mixed meat and starchy dishes, oil for frying/sautéing and low intake of desserts), and a Middle Eastern snacks and fast food pattern (nuts, seeds, savory cheese and starchy fast food such as non-meat pizza, savory cheese-filled phyllo dough or puff pastry).	Abu-Saad, <i>et al.</i> [14]

Country and Year	Sample Size and Gender	Dietary Assessment Method	Main Dietary Findings	Reference
Lebanon 2011	377 women 410 men	FFQ and single 24 HR	A traditional Mediterranean diet score was used to describe the diet along with a constructed composite Mediterranean score (whole cereals, vegetables, legumes and fruit, olive oil and fish, refined cereals and pastries, liquid sweets).	Issa, <i>et al.</i> [15]
Lebanon 2011	2048 adults	FFQ	Four dietary patterns were identified: western (fast food including pies and pizza, fast-food sandwiches, fried potatoes, regular soda, bottled juices, meat and poultry, cured meats, nuts and seeds, refined grains, mayonnaise, ice-cream and sweets), traditional Lebanese (fruit, vegetables, <i>burghul</i> , legumes, olives, whole-fat dairy, starchy vegetables, fats and oils, eggs), prudent (primarily whole bread, low-fat dairy, light soda) and fish and alcohol (fish and alcohol).	Naja, <i>et al.</i> [16]
Lebanon 2013	163 women 160 men	FFQ	Three dietary patterns were identified: fast food/dessert (high intake of fast food sandwiches including hamburgers, cha-warma, falafel in addition to pizzas, pies, desserts, carbonated beverages and juices, and mayonnaise), traditional Lebanese (dairy products, olives, fruits, legumes, grains, eggs, vegetable oil, dried fruits and traditional sweets), and high protein ( high intake of fish, chicken, meat, and low-fat dairy products).	Naja, <i>et al.</i> [17]
Morocco 2009	526 households	FFQ	Food variety was measured and found to be distributed according to two patterns: based on area of residence (urban areas having greater food variety than rural areas) and based on socio-economic factors (advantaged households having higher food variety than disadvantaged households in urban areas only).	Anzid, <i>et al.</i> [18]
Morocco 2012	1461 women 1430 men	FFQ	Mediterranean diet (vegetables, legumes, fruits, cereal or potatoes, fish, red meat, dairy products and olive oil) is far from being a universal pattern in the Moroccan population.	El Rhazi, <i>et al.</i> [19]
Saudi Arabia 2007	170 men	Three-day food records	One main dietary pattern described consisting of mutton, white rice, wheat bread and dates (these foods were consumed by > 90% of participants); chicken, camel meat, tomatoes, cucumber, potatoes, broad beans and watermelon (consumed by > 70% of participants); cultured buttermilk, sweet black tea and Arabic coffee.	Al-Assaf and Al-Numair [20]

**Table 1:** Characteristics of studies included in the review.

**Patterns favouring the local food culture**

Patterns favouring the local food culture tended to include traditional and ethnic foods as depicted in Figure 2. They were characterized by the inclusion of both whole and refined grains, fruits and vegetables, legumes, eggs, red and processed meat, composite meat and vegetable dishes (casseroles), full-fat dairy products, olives, Middle Eastern pastry snacks and tea [20].



**Figure 2:** Traditional Kuwaiti meal.

### Adherence to the Food Dome dietary guidelines for Arab countries

None of the studies included in this review mentioned the Food Dome dietary guidelines for Arab countries. However, it was found that the majority of the guidelines are being followed as detailed in Table 2. Regular legume consumption was reported in the favorable and local food patterns, vegetable consumption was reported in the favorable and local food patterns although no particular preference for dark green or orange vegetables was mentioned. The consumption of both whole grains and refined grains was reported. While whole grains were predominant in the favorable patterns and refined grains in the detrimental patterns, the local food patterns reported the inclusion of both types of grains. Regular fruit consumption, including fruit juice, was reported although no mentioning of seasonal food consumption was found. Low-fat dairy products were reported as part of the favourable patterns while full and high-fat dairy products were reported in the local food and detrimental food patterns respectively.

### Discussion

As the use of dietary pattern analysis becomes more widespread, ethnic and country specific patterns have been identified such as the South Asian dietary pattern [21], the traditional Korean dietary pattern [22] and the traditional Iranian dietary pattern [23]. An Arab dietary pattern as such is yet to be ascertained as typical food selection and consumption practices present great variation from country to country. Originally, the peoples of the Arabian Peninsula relied heavily on a diet of dates, wheat, barley, rice and meat; with a heavy emphasis on yoghurt products, such as *leben* (1). Arabian cuisine today is the result of a combination of richly diverse cuisines, spanning the Arab world from Iraq to Morocco and incorporating Lebanese, Egyptian, and others. It has also been influenced to a degree by the cuisines of India, Turkey, Berber, and others. Food consumption patterns and dietary habits in the Arab countries have changed markedly during the past four decades; this is particularly true in some Gulf countries where there has been a great shift from traditional foods to more westernized diets.

One of the difficulties in comparing dietary patterns across a multiregional ethnic group is the presence of shaping factors for the development of unique dietary patterns among populations that would otherwise are likely to have remained much more similar. These factors, including geographical location, food availability and income, have created a noticeable amount of variation in the diets of Arab people. In terms of location, the data investigated for this review was limited to those Arabs in the geographical Middle East and North African region. While a seasonal climate is present across the MENA region with hot summers and cold winters, the main difference influencing the food environment is rainfall. While in parts of Morocco, Jordan and Lebanon rates of rainfall are sufficient for a surplus food production (which allows not only for sufficient local consumption but also for exports); other countries in the region face a much dryer desert environment not optimal for food production. Kuwait, for example, relies heavily on food imports and is thus

1. Yoghurt without butter fat.



more likely to experience changes in food consumption patterns due to the food products entering the country. Food availability thus becomes a distinctive shaping factor for the dietary patterns of the MENA.

Food Group	Guidelines	Reported Practices
Meat, eggs and legumes	Choose low fat or lean meat. Consume legumes at least 3 times a week Consume more fish as possible	Meat consumption described as being poultry or red meat, no evidence of choosing low-fat or lean versions were found. Regular legume consumption was reported in the favourable and local food patterns. Limited fish consumption was reported.
Vegetables	Eat more dark green vegetables like spinach and orange vegetables like carrots	Vegetable consumption was reported in the favourable and local food patterns but no particular preference for dark green or orange vegetables was mentioned
Cereals and their products	Eat at least half of cereals of whole grain Eat more fortified cereals and their products	The consumption of both whole grains and refined grains was reported. While whole grains were predominant in the favourable patterns and refined grains in the detrimental patterns, the local food patterns reported the inclusion of both types of grains. No specific mentioning of fortified cereals was reported although it is likely that the refined grains consumed are fortified as a common practice for refined flours.
Fruits	Eat variety of fruit Choose fruit during their seasons Drink fresh fruit juice	Regular fruit consumption was reported No mentioning of seasonal food consumption was found Fruit juice was reported as part of the favourable patterns and the detrimental patterns. The latter emphasised the consumption of processed juice as opposed to fresh juice
Milk and dairy products	Consume low fat milk and their products Consume milk fortified with vitamin D	Low-fat dairy products were reported as part of the favourable patterns. Full and high-fat dairy products were reported in the local food and detrimental food patterns respectively No specific mentioning of fortified milk consumption was reported; however, fortification of dairy products is a common practice in the MENA region

**Table 2:** Food Dome dietary guidelines and reported practices.

Guidelines from the Food Dome: dietary guidelines for Arab countries [7].

Income is one of the strongest shaping factors for the development of dietary patterns. While no specific studies have investigated the impact of income on diet quality in the MENA region, it is likely that similar findings would be found from studies carried out in other regions of the World. Nikolic., *et al.* [24] reported a low intake of fruit and vegetables, whole grain products, fish, energy, fiber, vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>6</sub>, B<sub>12</sub> and C, folate, calcium, magnesium, iron, potassium and zinc and a high intake of starchy foods, processed meat and sodium among low income groups in Europe. While no information relating income to these patterns was reported, dietary variance from rich Arab countries (mainly Gulf countries) to poor Arab countries (i.e. Morocco) is likely to follow these trends. Further, the consumption of food items such as red meat and full fat dairy, generally considered in the patterns detrimental for health and wellness, may not be reflecting poor eating habits in the MENA but rather, because they may be considered luxury items in some poor Arab countries, may represent a marker of wealth [15].

On the other hand, there are factors that give rise to similarities across an ethnic group. In the case of Arabs, a strong bonding factor is religion. In Islam, certain dietary restrictions will help shape the main dietary patterns of a population. For example, as pork and alcohol consumption are not encouraged it is very unlikely that these products be found as part of the diets of Arab people as demonstrated from the findings of this review. An additional commonality in the dietary patterns of the MENA region is the influence of neighboring cuisines. Due to its central location, the dietary patterns of the MENA region have adopted culinary practices and food

selection from Europe, Asia and the rest of the African continent. This influence can be observed strongest in the predominant cooking techniques and the use of spices and staple foods, mainly rice.

Although specific food contributors to set patterns vary, the Western dietary pattern tends to be identified as unfavorable for health and characterized by as a high-fat high-sugar diet with red meat, full-fat dairy and refined/processed products; while the healthier or prudent set patterns tend to be characterized by the consumption of vegetables and fruits, whole grains and fish [25].

### Cereals

Research has shown that dietary patterns characterized by the consumption of minimally processed cereals and higher dietary fiber reduce glycemic and insulinaemic responses, lower the risk of type two diabetes and other cardiovascular disease risk factors [26]. Food products in the MENA region are becoming increasingly processed with grains tending to lose their fiber content due to a refinement process. Further, fiber from cereal products is further reduced by the minimal consumption of wholegrain products in the patterns favouring the local food culture and non-consumption in the patterns considered detrimental for health and wellness. Sorghum and millet, previously predominant in the diets of poor Arab countries, are becoming less important and replaced by refined wheat flour [7]. Flat bread, *couscous* and rice are staples in the Arab diet. Noteworthy is the predominance of carbohydrates from cereal food sources as the largest component of the Arab diet. While this might be due to tradition and culture it is also likely that, being a cheaper source of energy, carbohydrates make up the majority of the diet due to financial reasons.

### Fruits and vegetables

Olives, as well as dates, figs, and pomegranates are widely used in the Arab diet. Dates are a particularly important staple in the Arab diet, often eaten with coffee and to break fasting periods. Although fruits and vegetables were reported in the majority of the studies reviewed, data from the World Health Organization survey of Arab countries [27] found that these foods tend to be consumed in insufficient amounts (below 5 servings per day). Fruits tend to be consumed in their juice presentation contributing to a high sugar intake and a further reduction of dietary fiber sources. Vegetables tend to be present in the diets of most Arab countries as part of traditional dishes including *tabouleh* (2), *fatoush* (3) and *mahashi* (4).

### Dairy

Existing studies have reported that food patterns characterized by a frequent intake of dairy foods can reduce the prevalence of diet-related chronic diseases and their components including obesity [28], hypertension [29] and hyperlipidaemia [30]. From the findings of this review it is clear that Arabs are frequent consumers of dairy products, the most popular presentations including *leben*, white cheese and yogurt. While the recommendations in other regions of the World against the consumption of full-fat dairy products are being challenged, the dietary guidelines for Arab countries maintain the support for the popular belief that dairy foods, commonly high in dietary cholesterol, saturated fat and protein, actively contribute to the development of cardiovascular disease risk.

### Protein sources

According to the findings from this review, protein sources in Arab dietary patterns are from both animal and vegetarian sources. In contrast to dietary patterns identified as healthy among other non-Arab populations, the patterns considered favourable for health and wellness described here do not tend to include fish as a frequently consumed food. Although the Food Dome dietary guidelines for Arab countries do mention the consumption of fish as one of their recommendations this practice was not found to be commonly reported in the existing literature; instead, poultry and legumes are the main protein sources. *Hummus* (5), *falafel* (6) and *ful* (7) are popular legume-based dishes in the Arab diet. While many traditional Arabic dishes are meat-based (*kofta* (8), *meat tagine* (9), *machboos* (10)), the data reviewed did not show meat consumption to be a significant contributor to any of the identified dietary patterns. This may be partially due to financial hardship and increased food (meat) prices in some of the MENA countries.

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2. Arab salad traditionally made of bulgur or cuscus, tomatoes, finely chopped parsley, mint, onion and garlic, and seasoned with olive oil, lemon juice and salt.
  3. Bread salad made from toasted or fried pieces of pita bread combined with mixed greens and other vegetables.
  4. Stuffed vegetables, usually bell peppers, eggplant or zucchini filled with meat, pine nuts or rice.
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## Conclusion

The present review brought to light the knowledge gap existing in descriptive studies addressing the dietary patterns of populations in the MENA. As shown by the limited literature found, the studies that have been carried out have a small sample size often not representative of the national population. Although quantitative studies reporting on nutrient intake do exist, dietary pattern methodology does not seem to be a popular method for dietary assessment in the region. Regardless of its possible subjectivity, rather than evaluation single nutrients whose specific role in the development of non-communicable diseases is controversial, investigating the impact of dietary patterns on health is of paramount value for preventive public health.

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5. Food dip or spread made from cooked, mashed chickpeas blended with tahini, olive oil, lemon juice, salt and garlic.
  6. Deep fried patty made from ground chickpeas, fava beans, or both.
  7. Fava beans cooked with chickpeas.
  8. Balls of minced or ground meat-usually beef or lamb-mixed with spices and/or onions
  9. Boiled vegetables with meat cooked in a traditional clay pot.
  10. Cooked mutton, chicken, or fish served over fragrant rice that has been cooked in chicken/mutton spiced broth.

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