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Scaling up obesity and NCD prevention in the Eastern Mediterranean Region through fat reduction intake strategies at population levels

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Abstract:

NCDs are the leading cause of mortality globally which estimated 40 million death per year (68% of total death), with cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. In the Eastern Mediterranean Region (EMR), around 60% of all deaths are attributed to NCDs. Two-thirds of NCD premature deaths are linked to 4 shared modifiable behavioural risk factors: tobacco use, unhealthy diet, physical inactivity and harmful use of alcohol. These unhealthy behaviours lead to 4 key metabolic/biological changes that increase the risk of NCDs: raised blood pressure, overweight/obesity, high blood glucose levels/diabetes, and hyperlipidemia (high levels of fat in the blood). Globally, countries are already working towards agreed global goals on maternal and infant nutrition and on the prevention of NCDs, and both these include halting the increase in overweight and obesity and reducing NCD diet-related risk factors including reducing saturated fatty acids (SFA) and Trans fatty acid (TFA) intake.

According to values reported for countries of the Eastern Mediterranean Region, average SFA intake is estimated at 10.3% of energy intake (EI), thus exceeding the WHO recommended level of 10% EI. Average TFA intake in EMR countries is estimated at 1.9% EI, which also exceeds the WHO recommended levels of 1% EI. The EMR region was reported amongst the regions with the highest levels of TFA intake. The highest SFA intake was reported from Djibouti, Kuwait, Saudi-Arabia and Yemen, while the highest TFA intakes were reported from Egypt and Pakistan.

If countries of the Eastern Mediterranean region receive immediate public health attention, that toll of NCD-related morbidity and mortality can be considerably decreased if evidence-based preventive interventions are implemented effectively. In this context, reductions in saturated fat and trans fat intakes have been highlighted as cost-effective strategies that may hamper the growth of the NCD epidemic.

Introduction:

The global burden of Non-Communicable Diseases (NCDs) represents a major public health challenge throughout the world [1]. NCDs are the leading cause of mortality globally, representing 68% of total deaths [1]. NCDs are also responsible for 16 million peoples' deaths prematurely (before the age of 70) (1). Currently, around 60% of deaths in the Eastern Mediterranean Region (EMR) are attributed to NCDs. Knowing that, the WHO EMR one of the six official WHO-designated geographical areas, comprises 22 countries and territories (Afghanistan, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United

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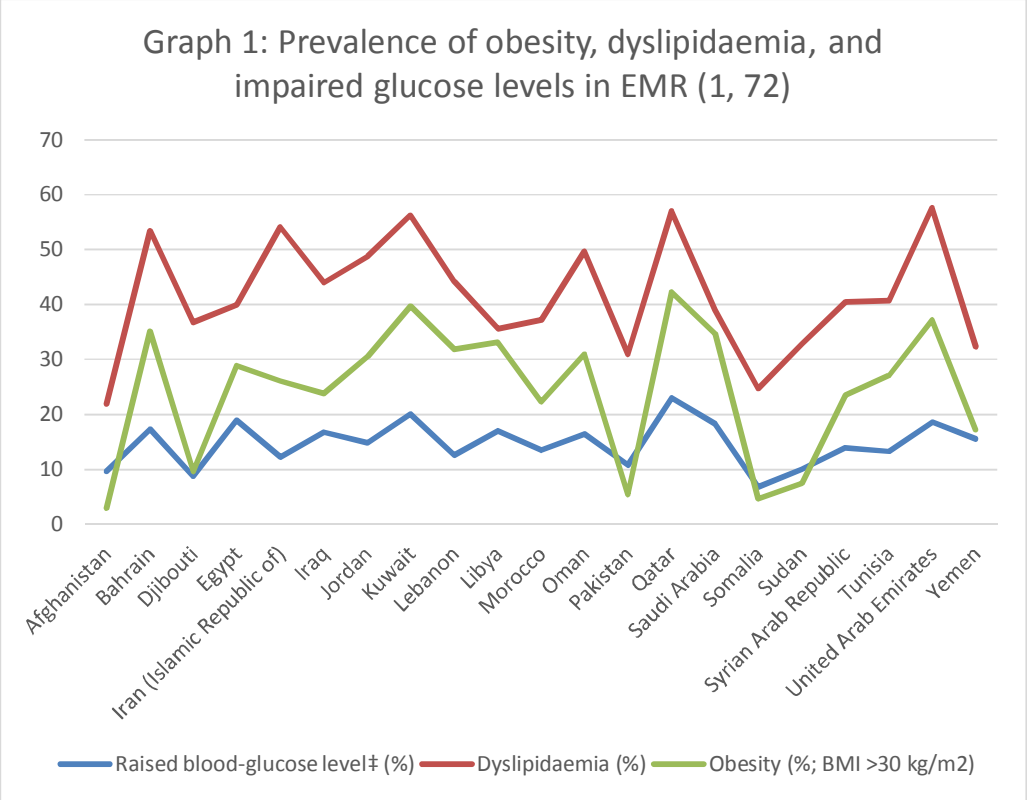
Arab Emirates (UAE), and Yemen), with a total estimated population of 620 million (2), there is substantial variation in terms of population health outcomes, health care infrastructure and quality and level of health expenditure. This variability is largely related to economic development in a region that consists of low, middle and high-income countries (2).

The regional obesity and overweight prevalence rates are above global average; half the Region's adult women (50.1%) and more than two in five men (43.8%) were overweight or obese in 2014 (1). In several countries, two-thirds or more of adults (especially women) are overweight or obese. Furthermore, high rates of childhood (6.9% of children under five years) are already overweight—higher than the global average of 6.2%—and in some countries more than 15% of children are affected. In many countries of the region, more than half of adolescents are overweight or obese (3). Around 43 million people in the region live with diabetes, affecting more than 20% of adults in some countries. The Region has the highest death rates from diabetes of all WHO regions with more than 10% of deaths in men and 9% of deaths in women attributed to diabetes (1).



The most recent global statistics available on the prevalence of dyslipidaemia stems from 2008 report by WHO (72). The global prevalence of elevated total cholesterol (≥5 mmol/l) among adults aged ≥25 years was 38.9% (37.3% for men and 40.2% for women) (1, 72). Among the WHO-designated regions, the prevalence of hypercholesterolaemia was third highest in the EMR, at 38.4% (40.4% for women and

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36.2% for men) 1, 72. In the majority of the Gulf countries, the prevalence of hypercholesterolaemia was ≥ 50%, with the UAE with the highest prevalence at 56.7%7 (Table 3). In the UAE with the highest prevalence at 56.7%7 (Figure 1). The trend of obesity, dyslipidaemia and raised blood-glucose levels are going on the same trend in all countries of the Region, which reflect the association of these risks factors with nutrition transition in the Region, especially in high income countries (1, 72). The main causes of obesity and Diabetes are closely linked to a dramatic reduction in physical activity accompanied by marked changes in dietary patterns in the Region. Average intakes of energy and fat are above WHO-recommended levels, with substantially higher fat intakes in the Region's high-income countries (3). Evidence shows an association between fat intake and the increased likelihood of weight gain and obesity and therefore diabetes. Traditional Middle East diets are very low in fat content. As fat content has risen so has the prevalence of obesity/diabetes, resulting in an epidemic which is more serious than in any other region in the world (3). Hence, the WHO has identified priorities for an approach to reduce exposure to unhealthy dietary risk factors for obesity and NCDs, including reducing fat (Total fat, SFA, TFA) intake. TFA from industrial refining is toxic to the heart and may increase the risk of diabetes: it needs to be eliminated. SFA, together with smoking, is the major risk factor for heart disease and stroke (3).

Prevention of obesity and diabetes flagged as a high priority for all member States in the Region. WHO recommends that populations should not exceed the consumption of 10% of energy from SFA, and 1% from naturally occurring TFA. . This paper will shed further lights on the Regional situational, strategies and recommended actions to reduce fat intake at population levels (3).

Improving dietary habits is a societal as well as an individual responsibility. It demands a population-based, multisectoral, and culturally relevant approach. Virtually eliminating trans-fat intake and reducing the intake of saturated fatty acids is one of the strategic interventions under the area of prevention and reduction of risk factors in the Regional framework for action (73). Fat consists of TFAs, saturated fatty acids (SFAs) and unsaturated fatty acids (UFAs). TFAs are unsaturated fats found in foods obtained from ruminants, such as dairy products and meat, and in industrially produced partially hydrogenated vegetable oils. TFAs are typically found in processed food, fast food, snack food, fried food, frozen pizza, pies, cookies, margarines and spreads (73, 74,75). Saturated fats are found in some types of food such as fatty meat, butter, palm and coconut oil, cream, cheese, ghee and lard. Unsaturated fats are naturally occurring in food such as fish, avocado, nuts, sunflower, canola and olive oils. Fat consumption provides the body with energy, supports cell growth, protects body organs and keeps it warm. However, excess consumption of fats is unhealthy. Moreover, consumption of TFAs, especially industrially produced partially hydrogenated vegetable oils has been associated with an increased risk of heart disease, infertility, endometriosis, gallstones, Alzheimer's disease, diabetes and some cancers (73). As part of a healthy diet, WHO recommends that less than 30% of total energy intake should be from fats. UFAs are preferable to SFAs. Industrial TFAs are not part of a healthy diet.(3,74,75)

Government policies and strategies should create environments that enable populations to consume adequate quantities of safe and nutritious foods that make up a healthy diet, including low levels of fat, SFA and TFA.

Fat intake in the EMR

1- Total Fat (TF) intake: Analyses of the FAOSTAT (FAO Statistical Databases)food availability data in the Eastern Mediterranean region show a gradual and significant rise in daily fat supply per capita over

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the past four decades in most countries of the region (FAOSTAT). As shown in Table 1, it is estimated that between 1969 and 2014, the daily average of dietary fat supply in selected countries of the Eastern Mediterranean region has increased by 26 grams (from 52.8g to 78.8 g/day). Fat supply has, in fact, almost doubled over the past 4 decades in many countries of the region, including Iran, Jordan, Kuwait, Lebanon, Syria, and Saudi Arabia. Nearly half of countries of the Eastern Mediterranean region (Iran, Jordan, Kuwait, Lebanon, Libya, Syria, Tunisia and the United Arab Emirates) have fat supply levels at or above the reported world average (81.8 g/person/day) [4, 68,69]. Food consumption surveys conducted in countries of the region have confirmed the same increasing trend in fat consumption. For instance, in Lebanon, average fat consumption level has increased from 22% in 1965–1967 up to levels ranging between 35.6 and 38.9% in 2002, which is higher than the recommended value of 30% [6, 36-39]. In Saudi Arabia, dietary fat intake was reported to contribute 38% of daily energy intake among adults [6, 40]. In addition, in Egypt, it was estimated that 20.5% of mothers and more than 30% of children consumed fat in levels exceeding 30% of total energy intake [5, 6].

When investigating the effect of total fat intake on general human health, available evidence highlights probable associations between total dietary fat intake and NCDs including obesity, CVDs, Diabetes, and various types of cancers [7, 8, 9, 10]. However, evidence suggests that individual dietary fatty acids may be differentially associated with health outcomes, highlighting the association of both SFA and TFA with detrimental health effects, mainly on the lipid profile and the cardiovascular system, with potential associations with the metabolic syndrome and diabetes [11].

Table 1: Changes in dietary fat supply (g/person/day) from 1969–1971 to 2002–2004 in selected countries of the Eastern Mediterranean region (FAOSTAT) [68, 69]

Fat supply (g/day)	1969–1971	1979–1981	1995–1997	2001–2003	2002–2004	2005	2006	2007	2008	2009	2010	2011	2014
Djibouti	34	36	54	65	57	66	65	68	69	63	56	60	60
Egypt	47	65	57	58	56	56	57	62	62	60	62	64	57
Iran	39	60	66	62	63	63	68	73	74	77	76	74	76
Jordan	52	62	76	80	74	90	94	95	87	92	98	101	94
KSA	33	76	73	82	78	84	96	81	82	82	92	96	82
Kuwait	69	88	98	113	102	116	124	123	126	122	122	116	123
Lebanon	63	82	103	113	103	117	107	110	107	109	108	106	108
Libya	62	91	102	94	93	97	93	95	96	94	95	95	-
Morocco	43	52	60	59	54	57	62	65	64	65	64	65	61
Palestine	-	-	67	63	69	62	53	55	51	52	50	48	-
Sudan	65	74	65	74	68	66	-	-	-	-	-	-	-
Syria	60	83	99	101	91	104	107	96	99	104	104	107	-
Tunisia	63	70	86	94	83	90	92	85	95	87	86	87	87
UAE	97	130	107	92	92	74	82	84	90	92	91	103	83
Yemen	29	38	34	41	44	47	49	48	45	44	43	45	47

KSA: Kingdom of Saudi Arabia; UAE: United Arab Emirates

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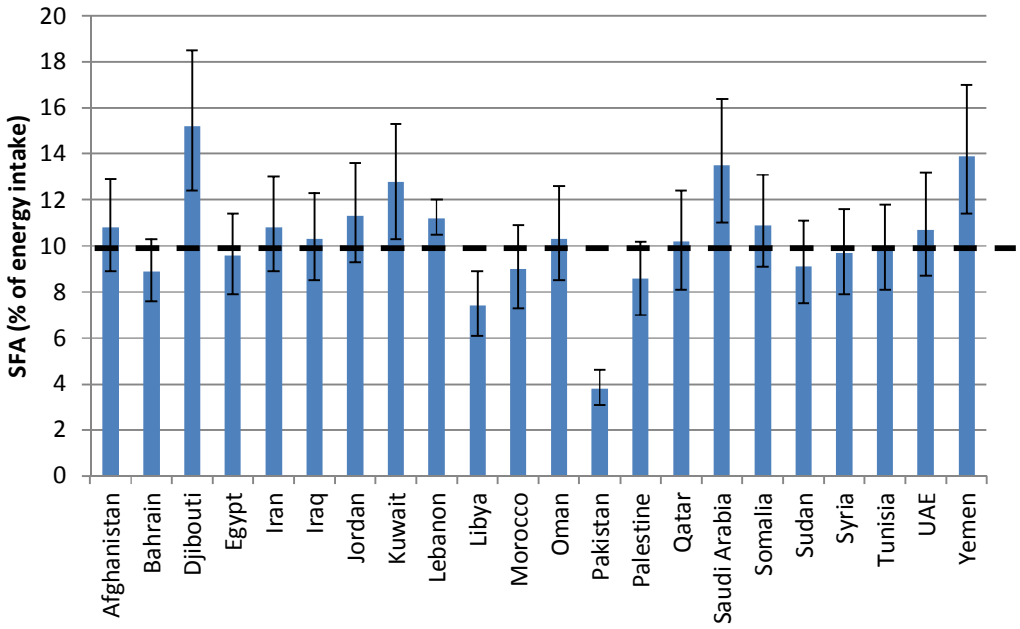
2- **Estimation of TFA and SFA intake in the EMR**: Based on a multilevel Bayesian hierarchical model, Micha et al [65], provided estimates for global and regional consumption of dietary fats. According to values reported for countries of the Eastern Mediterranean Region, average SFA intake is estimated at 10.3% of energy intake (EI), thus exceeding the global mean consumption level of 9.4% EI. Average TFA intake in EMR countries is estimated at 1.9% EI, which also exceeds the global average value of 1.4% EI. The North Africa/Middle-East region was reported amongst the regions with the highest levels of TFA intake. The highest SFA intake was reported from Djibouti, Kuwait, Saudi-Arabia and Yemen, while the highest TFA intakes were reported from Egypt and Pakistan (Figure 2) .

Very few studies reported on TFA consumption levels in the EMRO region. According to available data, intake estimates were found to range between 0.1% EI in Tunisia (based on the national survey conducted amongst adults in 2005) and to reach as high as 4.2% EI in Iran (based on per capita household assessment of dietary intake in 2007). As for SFA consumption levels, intake estimates amongst adults were found to be relatively high, with most countries exceeding the 10% upper limit. Intake estimates as high as 15% EI were reported from Morocco and Saudi Arabia. It is worthy to note that intra-country discrepancies in the levels of fat, TFA, or SFA intakes were sometimes observed. This may be explained by differences in study design, targeted age group, dietary assessment method used, and type of food composition database adopted for fat, TFA, and SFA intake estimation, amongst other factors.

Figure 2: Saturated fat intake in countries of the Eastern Mediterranean region based on a Bayesian model [65]



- ---------- WHO Upper Limit

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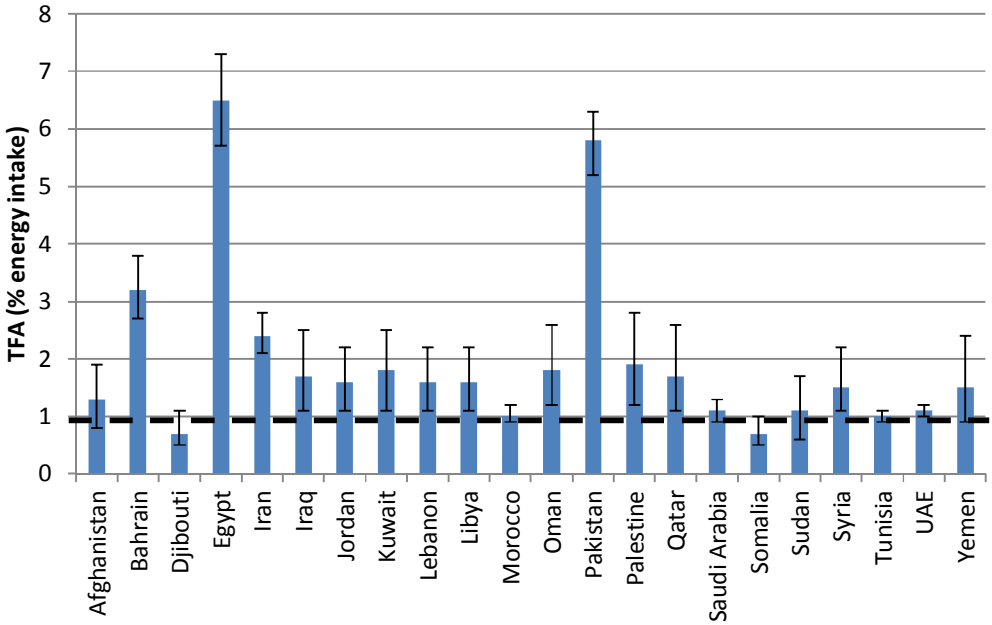
Figure 3: Trans fat intake in countries of the Eastern Mediterranean region based on a Bayesian model [65]



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3- Sources of TFA and SFA in commonly consumed foods in countries of the Eastern Mediterranean region:

Data from the literature shows large variations that can be seen in the TFA, and SFA content of foods per country, city, food groups, food items, and even brands of the same type of food. While this makes it difficult to draw a general conclusion on the TFA, and SFA levels in foods available in a country, it does indicate the need to enforce product-specific targets and upper limits for TFA, and SFA, and call for government monitoring as well as the inclusion of TFA, and SFA content in nutritional labels to allow the consumer to make an informed choice .

TFA content in food items has been analysed in seven countries, namely Pakistan, Iran, Jordan, Lebanon, Saudi Arabia, Morocco, and Tunisia. Reported TFA content in these countries have shown a large variation in TFA content depending on the type of food, subtype/brand, and country. For example, when comparing the TFA content in margarines and biscuits, two food products with high TFA content (range: 0.2-34.9% of TF), large intra- and inter-country variation was observed. Overall, Pakistan had the highest TFA content for both margarine (range: 2.2-34.8% of TF) [16] and biscuits (range: 9.3-34.9% of TF) [12] followed by Iran (margarine: 16.1% of TF; biscuits: range: 23.2-24.5% of TF) [13] and Morocco (margarine (range): 9.1-21.7% of TF). In Saudi-Arabia, three out of the four analysed brands of margarine had TFA content exceeding 2% of total fat (range: 0.2-8.3% of TF) [14], while in Tunisia, one out of the

two analyzed margarine brands exceeded 2% (range: 1.4-9.8% of TF) . For biscuits, one third of the samples analyzed in Lebanon exceeded 5% of TF (range: 0.2-19.5% of TF) [18] and one eighth of the analyzed samples in Jordan had TFA content exceeding 5% of TF (range: 0.7-7.0% of TF) [15].

Similarly, of the seven EMR countries listed above, Pakistan had the highest TFA content in food items such as French fries (range: 0.11-24.00% of TF) [17] and cereal based foods (range: 2.5-16.3% of TF) [19]. This is also true for TFA content in Iranian food products such as fast food (range: 23.6-30.7% of TF) [20], milk (range: 9.2-14.1% of TF), as well as junk foods and bakery items (range: 4.5-36.1% of TF) [21]. Lower TFA content has been reported for edible oils in Iran (range: 0.17-5.40% of TF) [22, 23] as a result of food standards limiting TFA content in edible oils [24]. Lebanon recorded an elevated content of TFA in bakery products (4.91±3.11%, range: 0.10-6.28% of TF) as well as snacks (8.85±8.57%, range: 0.19-20.85% of TF) [25], which was on average lower in Jordan (snacks: 3.93±8.85%, range: 0.73-41.11%; and bread & bakery: 2.46±0.97%, range: 1.35-4.40% of TF) [193]. Similarly, lower TFA content was reported for Moroccan fast foods (average: 1.6±1.1, range: 0.75-2.66% of TF) and traditional foods (average: 2.1±1.9, range: 0.29-6.30% of TF), with TFA content in most analysed foods being below 5% of total fat [26]. Likewise, relatively low TFA levels were recorded for Tunisia with most food items ranging between 0.7% and 1.4% of total fat. However, elevated TFA content was recorded in Tunisian classic margarine (9.8% of TF), butter (4.5% of TF), pie (12.7% of TF), and cake (3.1% of TF).

Few standards limiting SFA in food items were found in the literature for the EMR. The one standard found was an upper limit of 30% SFA in edible oils in Iran (passed in November 2007) [22]. According to Hajimahmoodi et al. (2013), SFA content in solid oils and liquid frying oils is on average 32.07% and 26.77% of total fat respectively [23], indicating that not all edible oils are within the current standards. Other fat-based food items have been analysed for SFA content in Iran, including animal butter (67.0%), margarine (42.4%), and mayonnaise (18.1-24.9%) [13, 27]. Margarine fatty acid composition has also been assessed outside Iran, with margarine in Pakistan having higher SFA content (24.2-58.1%) [16] and Saudi Arabia having lower SFA content (19.8-29.3%) [192] as compared to Iran [13] . Moreover, dairy products, which are also major sources of SFA in the diet, have SFA content of around 50% of total fat in Kuwait [28, 29] and 52.8% to 78.5% of total fat in Iran [14].

Snack (e.g. biscuits, chocolate, chips) and bakery food items (e.g. cakes, croissants) also had high SFA contribution to total fat with ranges of 19.3-82.3% in Lebanon [31] and 27.6-72.2% in Iran [20]. In both countries, bakery products had on average lower SFA contribution to total fat than snack food items [31, 20]. SFA contribution to total fat in snack items differed per country. For example, SFA contribution to total fat in plain biscuits was 50.1% in Lebanon [31], 37.9-46.9% in Pakistan [30], and 33.6% in Iran [20).

Several studies have also determined the fatty acid content of commonly consumed fast foods and traditional foods. With respect to SFA content in fast foods, Moroccan fast foods had a high contribution of SFA to total fat (44.3%) [32]. Inversely, significantly lower SFA was recorded for fast foods in Iran (21.5-38.4%) [33] and Bahrain (28.4%) [16]. Interestingly, when comparing local versus Western fast foods in Bahrain, a similar SFA contribution to total fats was recorded (27.3% and 29.5%, respectively) [16]. A similar trend can be seen when comparing Moroccan fast foods with traditional foods where average SFA is 44.3% and 43.1%, respectively. Within Moroccan traditional foods, red meat dishes were relatively high in SFA [34], while Kuwaiti traditional foods had a far lower SFA contribution to total fat

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than was seen in Morocco. Within the Kuwaiti dishes, SFA content differed per food group with fish dishes having a relatively high SFA contribution to total fat (29.1%) and vegetable-based dishes had relatively low SFA (14.6%) [35, 36].

Evidence on impacts of reducing TFA and SFA intake:

Globally, increased intake of TFA is estimated to be responsible for more than 500,000 deaths per year (76). An overview of national policies has concluded that the most effective way of ensuring a significant fall in TFA intakes is by legally prohibiting the sale of food products containing industrially produced TFA. In practice, highly effective legislation (such as that in Austria, Denmark, Iceland and Switzerland) indicates a limit of 2 g/100 g of oils or fats [37, 38, 39]. The voluntary reduction approach taken by some countries requires a solid and sustainable monitoring system and has not been proven to be as effective. It is evident that in countries of the Region there are local oil refining companies which could rapidly be required to eliminate the production of TFA, e.g. when producing local ghee or margarine. If a sales ban is implemented, import of products that do not comply with it may also be prohibited without infringing international trade agreements. This is important in a region where food imports often comprise a substantial proportion of the national food supply. It is also important to advise oil producers and traders to increase the content of polyunsaturated fatty acids (PUFA) and not to increase the content of SFA in the process of TFA elimination. Experience in this direction has been gained in Singapore [37, 38,39] .

It is important to note that reducing TFA lowers LDL-C regardless of whether TFA was replaced with PUFA, MUFA, or carbohydrates. TFA consumption has also been shown to reduce the uptake of triglyceride (TG) by the liver [40,41], highlighting the implication of TFAs in the lipid triad which is a documented risk factor for CVDs. In addition, other CVD risk factors have been linked to increased TFA consumption, including increased platelet aggregation [42], increased plasma inflammatory markers (E-selectin and C-reactive protein) and endothelial function disruption [43, 45]. Evidence is also suggesting a role for TFA in increasing the risk of other NCDs, namely obesity, insulin resistance, and metabolic syndrome [41, 46, 47]. The role of TFA in the etiology of type 2 diabetes has not been as extensively investigated compared to its role in CHD pathogenesis; however, the Nurses' Health Study has showed a clear dose-response relation between TFA consumption and type 2 diabetes due to TFA's inflammatory cascade response [48]. As for obesity, increased consumption of TFA may promote abdominal fat deposition and therefore weight gain [49, 50]. A role for TFA in early life nutrition and its link with NCDs has been also proposed, with TFA reported to interfere with fetal essential fatty acid metabolism, thus affecting proper fetal growth and development [51].

The reduction of the dietary intake of SFA has been remarkably successful in bringing down deaths from coronary heart disease and stroke, by as much as 85%, in Finland. Reducing SFA requires a good understanding of the food chain within a country. For example, in Finland 19 government initiatives involved all sectors of the food chain, from local production to government purchase of food and import policies. It did not rely on health education alone (39).

Increased intakes of SFA have been linked with disrupted blood lipid profile including elevated total cholesterol (TC) and low density lipoprotein cholesterol (LDL-C), rendering SFA among the leading risk factors for CVDs such as strokes and heart diseases [33, 44]. Reducing SFA intake would lower both LDL-C and high density lipoprotein cholesterol (HDL-C); however the magnitude of the reduction is greater for LDL-C compared to HDL-C. Micha & Mozaffarian (2010) have evaluated SFA's effects on

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cardiometabolic risk factors, CHD, stroke and diabetes, concluding that the TC:HDL-C ratio is significantly decreased by the consumption of lauric acid, when compared to carbohydrate consumption. More promising effects on both the lipid profile and CHD risk were documented when SFA was replaced by polyunsaturated fatty acids (PUFAs) first, followed by monounsaturated fatty acids (MUFAs) and then by carbohydrates, specifically the unrefined type [52, 56,57,58]. In fact, when looking at a substitution of 5% of energy intake between SFAs and PUFAs, replacing SFA with PUFA lowered the risk of CHD by 10% [57].

However, it is crucial to note that recent meta-analyses re-evaluated the association between SFAs and CVDs, concluding that there is no significant evidence associating the consumption of SFA with CHD; therefore, it is imperative to investigate the nutrients replacing SFA when the latter's consumption is modified [59,60]. As for SFA's effect on vascular function, diabetes, and insulin resistance, further research is needed as evidence in this area is still inconclusive [32]; however, given the suggested biologically plausible mechanisms implicating SFA in the etiology of insulin resistance, it is recommended to limit the intake of dietary SFAs [53].

Regional strategies to reduce fat (total fat, SFA & TFA) intake at population levels

The Political Declaration of the United Nations General Assembly on the Prevention and Control of Non-communicable Diseases in September 2011 (37), prompted the WHO Regional Office for the Eastern Mediterranean to spearhead a salt and fat reduction initiative in the region. In May 2013, the World Health Assembly endorsed the WHO Global Action Plan for the Prevention and Control of NCDs 2013–2020. This Global Action Plan provides Member States, international partners and WHO with a road map and menu of policy options based on nine global NCDs targets, to be attained by 2025, including the number one target: to achieve a 25% relative reduction in premature mortality from NCDs by 2025. The 59th session of the WHO Regional Committee for the Eastern Mediterranean (2012) adopted the resolution EM/RC59/R.2, thus endorsing the regional Framework for Action on the commitments of Member States to implement the United Nations Political Declaration on Non-Communicable Diseases [88]. In its EM/RC59/R.2 resolution, the WHO EMRO urged Member States to implement the core set of interventions in the regional Framework for Action, with these interventions including the reduction of the population's salt intake levels and the replacement of trans fat with polyunsaturated fat [37, 38, 39].

In addition, WHO EMRO is working within the Global strategy on diet, physical activity and health and closely with governments to achieve the seventh global target aims to halt the rise in diabetes and obesity (). Technical guidance, based on in-depth review of evidence and international experience, was developed in the form of policy statements on reducing intake of fat, sugar and salt. A policy statement on the reduction of fat intake and the lowering of heart attack rates in the Eastern Mediterranean region was also issued on 2013 by WHO [39]. The policy goals are to:

1) eliminate all industrially produced trans-fats from the food supply; and
2) reduce markedly the saturated fat content of the food supply.

It's recommended to establish a national taskforce on fats representing key stakeholders and partners in each country and introduce legislation to ban the sale, and therefore local production and importation, of products containing artificially produced TFA (in oils and fats alone or part of processed food products)

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in shops and catering outlets. Legislation would need to establish the maximum content of all TFA in products (max. 2 g/100 g of oils). Identification of processed foods rich in artificial TFA and determine the average population intake of these foods will help in elimination of consumption of these foods and go through product reformulation to eliminate TFA content. However, recommend that replacement fats used do not increase the saturated and total fat content of the foods; mechanisms will need to be established to monitor compliance with the recommendations (39).

There is a substantial opportunity to reduce SFA intake by introducing policies that discourage the use of products containing palm oil and coconut oil and that encourage the sale and consumption of products containing other vegetable oils with less SFA and more unsaturated fats. Current international trade prices are lower for palm oil so financial adjustments would be needed. The current oil subsidy policy should be revised to promote the sales of oil products containing less SFA. If cow's milk and its products are widely used in a country, policies to establish the routine use of semi-skimmed or low fat milk (with fat content of 1–1.8%) are highly effective measures for reducing national SFA intakes. Animal producers should be encouraged to use feeds containing more unsaturated fat (e.g. canola oil), which is then reflected in the fat content of meats such as chicken. Actions to encourage such changes include pricing policies, the establishment of food quality standards to guide purchases in public institutions, and labelling (including front-of-the-pack labels, easily understandable traffic light systems, and healthy option symbols). Government procurement policies should move progressively to the purchase of only exclusively healthy, low fat, low SFA, low salt and low sugar products, together with training of all caterers and food producers (39).

Development of national standards to limit the use of hydrogenated fat, palm and coconut oil in the food industry is a key strategic mandatory interventions recommended to ensure lower content and intake of SFA and TFA in highly consumed foods, whither its locally produced or imported. Establishing a differential taxation system favoring products with a reduced SFA content, and establish mandatory labelling schemes for SFA content that are easily understandable by consumers [39].

Examples of action taken by Countries

In the WHO Eastern Mediterranean Region, several countries have initiated fat reduction initiatives. However, in most countries of the region, advocacy groups or research institutions are undertaking these initiatives in the absence of policies. Initiatives aiming at reducing TFA and SFA in food products (e.g. oils, margarines, general food products) have been undertaken in Iran and countries of the Gulf Cooperation Council (GCC). In most countries, industry participation remains voluntary and timid. Legislative nutritional labelling has been implemented in Iran and Saudi-Arabia, while in most other countries nutritional labelling is only mandatory for foods with dietary or nutritional claims or special dietary purposes (e.g. infant formula) (65).

Different countries are currently at different stages in the development and/or implementation of fat reduction initiatives. National initiatives included the establishment of national committees or working groups, the engagement of the government in fat reduction initiatives, the development of national benchmarks and targets (e.g. Iran and Saudi-Arabia have fat targets), dietary guidelines (e.g. Afghanistan, Pakistan, Lebanon, Oman, Qatar, Tunisia), including the specification of the food categories prioritized for action, the use of the media to raise consumer related awareness, the use of labelling as an approach to highlight high salt, high fat foods, the development of collaborative action involving the food industry

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and/or restaurants and food caterers, the monitoring and evaluation of SFA and TFA intakes and the regular generation of data on TFA and SFA content of foods. The following are examples for action taken by Countries:

1- **GCC** Standardization Organization: the Gulf Standardization office (GSO) provides standards for food policy in 7 Member States (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen). This includes mandatory nutritional labelling of fat (total fat, TFA, SFA, PUFA, MUFA) as g/100g and % daily value (DV) [35]. Progress is also being made towards the reduction of dietary TFA through a project by the GSO (2013) which aims at limiting the maximum level of TFA for hydrogenated oils & spreadable vegetarian margarine to 2% of total fat and the maximum level for all other foods containing TFA to 5% of total fat [64].
2- **Iran**: executive committee, composed of members from the Ministry of Health and Medical Education, Ministry of Industry, Ministry of Agriculture, Ministry of Commerce and the National Standard Organization, was established in 2004 to develop an operational plan for reducing SFA and TFA in edible oils in Iran. In 2005, the Ministry of Commerce was obliged to gradually replace the hydrogenated oils as the subsidized ones, by non-hydrogenated (especially olive oil) and liquid frying oils. In 2008, the Ministry of Health and Medical Education and National Standard Organization were obliged to revise the instructions of packaging and mandate manufacturers and importers to affix labels to all food products, especially edible oils. Also in 2008, the National Standard Organization was mandated to revise standard NO.9131, so that saturated and trans-fatty acids contents of edible oils (both imported and locally produced ones) are limited to 25% and 5%, respectively. As of 2011, Ministry of Health and Medical Education, Industry, Agriculture, Commerce and National Standard Organization developed a national policy for edible oil safety. In 2014, the High Council of Health and Food Security approved to revise the standards of TFA to less than 2% and saturated fatty acid to less than 25%. In order to reduce saturated fatty acid, the Ministry of Trade was asked to reduce the amount of palm oil import, so in 2014, palm oil import was reduced from 70 % to 30% . As a result of these legislations, both palm oil imports and TFA content in edible oil has been significantly reduced (information provided by nutrition focal point) (65).
3- **Iraq**: Subsidy on palm oil and hydrogenated ghee removed and replaced by other types of oil(65)
4- **Jordan**: banning adding vegetable oils to dairy products including Palm oil (65)
5- **Tunisia**: In 2015, one manufacturer has just launched a kind of margarine without trans-fat after adapting new food processing technology (65).

Data quality and availability

Accuracy and availability of data is a key challenge in the region**, s**everal Member States have attempted to evaluate SFA and TFA intake levels based on dietary assessment approaches, including food frequency questionnaires, dietary records or 24-hour dietary recalls. One of the biggest challenges for the assessment of SFA and TFA intakes based on dietary assessment tools is the availability of up-to-date, culture-specific food composition tables. However, several Member States recurred to the use of food composition databases published by Western developed countries such as the US, the UK or France. As region- and country-specific differences may exist in the levels of salt and the types of fat used in various foods, and particularly traditional types of foods, the use of international food composition databases may be a limiting factor to the data generated by dietary assessment methods in countries of the region.

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Overall, available data stemming from dietary assessment studies in the region highlight inter-country discrepancies in the levels of TFA or SFA. They are commonly consumed foods or traditional food products underline high concentrations of these atherogenic nutrients and highlight the need for product reformulation interventions and consumer awareness campaigns.

Conclusions and recommendations (3, 77):

The high burden of obesity and NCDs, increasing secular trend of obesity and NCDs, in countries of the Eastern Mediterranean region require immediate public health attention. The toll of NCD-related morbidity and mortality can be considerably decreased if evidence-based preventive interventions are implemented effectively. In this context, reductions in saturated fat and trans-fat intakes have been highlighted as cost-effective strategies that may hamper the growth of the NCD epidemic. This report emphasizes the high intake levels of total fat, TFA and SFA in countries of the EMRO region, and highlights the need for more data on TFA intake levels. The report also underlines the wide spectrum in total fat, TFA and SFA reduction initiatives that are currently being undertaken in countries of the region. It is recommended that countries that have been able to carry out surveys to determine the main dietary contributors and sources of salt in their populations can serve as examples for neighbouring countries that have yet to undertake such investigations.

Specific recommendations stemming from the report include:

1. **Strengthening of political commitment**: countries of the region are encouraged to strengthen the political commitment to the reduction of TFA and SFA intakes as one of the most cost-effective strategies to hamper the growth of obesity and NCDs that are plaguing the economies of countries of the region. This can be achieved by organizing politician briefings as well as regular one to one meetings with relevant governmental officials.
2. **Fiscal measures**: progressively eliminate national subsidies for all types of fats/oils.
3. **Public procurement**: implement mandatory nutrition standards across all public institutions through application of the regional nutrient profile model to assess the nutritional quality of different foods, introduction of meal standards and measures to eliminate the sale of foods or drinks high in fat, sugar or salt
4. **Food supply and trade**: regulate all food produced locally or imported by setting benchmark on the recommended levels of TFA and SFA, as well as limiting the imports of Palm oil or using it in the food industry or processing.
5. **Marketing**: Implement the WHO Set of Recommendations on Marketing of Foods and Non-alcoholic Beverages to Children and consider mandatory restrictions to eliminate all forms of marketing of foods high in fat, sugar and salt to children and adolescents (up to age 18) across all media, according to the Regional Action Plan to Address Unopposed Marketing of Unhealthy Food and Beverages.
6. **The need for additional data**: It is recommended that data from the region be enhanced by additional investigations conducted in individual Member States, particularly in countries where a lack of data is still noticeable.
7. **Standardization of regional food composition tables** : it is recommended to standardized Food Composition Tables with more focus on traditional diets and reflecting the content of TFA and SFA in the foods through expanding the regional initiative led by WHO, and other International organization.

8. **Product Reformulation**: Member States should strive to collaborate with food producers (industry, catering companies, restaurants) for the reformulation of processed and catered foods with the aim of decreasing total fat, TFA and SFA content of processed foods.
9. **Food Labelling**: implement a mandatory front-of-pack labelling scheme with elements to enable consumers to interpret information easily (such as colour coding or the use of terms such as "high", "medium", "low").
10. **Raising consumer awareness**: a continuum of activities aiming to raise fat-related consumer awareness should be planned at the national level rather than engaging in sporadic and intermittent awareness activities. Success in raising consumer awareness may require a partnership between NGOs, industry, media, the health sector and national platforms. Member states are encouraged to participate and develop campaigns with clear objectives and messages, and to develop campaign-related materials such as educational pamphlets, posters, and websites.
11. **Social support**: Reconsider social support policies (e.g. subsidies for the poor allowing purchase of foods with only modest amounts of total fat and low saturated fat content).
12. **Monitoring and evaluation**: Those countries that have baseline data on actual FA and SFA intakes and their levels in foods, and that have launched fat reduction initiatives are encouraged to embrace monitoring approaches.
13. The World health Organization should continue to play a key role in providing evidence-based tools for the planning, implementation and surveillance of national TFA and SFA reduction initiatives.

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