Kingdom of Saudi Arabia
Saudi Food & Drug Authority

The Journey of Change & Health Transformations

SFDA's Achievements and Initiatives in Enhancing Quality of Life to Empower Saudi Arabia's Vision 2030.

Saudi Food and Drug Authority
2025

Contents

FOREWORD

The Kingdom of Saudi Arabia is experiencing remarkable progress across various sectors, driven by the dedicated efforts of government entities to achieve the objectives of Vision 2030. This development is made possible by the unwavering support of the Kingdom of Saudi Arabia's leadership.

The Saudi Food and Drug Authority (SFDA) is committed to keeping pace with this progress and contributing to the government's success by enhancing its operations and launching initiatives across the fields of food, drugs, medical devices, herbal product monitoring, and legislation.

As a nation with ambitious goals, we are dedicated to developing a regulatory framework that will enable us to achieve global excellence in food, drugs, medical devices, and herbal products. This vision aligns with the national agenda to realize Vision 2030, aiming for the SFDA to emerge as a global leader based on scientific principles to safeguard and promote public health.

This whitepaper is presented as a celebration and a detailed showcase of the SFDA's achievements. It provides an in-depth account of the accomplishments and initiatives in the food sector, beginning with a discussion on non-communicable diseases and their modifiable risk factors within the Kingdom. It then offers an overview of the key regulatory efforts, achievements, and oversight undertaken by the SFDA's food sector.

In conclusion, we extend our deepest gratitude to the Custodian of the Two Holy Mosques, King Salman bin Abdulaziz, and His Royal Highness Prince Mohammed bin Salman bin Abdulaziz, the Crown Prince, Prime Minister, and Chairman of the Council of Economic and Development Affairs—may Allah protect them—for their continues support of the SFDA. We hope that the SFDA's pioneering journey continues to thrive.

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ABBREVIATIONS

Abbreviation	Term
BMI	Body Mass Index
BOPL	Back-Of-Pack Label
CVD	Cardiovascular Disease
DPAS	Diet and Physical Activity Strategy
DR	Dose-Response
EMR	Eastern Mediterranean Region
ES	Effect Size
FAO	Food and Agriculture Organization of The Kingdom of Saudi Arabia
FOPL	Front-Of-Pack Label
HFP	Healthy Food Palm
HFS	Healthy Food Strategy
HFSS	High in Fat, Sugar, And Salt
SSF	Sugar, Salt, Saturated Fat
HSTP	Health Sector Transformation Program
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GSO	Gulf Standardization Organization
ZATCA	Zakat, Tax and Customs Authority
KSA	Kingdom of Saudi Arabia

Abbreviation	Term
KSAWHS	Kingdom of Saudi Arabia World Health Survey
MOH	Ministry of Health
MTL	Multiple Traffic Light
NCDs	Non-Communicable Diseases
PHO	Partially Hydrogenated Oil
RCTS	Randomized Controlled Trials
SCM	Structural Causal Model
SFA	Saturated Fatty Acids
SFDA	Saudi Food and Drug Authority
SNPM	Saudi Nutrient Profiling Model
SSB	Sugar-Sweetened Beverages
TFAs	Trans Fatty Acids
UK	United Kingdom
UN	United Nations
USD	United States Dollars
USDA	United States Department of Agriculture
WHA	World Health Assembly
WHO	World Health Organization

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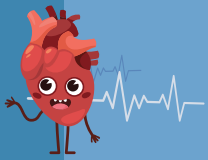


01

Non-Communicable Diseases and Their Modifiable Risk Factors in the Kingdom

Chapter 1. Non-Communicable Diseases and Their Modifiable Risk Factors in the Kingdom: The Burden of Non-Communicable Diseases

This chapter explores the significant burden of non-communicable diseases (NCDs) in the Kingdom of Saudi Arabia (KSA), with a focus on cardiovascular diseases, diabetes, obesity, and chronic kidney disease as major public health concerns. This section identifies modifiable risk factors that contribute to the rising prevalence of these diseases, including high body mass index (BMI), physical inactivity, unhealthy diets, and excessive screen time. It also discusses the social determinants of health that influence NCD incidence, such as education, income, and rural residence. The chapter notes the economic impact of NCDs, which cost the Kingdom billions in healthcare expenses. Additionally, it emphasizes the importance of maternal and child health, with low breastfeeding rates and rising childhood obesity identified as critical areas needing attention. Finally, the chapter links increased electronic media exposure among children and adolescents to decreased physical activity and increased obesity rates, signaling a shift in lifestyle patterns that exacerbate NCD risks.

In 2022, Saudi Arabia experienced the fastest economic growth among the G20 economies, achieving an increase of 8.7%. It is the largest Arab country in West Asia and has witnessed exponential development in recent decades (1,2). Like most developed economies, the Saudi Arabia has been battling NCDs. Cardiovascular diseases (CVDs) have been identified as the leading cause of mortality in the Saudi Arabia, with over 30% of the population at risk of a CVD event (3,4). Further, the prevalence of hypertension among Saudis aged 15 years and older is 9.2%, with higher rates in women (10.0%) than men (8.5%). The condition is more common among those aged 65 years and older, affecting 55.3% and 48.0% of older women and men, respectively. Among younger individuals aged 15–19 years, the prevalence is low at 0.1% (5,6).

High BMI is the second leading risk factor for mortality in Saudi Arabia, contributing to 18% of deaths. Between 1990 and 2017, deaths associated with elevated BMI increased by 208%, BMI greater than 25 is significantly associated with diabetes (7,8). The prevalence of diabetes has risen notably over the past three decades, affecting 16% of the total population and 49% of older adults. Type 2 diabetes, the most common type, is poorly controlled in 77% of cases (9,10). Furthermore, the incidence of chronic kidney disease (CKD), a condition closely linked to diabetes and hypertension, has increased by 25% over the past decade, affecting approximately 6% of the population (11).

In 2019, the Kingdom of Saudi Arabia World Health Survey (KSAWHS) reported on obesity among individuals aged 15 years and older. The survey revealed that 62% of men and 54% of women were either overweight or obese. Additionally, 30% of respondents had a high waist circumference were ratio ≥0.9 cm in both women and male, and 91% had an elevated waist-to-hip ratio. The survey also found that women, individuals with limited education, and those residing in rural areas were at a higher risk of having an increased waist circumference, with the highest prevalence observed in the Najran region (12).

NCDs impose a heavy financial burden on the Saudi Arabia, compromising citizen productivity and quality of life. An analysis of the economic burden of the seven major NCDs alone (coronary heart disease, stroke, diabetes mellitus, breast cancer, colon cancer, chronic obstructive pulmonary disease, and asthma) revealed a cost of 9.7 billion USD in 2019, constituting 11% of the Saudi Arabia annual health expenditures and approximately 0.6% of the local gross domestic product (GDP) (13). These numbers are considered conservative, given that the costs of many NCDs, such as hypertension and dyslipidemia, were not considered. Another analysis published in 2022 revealed that direct costs of the top 10 NCDs account for 4.5% of Saudi Arabia's GDP (14).

1.1 Determinants of Non-Communicable Diseases

In Saudi Arabia, social disparities in the prevalence of NCDs have been highlighted. In 2018, an analysis of the Household Family Survey revealed that factors such as educational level, marital status, nationality, age, sex, income, and area of residence influence the likelihood of developing NCDs. The study indicated that individuals with less than primary school education were at higher risk of developing these diseases compared to those with secondary education, as well as unmarried individuals compared to married ones, and Saudis compared to non-Saudis. Additionally, the risk was higher among individuals aged 60 years and older compared to the 18–29-year age group, and among women compared to men. Income tends to have a U-shaped relationship with NCDs, with individuals with very low and very high income having the highest risk of developing NCDs compared to individuals in the middle-income categories (15). Additionally, the risk of obesity was higher among individuals without formal education than among those with more than a secondary school education, as well as among those living in rural areas compared to those living in urban areas (12).

The increase in NCDs can be partially explained by enhanced longevity and a rise in the proportion of the population that is classed as older. Owing to the elevated birth rate, enhanced maternal and child health, and improved healthcare access and quality, life expectancy in Saudi Arabia has increased by 13 years from the 1980s to the 2020s, reaching 77 years in 2021 (6). Longevity is projected to continue rising with the Saudi Vision 2030, with a goal of reaching 80 years by 2030 (16).

NCDs are increasingly associated with alarming rates of physical inactivity, unhealthy dietary patterns, and excessive screen time. The KSAWHS conducted in 2019 revealed that 80% of respondents reported insufficient physical activity. Notably, women, individuals residing in rural areas, and those with a lower educational level exhibited significantly lower physical activity levels compared to their male counterparts, urban dwellers, and those with higher educational levels, respectively (12).

Regarding dietary patterns, the findings were equally concerning, with 71% of participants failing to meet the recommended vegetable intake and 82% consuming insufficient quantities of fruit (17). Moreover, Saudi males, single individuals, and those in employment reported fruit consumption rates below the national average. A regional assessment further highlighted that the provinces of Najran and Hail recorded the lowest consumption of fruits and vegetables, with an astonishing 96% of individuals not achieving the recommended daily intake of five servings of fruits or vegetables (12).

Ultra-processed foods (i.e., items that are created via a series of industrial processes) have been associated with obesity and many other NCDs (18,19). An assessment of the food groups sold in Saudi Arabia between 2010 and 2019 revealed an increase in the consumption of ultra-processed foods from 8.7% to 10.4% and a reduction in the consumption of fresh foods from 30% to 28% of total calories (7). Finally, excessive screen time (e.g., television, mobile devices, computers) has been linked to obesity in adults. A report by the National Saudi Health Interview Survey found that television viewing times were positively associated with elevated BMI (20). University students in Saudi Arabia regularly use social media. In 2021, a cross-sectional study at two universities in Jeddah reported that 89%, 86%, and 76% of respondents used YouTube, Snapchat, and Instagram daily, respectively. Exposure to food marketing on social media networks was positively correlated with the consumption of unhealthy foods and obesity in this sample (21).

1.2 Child and Maternal Health in the KSA

The management of NCDs has traditionally focused on adult and older adult life stages. However, NCDs can be rooted in pregnancy and early childhood (22). The risk of preterm delivery is shaped by mothers' dietary status and body composition phenotypes, as well as infants' intra- and extra-uterine growth. These latter factors affect children's physical and intellectual development and metabolic adaptations, increasing the risk of NCDs in adulthood (23). This section examines the dietary status of mothers and children in Saudi Arabia.

1.2.1 Breastfeeding Practices in the KSA

Breast milk is considered the best source of nutrition for young infants and has the potential to protect against NCDs in adulthood, along with providing short-term benefits in infancy (24). The World Health Organization (WHO) advocates that infants be exclusively breastfed for the first 6 months of their lives (starting within the first hour of birth) and rely on breast milk and complementary feeding until they reach 2 years of age (25). In 1981, the International Code of Marketing of Breast Milk Substitutes was introduced as a legal framework to regulate the promotion of any breast milk substitutes (26). Despite its importance, breastfeeding is not adequately provided to infants in Saudi Arabia. A national cross-sectional study showed that only 44% of infants were breastfed within 1 hour of birth, with lower rates being observed in the Northern and Central regions compared to other districts (27). The primary reasons for delaying breastfeeding were related to hospital practices that separated mothers from their newborn and the newborn being delivered via Cesarean section. Rates of exclusive breastfeeding for the first 6 months ranged from 10% to 50%, depending on the sample and region assessed, but most were well below the 50% target set by the WHO (28–32). Low rates of exclusive breastfeeding at 6 months have been linked to the lack of suitable venues for breastfeeding, mothers' illness during the lactation phase, low antenatal breastfeeding intentions, lack of antenatal education, and the mode of delivery (30–32). Anemia, caused by micronutrient deficiency, is the most prevalent health issue among women of reproductive age in Saudi Arabia. No progress has been made toward achieving the target of reducing the prevalence of anemia among women of reproductive age since 2013, with 28% of women aged 15–49 years experiencing anemia in 2019 (33).

1.2.2 Childhood Overweight and Obesity in the KSA

Childhood overweight and obesity is a major public health concern in the Saudi Arabia; its prevalence among children under 5 years of age increased from 3.6% in 2000 to 10.1% in 2022. These rates surpass those of the Eastern Mediterranean Region (EMR) and the world, which were 6.4% and 5.6%, respectively, in 2022 (34). Moreover, one-third of individuals in Saudi Arabia aged 5–19 years are estimated to have excess weight, which is double the global average of 18% (7). Among children aged 5–9 years, the prevalence of overweight and obesity was estimated to be 37% in 2016. The mean BMI increased by 8.3% in this age group between 2000 and 2016, with higher odds of obesity observed among boys compared to girls; among children and adolescents aged 10–19 years, 52% were categorized as overweight or obese (7,35).

1.3 Electronic Media Exposure

Excessive screen time is linked to reduced physical activity and an elevated risk of obesity in children globally (36). In Saudi Arabia, a concerning trend has emerged: problematic use of social media is associated with the obesity epidemic among school-aged children (37). An online cross-sectional study of adolescents in Saudi Arabia showed a positive association between BMI and television viewing time (38). The study reported that 76% of respondents watched television for more than 2 hours daily, 72% consumed sweetened beverages more than three times per week, and 73% consumed fast-food meals more than three times per week. Adolescents who spent more time watching television tended to have more unhealthy habits than those who watched for fewer hours per day (38). More recent analyses suggest a weak or no association between television watching and obesity, but a strong association between exposure to electronic mobile devices and excess weight (39). This shift may reflect children's increasing preference for mobile devices over television to satisfy their need for electronic media engagement (40).

CHAPTER

02

Strategies to Address Obesity in the KSA

Chapter 2. Strategies to Address Obesity in the KSA

This chapter explores the multifaceted strategies implemented in Saudi Arabia to address the rising prevalence of obesity and NCDs. While individual behaviors play a role in developing NCDs, these conditions are also shaped by broader social, organizational, and policy factors. The chapter highlights key initiatives of different stakeholders such as the Healthy Food Palm and the Saudi Arabia National Strategy for Prevention of NCDs by the Ministry of Health (MOH). It also discusses the Saudi Food and Drug Authority's (SFDA) initiatives, such as the Healthy Saudi Plate and the Healthy Food Strategy, which focus on reducing unhealthy food consumption through reformulation and labeling. Furthermore, the chapter examines the role of Saudi Vision 2030 and the Health Sector Transformation Program in promoting public health by enhancing healthcare access, improving service quality, and emphasizing preventive measures. The international recognition of Saudi Arabia's efforts, notably the SFDA's receipt of the 2021 UN Interagency Task Force on NCDs award, highlights the country's commitment to combating obesity and improving public health outcomes (41).

At face value, individuals can be praised or blamed for adopting selected behaviors that shape their risk of developing NCDs. However, NCDs, such as obesity, are not solely determined by individual decisions (7). Policies are critical for promoting or hindering certain behaviors (42). Given the alarming increase in NCDs, several government authorities have established strategies to prevent and manage obesity and NCDs in Saudi Arabia (Table 2.1).

Table 2.1. Snapshot of Obesity-related Guidelines and Strategies in the Kingdom of Saudi Arabia (KSA)

Agency leading the strategy/plan	Strategy/Plan name	Date of conception
Vision Realization Office	Saudi Vision 2030 (43)	2016
	Health Sector Transformation Program (16)	2021
	Saudi Healthy Plate (44)	2020
SFDA	Healthy Food Strategy/Third Strategic Plan (2018–2022) (45)	2018
	SFDA Third (2018–2022) and Fourth Strategic Plan (2023–2027) (46,47)	2018
Ministry of Health	The Healthy Food Palm (48)	2012
	National Execution Plan for Diabetes Control (49,50)	2013
	Saudi Guidelines on the Prevention and Management of Obesity (51)	2016
	Diet and Physical Activity Strategy (2015–2019) (52)	2014
	Saudi Arabia National Strategy for Prevention of NCDs (2019–2023) (53)	2019
	National Strategy for Prevention of Cardiovascular Disease (54)	2014

In 2012, the Healthy Food Palm (HFP), featuring dietary guidelines specific to the Saudi culture, became publicly available and provided the basis for educational programs and nutritional reforms for adults and children starting at age 2 (48,55). The Palm graphics mimic the "MyPyramid" used in the United States Department of Agriculture (USDA) pictorial dietary guidelines in 2005 and were selected because of their cultural and religious significance to the Saudi community, reflecting its vitality and growth (56,57). At the base of the palm lie water, cereals, bread, vegetables, and fruits, while oils and sugars are at the top of the palm tree and should be consumed moderately. Physical activity is depicted at ground level, reflecting the importance of regular exercise (55).

In 2020, the National Nutrition Committee of the SFDA issued the Healthy Saudi Plate, aligning with the MyPlate graphic developed by the USDA in 2011, to illustrate how individual plates must include fruits and vegetables (44,58). The Healthy Saudi Plate places less emphasis on carbohydrate-rich components and advocates limits on the consumption of solid fats and ultra-processed food items (44).

In 2016, Saudi Arabia's leadership launched the 2030 Saudi Vision, which aims to institute a vibrant society comprising individuals with increased longevity and a satisfactory quality of life. Proper prevention and management of NCDs have been identified as a priority to achieve this goal, with an objective of achieving a life expectancy of 80 years by 2030. Vision 2030 seeks to transform Saudi Arabia's healthcare sector by pursuing these objectives. This vision aims to provide high-quality healthcare services to all citizens and residents of the Saudi Arabia, improve health outcomes, and contribute to the overall well-being and prosperity of Saudi society (43).

Consistent with the Saudi Vision, the Health Sector Transformation Program (HSTP) was established to restructure the healthcare sector into an efficient and comprehensive system (16). The program focuses on achieving a set of strategic objectives (Fig 2.1) that will bring about positive changes in the healthcare landscape. Namely, it aims to facilitate access to healthcare services by expanding healthcare capacity, geographically distributing healthcare providers, providing timely access to services, and making healthcare affordable for all individuals. The program improves the quality and efficiency of healthcare services by offering free insurance to citizens. It supports the healthcare sector in meeting the health needs and expectations of the community and aims to promote safe, effective, and financially sustainable health coverage. Traffic safety is enhanced by implementing measures to improve road safety, reduce traffic accidents, and minimize associated health risks. Efforts have been made to reduce injuries, prevent accidents, and address traffic violations that pose risks to individuals and communities. Preventive measures are promoted to reduce the incidence of health risks. Strengthening preventive measures against health risks involves two elements: general preventive health measures, such as community awareness programs to reduce disease exposure, and effective management of health crises, both infectious and NCDs.

Fig 2.1. Health Sector Transformation Program (HSTP) Strategic Objectives (16).

These strategic objectives were translated into a series of initiatives that collectively ensured commitment and established a fundamental framework for realizing the Vision 2030 goals. The SFDA spearheaded several of these initiatives, including the Interactive Awareness Initiative. This initiative aims to enhance social understanding and knowledge of the optimal handling of food, drugs, and medical devices, while raising awareness among various segments of society through specialized campaigns tailored to their needs and current levels of awareness.

Furthermore, the third and fourth strategic maps contained elements focused on preventing NCDs. The Third Strategic Map emphasized developing nutritional reforms to improve dietary patterns, leading to the Healthy Food Strategy (HFS) issued by the SFDA. The HFS specifically targets reduced intake of food and beverage items high in sugar, salt, saturated fat (SSF), and trans fatty acids (TFAs) through measures including food reformulation and improved labeling standards (45–47).

The calorie and total fat targets were based on Saudi Arabia's balance sheets from the Food and Agriculture Organization (FAO), reflecting a per capita mean daily consumption of 3,320 calories and 99 grams of fat in 2017 (59).

The targets for salt and sugar consumption were aligned with the WHO recommendations of less than 5 grams of salt and 50 grams of sugar per day (60,61). As part of the HFS, the SFDA issued several nutritional legislations for food products and establishments. These regulations aimed to enhance the nutritional value of food products available in local markets by reducing the contents of sugar, salt, and fat. Food establishments were also mandated to display nutritional information on food items, including calories and allergens. The overarching goal is to promote a healthier lifestyle, improve daily food and beverage choices, and reduce the incidence of NCDs in Saudi Arabia.

In 2021, the WHO announced that Saudi Arabia, represented by the SFDA, won the UN Interagency Task Force on the Prevention and Control of Non-Communicable Diseases award for its efforts in preventing and controlling NCDs through the implementation of the HFS (41). This award serves as international recognition of the SFDA's high-quality work and progressive public health legislation. Moreover, it highlights the SFDA's distinguished international presence, establishing it as a reliable reference for similar organizations.

CHAPTER

03

Food Reformulation: Reforms, Surveillance, And Training

Chapter 3. Food Reformulation: Reforms, Surveillance, and Training

Food environment interventions aim to alter the composition, affordability, and information available on food and beverage items and have proven effective in improving the dietary habits of populations and reducing the rates of NCDs (62). In this chapter, we describe the initiatives spearheaded by the SFDA to promote food reformulation and improve food labeling.

3.1 Food Reformulation

Food reformulation refers to the process of altering a product's composition and/or preparation method to enhance its health footprint (63). This chapter describes the reforms led by the SFDA to limit high in fat, sugar, and salt (HFSS) and TFAs in food and beverage products. Before presenting the reforms, it is important to understand the legislative framework of the Saudi Arabia. Since the Saudi Arabia is part of the Gulf Cooperation Council (GCC), legislation is regulated by local bodies and influenced by GCC reforms. The technical regulations of the Gulf Standardization Organization (GSO) and SFDA are mandatory, whereas those of the GSO and SFDA are optional (64,65). After publishing the regulations, the SFDA provides a grace period for their implementation by stakeholders before the regulations are enforced. During this grace period, the SFDA raises awareness and conducts workshops with stakeholders to optimize their preparedness (45).

3.1.1 Sodium

Regulations aimed at reducing sodium intake are a global priority, as excessive sodium consumption impacts cardiovascular health and increases the risk of cancer (66,67). In 2013, the WHO recommended that member states work toward reducing sodium intake by 30% by 2025. The SFDA chose a gradual approach for salt reduction initiatives, starting with identifying the main sources of sodium intake and then gradually reducing their composition. In 2019, the SFDA identified bread as the primary source of sodium intake based on an analysis conducted by Euromonitor, which showed that bread accounted for 68% of sodium consumption among the Kingdom's residents. Accordingly, in the same year, the SFDA issued technical regulations for bread production and regulations for Laban, flavored Laban, and Laban drinks to limit sodium to 1 g per 100 g and 1 g per 100 ml, respectively (68–71). Simultaneously, the SFDA endorsed a standard identifying the recommended limits for sodium composition in 23 food categories, consistent with Public Health England's recommendations, although its implementation was optional. In 2022, the standard was updated (72,73). The update included additional food products and incorporated a limit of 0.5 g sodium per 100 g of bread (Table 3.1). The implementation of this standard remained optional for the industry and did not replace the technical regulations for bread production. Bread manufacturers are required to adhere to the 1% sodium limit for bread and are encouraged to further limit the sodium content to 0.5% (70).

Table 3.1. Salt Limit Guidelines for Food Products (73)

Products category	Products subcategories	Sodium limit per 100 g of food product
1- Meat Products	1-1 Sausages	550 mg
	1-1-1 Sausages, fresh, chilled, and frozen Including fresh, frozen, and chilled sausages prepared from meat and poultry	700 mg
	1-1-2 Sausages, canned Including canned sausages prepared from meat and poultry (excludes fresh, chilled, and frozen sausages)	350 mg
	1-2 Burgers, kofta, meatballs and kebabs, fresh, frozen, and chilled Including all types of burgers, kofta, meatballs and kebabs, prepared from beef, buffalo, lamb, goat, camel, and poultry meat	425 mg
	1-3 Meat pastries, frozen or chilled Including samosas, spring rolls, kibbeh, and meat pies of all kinds, with fillings prepared from beef, buffalo, lamb, goat, camel, or poultry meat	425 mg
	1-4 Minced meats Including all kinds of minced meat from beef, buffalo, lamb, goat, camel, or poultry	250 mg
2- Meat Alternatives	2-1 Tofu 2-2 Vegetarian sausages and burgers	475 mg
3- Breakfast Cereals	3-1 Breakfast cereals	350 mg

Products category	Products subcategories	Sodium limit per 100 g of food product
4- Cheese	4-1 Cheddar and other similar types of cheeses	800 mg
	4-2 Fresh cheeses	
	4-2-1 Soft white cheeses	270 mg
	Including Nabulsi cheese	190 mg
	4-2-2 Cottage cheeses: regular and flavored	1,000 mg
	4-2-3 White cheeses: Feta cheeses	
	4-2-4 Kashkawan cheeses	600 mg
	4-3 Mozzarella cheeses	
	Including all types of mozzarella cheese (excluding fresh mozzarella)	540 mg
	4-4 Blue cheeses	800 mg
	4-5 Processed cheese and processed cheeses analogues	
	4-5-1 Spreadable processed cheese and processed cheeses analogues	720 mg
	4-5-2 Other processed cheeses and processed cheeses analogues	800 mg
	4-6 Halloumi cheeses	540 mg
5- Labneh	5-1 Full-fat labneh	300 mg
	5-2 Low-fat labneh	260 mg
6- Butter	6-1 Salted butter	670 mg
	Including all types of salted butter	
	6-2 Lightly salted butter	550 mg
	Including all types of lightly salted butter	
7- Margarine	7-1 Margarine	550 mg
	Including all kinds of spreadable vegetable oils and margarine	

Products category	Products subcategories	Sodium limit per 100 g of food product
8- Cooked/Canned Beans	8-1 Cooked/canned beans in tomato sauce without other items added	225 mg
9- Ready-to-eat Meals	9-1 Ready-to-eat meals Including all packaged and canned ready-to-eat meals (e.g., Chinese, Thai, Italian, traditional dishes, and others). It also includes potatoes, rice, pasta, noodles, and other ready-to-eat meals prepared from meat, poultry, fish, and vegetables	380 mg
10- Soups/Stews	10-1 Soups/stews Including all types of ready-to-use soups (e.g., canned liquid, canned concentrated, thickened, and dried)	250 mg
11- Pizza	11-1 Pizza with processed meat toppings Including all types of refrigerated and frozen pizzas with added processed meat	500 mg
	11-2 Pizzas with other toppings Including all types of refrigerated and frozen pizzas without meat toppings	475 mg
	11-3 Pizza crusts	400 mg
12- Snacks and Crackers	12-1 Potato chips flavored with vinegar and salt	772 mg
	12-2 Chips Including all flavors (except vinegar and salt flavors; see 12-1)	500 mg
	12-3 Puffed grains Including those made from potato starch, corn, rice, and others	800 mg
	12-4 Fried puffed grain (e.g., made from corn or rice) Including those made from potato starch, corn, rice, and others	1,090 mg
	12- 5 Salted popcorn	575 mg
	12- 6 Sweet popcorn	400 mg
	12-7 Salted nuts	480 mg

Products category	Products subcategories	Sodium limit per 100 g of food product
13- Cakes	13-Cakes Including all types of cakes (e.g., sponge cakes, muffins, and donuts)	280 mg
14- Sandwiches and Pies	14-1 Baked goods with salty fillings Including baked croissants and pies with salty fillings (e.g., cheese and thyme)	350 mg
	14-2 Baked goods with sweet fillings Including croissants and pies with sweet fillings (e.g., custard, chocolate, fruit, and vanilla fillings)	200 mg
15- Seasoning	15-1 Ketchup Including standard and those with reduced salt and sugar	650 mg
	15-2 Brown sauces Including all types of brown sauces (e.g., barbecue sauce, curry-flavored sauce)	480 mg
	15-3 Mayonnaise	500 mg
	15-3-1 Mayonnaise, full-fat and high-calorie	680 mg
	15-3-2 Mayonnaise, low-fat or reduced-calorie	600 mg
	15-4 Salad dressings Including all types of dressings manufactured from oils and vinegar, including low-fat types	1,150 mg
	15-5 Chili sauce Including all types of chili and sweet chili sauces (excluding chili sauces intended for cooking)	350 mg
	15-6 Dips Including refrigerated and storable dips	

Products category	Products subcategories	Sodium limit per 100 g of food product
16- Cooking Sauces and Pastes	16-1 All cooking sauces and pastes Including all types of cooking sauces and pastes (e.g., tomato sauce, pasta sauce, pizza sauce, Mexican and Chinese sauces)	370 mg
	16-2 Pesto sauce	650 mg
17- Biscuits	17-1 Sweetened biscuits Including all types of sweetened biscuits, with or without filling	350 mg
	17-2 Salty biscuits Including all types of salty biscuits, with or without filling	700 mg
18- Pasta and Noodles	18-1 Plain or flavored pasta and noodles Including fresh, canned, or frozen, (e.g., spaghetti, fettuccine, lasagna, and fried vermicelli)	300 mg
19- Canned Fish	19-1 Canned tuna Including all types of tuna canned in oil, water, or brine (excluding tuna canned with sauces or other additives)	350 mg
	19-2 Canned salmon Including all types of canned salmon (excluding salmon canned with sauces or other additives)	320 mg
	19-3 Other canned fish Including sardines, tuna, salmon, and other canned fish with sauces or other additives, such as tomatoes (excluding anchovies, smoked fish, and caviar)	600 mg

Products category	Products subcategories	Sodium limit per 100 g of food product
20- Canned Vegetables and Legumes	20-1 Canned and packaged vegetables Including all kinds of vegetables and legumes (excluding pickles)	50 mg
21- Potato Products	21-1 Instant mashed potatoes Including all types of instant, plain, and flavored mashed potatoes 21-2 Potato products Including all potato products, frozen and chilled (excluding mashed potatoes)	60 mg 275 mg
22- Powdered Drinks	22-1 Dried powdered drinks, ready-to-use Including instant chocolate drinks and fruit-flavored drinks (excluding coffee and tea)	60 mg
23- Flavor Enhancers	23-1 Flavor enhancers, ready-to-use Including all flavors (in the form of cubes, granules, powder, or pastes)	360 mg
24- Bread	24- Bread and bread products	200 mg

3.1.2 Sugars

Added sugars have been identified as a primary factor related to the rise of NCDs and mortality. The WHO established an upper limit of 10% for free sugars and encouraged individuals to aim for a limit of 5% for additional benefits (61). In Saudi Arabia, the major contributors to added sugar intake are sweetened drinks and bread. The SFDA used the Euromonitor database to identify the largest contributors to sugar intake in packaged products (e.g., dairy products, snacks, culinary ingredients, juices, soft drinks, and energy drinks) and found that in 2020, soft drinks, juices (e.g., drinks and nectar), and bread contributed 25%, 22%, and 16% of the total sugar intake, respectively (Fig 3.1.) (74,75).

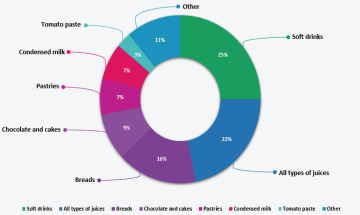


Fig 3.1. The expected contribution of purchased products to daily sugar intake in the Kingdom .of Saudi Arabia (KSA) based on Euromonitor 2020 data (75)

Globally, taxation has increased to reduce sugar-sweetened beverage (SSB) consumption and hinder the rise in obesity (76). Citizens in the Saudi Arabia have a high consumption of SSB, with the fifth-largest consumption globally in 2014 in terms of its contribution to total caloric intake (77). In 2015, the GCC attempted to regulate this with an excise tax of 50% on sweetened beverages and 100% on energy drinks, among the highest taxes worldwide (78). This regulation was first implemented in the Gulf by Zakat, Tax and Customs Authority (ZATCA) in the Saudi Arabia. In 2018, as part of the Saudi Vision 2030, a 5% value-added tax was imposed on all consumption goods, including soft drinks (79). Taxation is associated with a drop in the purchase of soft drinks by approximately 30%–58% and a reduced growth rate (78,80). In 2019, the ZATCA, in collaboration with the SFDA, expanded its scope to include beverages that were previously excluded, such as sweetened juices and milk (79).

The technical regulation mandates that all juice stores, cafés, and restaurants offering fresh juices must prohibit the inclusion of added sugars and energy drinks in their fresh juices and promote healthier beverage options to reduce the consumption of added sugars in foods. Additionally, establishments are obligated to provide clear information to consumers regarding the amount of added sugar in all types of juices. Further, disclaimers should be printed on menus indicating the recommended daily sugar intake for both adults and children to enhance consumer awareness. These measures aim to empower individuals to make informed choices regarding their food intake, fostering healthier dietary habits and overall well-being (81).

3.1.3 Trans Fatty Acids

TFAs have been widely used by the food industry to increase products' shelf life, enhance their oxidative resistance, and improve their texture (82). However, TFAs have been associated with inflammation, increased incidence of NCDs, and increased mortality. The WHO established the REPLACE plan to gradually abolish industrially produced TFAs from food products to address the health hazards of TFAs (82). Saudi Arabia was the first country in the EMR to adopt such policies. In 2017, the SFDA set an upper limit for TFAs of 2% and 5% of the total fat composition of oils and other products, respectively. In 2018, the regulation was enforced in the Saudi market after a grace period of one year. The SFDA banned the incorporation of partially hydrogenated oils (PHOs)—the main source of industrially produced TFAs in food products—in food preparation (83). In the following years, the SFDA trained stakeholders, including industry representatives, to replace PHOs with healthier oils such as vegetable oils and emulsifiers. Moreover, banning industrially produced TFAs in food products enhances the availability of healthy oils in the Saudi market (45). In 2020, Saudi Arabia implemented the ban on the production and use of all PHOs, it became the first country in the EMR to have a "best practice TFAs" as it adopted legislative measures to limit industrially produced TFAs in foods, consistent with the WHO guidelines (84).

3.1.4 Vitamins and Minerals

Based on the WHO's global analyses, iron, vitamin A, and iodine deficiencies are the most prevalent micronutrient deficiencies (85). Specifically, over one-third of the EMR population experiences anemia, with heightened susceptibility among pregnant women and young children. Iron deficiency anemia affects approximately 50% of pregnant women and 63% of children under the age of 5 years in this region (85,86). Fortifying food products and beverages with one or more micronutrients has the potential to improve the nutritional quality of the food supply and provide significant public health benefits with minimal health risks. Therefore, the SFDA issued a Mandatory Addition of Vitamins and Minerals in Food Stuff. For instance, milk and yogurt must be fortified with vitamin D and vitamin A, while flour should be fortified with iron, vitamin B12, folic acid, and zinc. This regulation requires manufacturers to enrich certain food products with vitamins and minerals and accurately disclose their presence on nutritional information labels. Tables 3.2, 3.3, and 3.4 outline the recommended levels of vitamin and mineral fortification for selected food products (87).

Table 3.2. Vitamin and Mineral Fortification in Wheat Flour (87)

Vitamins/Minerals	Flour extraction rate	Compound	Level of vitamin/minerals to be added in parts per million (mg/kg) Fortification range
Iron	Low	NaFeEDTA	15–40
		Ferrous sulfate	20–60
		Ferrous fumarate	20–60
		Electrolytic Iron	40–60
	High	NaFeEDTA	15–40
Folic acid	High/Low	Folic acid	1.0–5.0
Vitamin B12	High/Low	Cyanocobalamin	0.008–0.04
Zinc	High/Low	Zinc Oxide	30–95
		Zinc Oxide	70–100
Vitamin A	High/Low	Vitamin A palmitate	1.0–5.9
		Vitamin A acetate	
Vitamin D3	High/Low	D3 cholecalciferol	0.02

Note. NaFeEDTA: Sodium ferric ethylenediaminetetraacetate

Table 3.3. Vitamin and Mineral Fortification in Food Products (87)

Food Product	Vitamins/Minerals	Quantity	Unit
Pasteurized milk, sterilized milk, UHT milk (long shelf life)	Vitamin A	200	IU/100 ml
	Vitamin D	40	IU/100 ml
Flavored milk	Vitamin A	200	IU/100 ml
	Vitamin D	40	IU/100 ml
Milk powder	Vitamin A	200	IU/100 ml
	Vitamin D	40	IU/100 ml
Laban, flavored Laban, Laban drink	Vitamin A	200	IU/100 ml
	Vitamin D	40	IU/100 ml
Yogurt, flavored yogurt	Vitamin A	200	IU/100 ml
	Vitamin D	40	IU/100 ml
Goat milk	Vitamin A	200	IU/100 ml
	Vitamin D	40	IU/100 ml
Pasteurized camel milk	Vitamin A	200	IU/100 ml
	Vitamin D	40	IU/100 ml
Cereals	Thiamin (B1)	2	mg/100 g
	Niacin (B3)	4.8	mg/100 g
	Vitamin B6	0.6	mg/100 g
	Folic acid (B9)	0.06	mg/100 g
	Pantothenic acid (B5)	1.6	mg/100 g
	Magnesium	160	mg/100 g
	Iron	13.3	mg/100 g
	Zinc	3.5	mg/100 g
Rice	Thiamine (B1)	4.4	mg/kg
	Riboflavin (B2)	2.6	mg/kg
	Niacin (B3)	35	mg/kg
	Iron	29	mg/kg
	Folic acid (B9)	75	µg/100 g
Salt	Iodine	15	mg/kg

Note. IU: International Unit, mg: milligram, µg: microgram, UHT: ultra-high temperature processing

Table 3.4. Vitamin and Mineral Fortification in Infants formula, Follow-on Formula, and Formula for Special Medical Purposes (87)

Food Product	Vitamins/Minerals	Age group	Quantity	Unit
Infants formula, follow-on formula, and formula for special medical purposes	Vitamin A	0–6 months 6–12 months 12–36 months	80–140 70–180 80–140	µg(RE/100 kcal
	Vitamin D_3	0–12 months 12–36 months	1–3 1.5–4.5	µg/100 kcal
	Vitamin E		0.5–5	mg α-TE/100 kcal
	Vitamin K	0–6 months 6–12 months	0.94–27 1–27	µg/100 kcal
	Thiamin (B1)		40–300	µg/100 kcal
	Riboflavin (B2)	0–12 months 12–36 months	60–500 80–450	µg/100 kcal µg/100 kcal
	Niacin (Nicotinic acid; B3)		0.3–1.5	mg/100 kcal
	Pyridoxine (B6)		20–175	µg/100 kcal
	Cobalamin (B12)	0–12 months 12–36 months	0.1–1.5 0.1–2	µg/100 kcal
	Pantothenic acid (B5)		0.4–2	mg/100 kcal
	Folic acid (B9)	0–6 months	9–50	µg/100 kcal
	Vitamin C		4–70	mg/100 kcal
	Biotin (B7)		1–10	µg/100 kcal
	Iron	0–6 months 6–12 months 12–36 months	0.3–1.3 0.4–2 1–3	mg/100 kcal
	Calcium	0–6 months 6–12 months 12–36 months	50–140 50–180 90–280	mg/100 kcal
	Phosphor		25–100	µg/100 kcal
	Magnesium		5–15	µg/100 kcal
	Sodium		20–40	µg/100 kcal
	Chloride		50–140	µg/100 kcal
	Potassium		40–180	µg/100 kcal
	Manganese		1–100	µg/100 kcal
	Iodine		10–40	µg/100 kcal
	Selenium	0–6 months 6–12 months	1–9 2–9	µg/100 kcal
	Copper		35–120	µg/100 kcal
	Zinc		0.5–1.5	mg/100 kcal

3.2 Collaboration with the Food Industry

Following the issuance of the technical regulations, the SFDA conducted workshops to introduce and train stakeholders in the food industry. These workshops were held multiple times across different regions of the Saudi Arabia, encompassing the Eastern, Southern, Western, Northern, and Central provinces. They serve as interactive platforms, where owners of food establishments can actively participate, ask questions, and seek clarification regarding any concerns that they might have. The SFDA provides toolkits and educational resources to assist food establishment owners in understanding and navigating nutritional policies, thereby facilitating adherence.

In 2017, when the technical regulation of "Declaring of Calories on Food Establishment Menu's Selling Away-From-Home Foods" was issued, the SFDA conducted several training workshops to clarify the regulation requirements for food establishment owners (88). Prior to implementation, more than 200 individuals were trained in calorie calculation. Subsequently, the "Guideline on Restaurants and Coffee Shops Menus" was published, detailing how to display calorie information on menus and suggesting various methods to reduce calorie content in meals, offering detailed instructions on determining the caloric value of meals and accurately measuring portion sizes (Table 3.5). It also offers clear guidance on conducting nutritional calculations and analysis (89).

In 2019, the SFDA issued a guideline specifically addressing "Allergens in Menus." This guideline aligns with the technical regulation "Declaration of Allergens in Food Establishments Menu's Selling Away-From-Home Foods." It serves as a valuable resource for food establishment owners, providing clear instructions on how and where to declare allergens in their menus (90,91).

The SFDA introduced a comprehensive guide on nutrition labels for prepackaged foods "Guide to Nutrition Labels for Prepackaged Food Products," focusing on the requirements for displaying nutritional information on the labels of prepackaged food items (Table 3.5). This guide covers various types of food products, including prepackaged foods; prepackaged foods for special dietary use; foods for special medical purposes; gluten-free foods; dietary supplements; and foods for older infants, young children, and infants, including follow-on and special medical purpose formulas. A visual representation of the nutrition label is provided for each category (92).

Table 3.5. Example of Published Guidelines for Manufacturers by the SFDA

Guide Name	Year Published	Reference
Guidelines for Restaurant and Coffee Shop Menus	2019	(89)
Allergens on Menus	2019	(91)
How to Calculate Calorie Content in Meals	2019	(93)
Reducing Salt in Bread	2019	(70)
Guidance Manual for Salt	2020	(94)
Guide to Nutrition Labels for Prepackaged Food Products	2021	(92)
Labeling of Fruit Juices Nectars and Fruit Drinks	2021	(95)

The SFDA released guidelines for sodium limits in food products, targeting manufacturers and importers. The purpose of these guidelines is to provide practical assistance to industry stakeholders in effectively reducing salt levels in bread. It outlines the mechanism for minimizing salt addition during dough preparation (Table 3.5), ensuring that the salt quantity in bread does not exceed 1 gram per 100 grams in the final product (94). To facilitate implementation, a calculation chart was formulated (Fig 3.2) specifying the appropriate weight of flour (kg) and the corresponding quantity of salt (g) to be added to the flour. This chart was used as a poster in bread preparation to serve as a visual aid for workers involved in the manufacturing process to stay in alignment with the technical regulations for bread production.

Fig 3.2. Allowable salt levels in bread

After issuing regulations on the labeling of juices, nectar, and fruit drinks, an informative guide was released for food manufacturers and suppliers, titled "The Labeling of Fruit Juices, Nectars, and Fruit Drinks," which aimed to clarify the distinctions among juice types and assist manufacturers in choosing the appropriate name for their products to be displayed on the front of the package. This guide summarizes the 14 essential requirements of these regulations. An illustrative form of the juice card highlighting its key requirements has also been published (Fig S1) (95,96).

In 2018, as part of ongoing efforts to reformulate food products and align them with the HFS, the SFDA introduced a voluntary pledge to the food industry (Appendix 2). This initiative aimed to encourage voluntary engagement from the private sector to reduce the levels of sugar, salt, and fat in food products while enhancing the clarity and comprehensibility of nutrition information on food labels. In collaboration with the food industry, various food companies, including Nestlé Middle East, Mars Saudi Arabia & Gulf, Mondelez Arabia, Kellogg's Arabia, PepsiCo Global, Coca-Cola, Unilever, General Mills Company, and Friesland, signed voluntary commitment agreements with the SFDA to reduce the amounts of sugar, salt, and fat in their food products, thereby contributing to the improvement of packaged food quality. These companies have been mandated to submit annual progress reports on their initiatives and commitments, which are evaluated by the SFDA.

3.3 Surveillance and Inspection Campaigns

The SFDA has the authority to verify the food items, analyze their content, and compare their compliance with relevant regulations (45). As collaborative efforts with relevant sectors, surveillance and inspection initiatives were conducted for local and imported products available in the Saudi market. This section outlines the regulatory surveillance and inspection campaigns led by the SFDA to assess manufacturers' compliance with these nutritional reforms.

3.3.1 Sodium

To determine the sodium limit in bread, in May 2019, the SFDA evaluated the nutrition labels of bread from factories and bakeries (semi-automatic and automatic) in seven provinces in Saudi Arabia. Most products (85%) adhered to the recommended sodium limit of 1 g per 100 g of bread. The lowest adherence rate (70%) was observed in the Eastern region and the highest (98%) in the Western region (45). In 2020, the SFDA conducted a survey on food products in major supermarkets in Riyadh, the capital of Saudi Arabia, by comparing their sodium composition to the recommended limits. The results revealed that 47% of the products abided by the SFDA sodium limits (Figure 3.3). The lowest adherence rate was observed for ready-made meals, with none of the assessed products adhering to the set limits. More than half of the products in categories such as cheeses, cereals, canned beans, meats, and flavorings had sodium compositions that exceeded the SFDA food category recommendations (45). In 2021, the SFDA analyzed the sodium composition in selected breads from supermarkets and local bakeries in Riyadh. The results of this surveillance revealed that 70% of the analyzed bread products (n = 416) adhered to the technical requirements for the production of bread regulation of 1% sodium, and 23% were compliant with the standard of 0.5 g sodium per 100 g of bread.

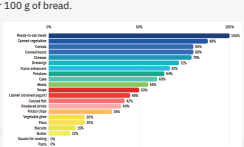


Fig 3.3. Percentage of products that were non-compliant with the salt limit in the 2020 surveillance campaign

3.3.2 Trans Fatty Acids

The SFDA conducted several inspection campaigns to evaluate manufacturers' adherence to the technical regulations to eliminate PHOs. In 2018, 413 products were selected from the Saudi market and analyzed to assess their compliance with the TFAs limits stated in the SFDA technical regulation, showing that 94.7% of the examined items adhered to regulations. In 2020, a broader campaign was conducted to ensure that manufacturers and importers of food products complied with the ban on PHOs by inspecting 2,697 products, revealing that 80% of the sampled products were compliant with the relevant nutrition policy. A higher proportion of imported products than local products was found to be non-compliant (62% vs. 38%). In 2021, inspection campaigns assessed 8,314 products and found a compliance rate of 97%. In 2022, two inspection campaigns were conducted. The first occurred in the first half of 2022, evaluating 3,898 food products, with 95% of them found to be compliant. A follow-up campaign targeting the food products that were non-compliant in the first campaign after the notice period was conducted in the second half of 2022, and a compliance rate of 99.5% was identified.

CHAPTER

04

Reforms to Promote Responsible Eating

Chapter 4. Reforms to Promote Responsible Eating

This chapter highlights the reforms in Saudi Arabia aimed at promoting responsible eating through improved nutritional labeling. Key measures include mandatory back-of-pack labeling for prepackaged foods and front-of-pack systems such as Multiple Traffic Light labels to help consumers assess product healthiness. Allergen labeling is also required to enhance transparency, and nutritional information must be provided for food sold online. These reforms empower consumers to make healthier choices (97).

4.1 Food Labeling

4.1.1 Labeling of Packaged Products

Food product labeling provides consumers with valuable information, enabling them to make informed and sustainable food choices. The FAO and WHO support the use of both back-of-pack labeling (BoPL) and front-of-pack labeling (FoPL) (98). BoPL lists calories and key nutrient compositions, indicating their contribution to the recommended daily intake, while FoPL provides easily interpretable information on food product quality for consumers (99).

In 2021, the Gulf Technical Regulation of Requirements of Nutritional Labeling mandated the declaration of nutritional information on the BoPLs for all pre-packaged products. This regulation stipulates the measurement and display of key nutrients, including energy, protein, total carbohydrates (such as dietary carbohydrates and fiber), fats, saturated fats, trans fats, cholesterol, sodium, total sugars, and added sugars (100). Consistent with the growth of e-commerce, the SFDA established the regulation "Nutritional Labeling on E-commerce/Internet Sales," which aims to ensure that consumers have access to essential nutritional information, when purchasing food online, by providing nutritional labels for all products, thus enabling consumers to make informed decisions (101).

In 2023, the SFDA enhanced consumer protection by implementing regulations for labeling food allergens on prepackaged foods. This regulation established clear guidelines for presenting allergen information, ensuring transparency and assisting consumers in avoiding potential health risks (102). Additionally, the regulations required manufacturers to disclose the possibility of cross-contamination by using phrases such as "contains" or "may contain." The technical regulation "Labeling of Food Allergens on Prepackaged Food" provided a comprehensive framework specifically focused on allergens in prepackaged foods (102).

In addition to the regulations, the "Multiple Traffic Light" label was introduced as a FoPL, with its implementation being optional and aimed at helping consumers make informed food choices. In the United Kingdom, food products are classified based on their nutrient content: low (red), moderate (orange), or high (green) (45,103–105).

Tables 4.1 and 4.2 present the reference points used to determine the quality level for key nutrients such as total fat, saturated FSS, based on a per 100 grams/ml basis. The regulations set specific limits for the red category for food items sold in portions exceeding 100 grams and for beverages served in portions larger than 150 ml. These standards provide consumers with additional tools to quickly assess the nutritional value of a product through the Multiple Traffic Light (MTL) labeling system, empowering them to make informed choices. By incorporating the MTL as a FoPL, these regulations complement the mandatory disclosure of nutrients on BoPL and promote healthier food options (100–102).

Table 4.1. Nutrient Classification of Solid Food Products

Nutrient	Low	Medium	High
	(g/100 g)	(g/100 g)	(g/100 g)
Total Fat	≤ 3	3.1–17.5	> 17.5
SFA	≤ 1.5	1.51–5	> 5
Sugar	≤ 5	5.1–22.5	> 22.5
Salt	≤ 0.3	0.31–1.5	> 1.5

Table 4.2. Nutrient Classification of Liquid Products

Nutrient	Low	Medium	High
	(g/100 g)	(g/100 g)	(g/100 g)
Total Fat	≤ 1.5	1.51–8.75	> 8.75
SFA	≤ 0.75	0.76–2.5	> 2.5
Sugar	≤ 2.5	2.51–11.25	> 11.25
Salt	≤ 0.3	0.31–0.75	> 0.75

Another nutrient-profiling method employed in Saudi Arabia is the Saudi Nutrient Profiling Model (SNPM) (106). This tool evaluates food products in terms of their composition of calories, saturated fats, total sugars, sodium, fibers, proteins, and the percentage of fruits, vegetables, and nuts. The SNPM categorizes products as having either “high” or “low” nutritional value based on a scoring system that distinguishes liquid and solid products (Tables 4.3 and 4.4).

Nutrients are divided into two groups: Group A, which includes nutrients that should be consumed in moderation (calories, saturated fats, total sugars, and sodium), and Group B, which encompasses nutrients and food groups that should be promoted (fruits, vegetables, fibers, nuts, and protein). The scoring within each group is additive, with the total score calculated by subtracting the Group A score from the Group B score. If the total score is below 4 for solid products and 1 for liquid products, the item is classified as having high nutritional value. The SFDA developed this calculator to be easily accessible to consumers, enabling them to assess the dietary quality of a given meal or item (106).

In 2022, the SNPM was incorporated into the requirements for food products with high nutritional value claims (107). This legislation applies to all prepackaged products, excluding fruits, vegetables, and items with minimal amounts of nutrients or calories. The SNPM has also been utilized in developing reforms related to the marketing of food products aimed at children, in nutritional legislation for schools, and in the development of general nutritional guidelines. However, the SNPM was not used for the FoPL standard because the MTL system had already been adopted in 2018, prior to the development of the SNPM (103,106).

Table 4.3. Scoring of Group, A Products

Points	Calories	SFA (g/100 g or 100 ml)	Total sugars (g/100 g or 100 ml)	Sodium (mg/100 g or 100 ml)
0	≤ 80	≤ 1	≤ 4.5	≤ 90
1	81–160	1.1–2.0	4.51–9.0	91–180
2	161–240	2.1–3.0	9.1–13.5	181–270
3	241–320	3.1–4.0	13.6–18.0	271–360
4	321–400	4.1–5.0	18.1–22.5	361–450
5	401–480	5.1–6.0	22.6–27.0	451–540
6	481–560	6.1–7.0	27.1–31.0	541–630
7	561–641	7.1–8.0	31.1–36.0	631–720
8	642–721	8.1–9.0	36.1–40.0	721–810
9	722–801	9.1–10.0	40.1–45.0	811–900
10	> 801	> 10.0	> 45.0	> 900

Table 4.4. Scoring of Group B Products

Points	Fruits, vegetables, nuts (% in 100 g or 100 ml)	Fibers (g/100 g or 100 ml)	Protein (mg/100 g or 100 ml)
0	≤ 40	≤ 0.70	≤ 1.60
1	41–60	0.71–1.40	1.61–3.20
2	61–80	1.41–2.10	3.21–4.80
3	--	2.11–2.80	4.81–6.40
4	--	2.81–3.50	6.41–8.00
5	> 80	> 3.50	> 8.00

4.1.2 Labeling of Packaged Beverages

The SFDA issued the Gulf Technical Regulation "Labeling of Fruit Juices, Nectars, and Fruit Drinks" to provide clear information to consumers about the content of juices and beverages. The regulation stipulates that if sugar or artificial sweeteners are added, the packaging must clearly display phrases such as "sugar added" or "sweetener added." Furthermore, the phrase "100% juice" can only be used if the juices are free from any added ingredients that affect their weight or composition, ensuring greater transparency for consumers regarding beverage ingredients (96).

4.2 Restaurants

Despite their convenience, foods eaten outside of the home are more likely to have higher levels of sodium, saturated fat, calories, and TFAs compared to homemade meals (108). The SFDA requires food establishments in Saudi Arabia to declare the caloric content of meals and products on their menus. This legislation mandates that food venues provide a comprehensive nutritional analysis upon request. Food establishments were provided with several methods to determine nutritional composition, including conducting laboratory-based nutrient analysis, inputting recipes into an SFDA-endorsed website, and consulting with a licensed dietitian (88). Prior to its enforcement, the SFDA conducted national training sessions to ensure compliance. The regulation enhances consumer awareness by offering transparency about the nutritional content of meals, which encourages healthier choices. The SFDA also addressed stakeholders' concerns about the complexity and costs by developing a free-to-use online calculator for calorie assessment (88).

The SFDA has implemented several additional regulations aimed at enhancing consumer awareness regarding the nutritional composition of meals and beverages consumed outside the home. From 2021 to 2024, the SFDA mandated that all food establishments incorporate information regarding common food allergens into their menus, including gluten, egg products, dairy, fish, peanuts, nuts, sulfites, celery, mustard, and sesame. The Saudi and Gulf regulation titled "Declaration of Food Allergens in Food Establishment Menus" specifically requires food venues to display allergen information in a manner that is easily identifiable by consumers, thereby reducing the risk of inadvertent consumption of harmful ingredients (90).

In 2022, the technical regulation titled “Requirements of Meals with Balanced Nutrients Served in Food Establishments Away from Home” was issued, defining the criteria for labeling meals in food establishments offering takeout food and beverages as “Nutritionally Balanced” (109). According to this regulation, meals for children labeled as balanced must contain fewer than 450 kcal per meal, with added sugar limited to 5% or less, saturated fat (SFA) capped at 10% or less, and sodium not exceeding 400 mg. For adults, nutrient-balanced meals must contain no more than 600 kcal per meal, with both added sugar and SFA content limited to 10% each, and sodium capped at 400 mg per meal. These guidelines were based on daily caloric needs of 1,500 kcal for children and 2,000 kcal for adults (109).

In 2023, the Labeling of High-Salt Meals in Food Establishments’ Menus regulation was introduced. This regulation requires restaurants and food establishments to place a “high salt” label next to any meal containing more than 2,000 mg of sodium. Establishments were also given the option to replace traditional labels with QR codes that display all sodium-rich items. The regulation applies to both printed and online menus, covering all meals, whether they are temporary or part of the regular menu. It affects venues such as restaurants, cinemas, supermarkets, bakeries, cafeterias, universities, entertainment facilities, gyms, and airports, while excluding nurseries and schools (110).

Additionally, in 2023, the Declaration of Caffeine Content in Food Establishments Menu’s regulation was issued to raise consumer awareness about the risks of excessive caffeine intake. It requires establishments offering coffee to list the caffeine content per 100 ml or per cup on both printed and electronic menus. Furthermore, a disclaimer regarding the recommended daily upper limit for caffeine consumption must be included. However, caffeinated beverages that are temporary items or served from food trucks and mobile coffee stations are exempt from this requirement (111).

In 2023, the Labeling of Physical Activities in Menus of Food Establishments Away from Home regulation was issued, requiring food establishments to display the amount of walking time needed to burn the calories of a menu item. A specialized calculator was provided to help establishments estimate the time based on the caloric content of the meal. This regulation aims to educate consumers on the relationship between food consumption and physical activity, encouraging healthier lifestyle choices and promoting regular exercise for improved well-being (112).

4.3 Government Establishments

Food providers within government facilities are not required to follow SFDA's existing nutritional regulations; however, the SFDA has introduced Nutritional Guidelines for Food Provided in Government Facilities to promote health awareness and foster a healthier environment across all sectors in Saudi (113). These guidelines encourage restaurants to offer meals rich in healthy fats (e.g., olive oil), various portion sizes, and high-fiber options (such as whole-grain bread and brown rice). Fresh fruits and vegetables should be readily available, while low-sodium meals and alternative seasonings like lemon and garlic are recommended. Coffee shops are advised to provide high-fiber snacks and decaffeinated options to help reduce caffeine intake. Additionally, vending machines in government buildings must stock nutritious options and be regularly restocked. Juice bars are encouraged to serve only 100% fresh fruit juice without added sugar and to avoid misleading health claims, such as labeling products as "fat-burning juice" or "energy juice" (113).

4.4 Inspection Campaigns

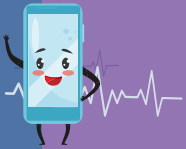
In 2019, several national inspection campaigns were conducted to assess compliance with calorie labeling and allergen information in food establishments which serves food to consumers outside home (restaurants, cafes, bakeries, etc) , specifically to determine whether foods included calorie information on their menus and to analyze the nutritional composition of their products (45). The first campaign covered numerous food establishments in Saudi Arabia, with results from 1,363 venues showing that 27% did not display the caloric composition of their meals, 25% partially displayed the caloric composition of menu items, and 19% had incorrect calculations. Additionally, the second campaign revealed that 37% of food venues did not include allergen information on their menus (45).

In 2020, an inspection campaign was conducted on juices and beverages, as well as juice mixtures sold in juice shops, restaurants, and cafés, targeting 1,284 establishments. It was found that 765 of these establishments were non-compliant, representing 60% of the total, due to several observed violations: first, the use of added sugars and both natural and artificial sweeteners in fresh juices; second, the failure to include warning statements or advisory labels as required by regulations; third, the lack of disclosure of all ingredients in juices, beverages, and mixtures on the drink menus; fourth, the use of misleading names or phrases on the fresh juice menu; and fifth, the non-implementation of calorie labeling (45).

In 2020, the SFDA conducted a campaign to assess compliance with the labeling regulation for fruit juices, nectars, and fruit drinks. The campaign covered juices in various forms (i.e. liquid, concentrate, condensed, gel, or essence) produced by juice manufacturers across six regions in Saudi Arabia, revealing that 4% of the manufacturers were non-compliant with the regulation. Among the non-compliant manufacturers, the most common discrepancy found was for products labeled "No Added Sugar" having an added sweetener other than sugar. Other discrepancies included writing sweetener information in a smaller font than the other listed ingredients (96).

In 2020, an assessment of the composition of added sugars in 54 bread products found that the mean sugar content was 4.2 g/100 g, exceeding the recommended composition of 1.5 g/100 g. The SFDA investigated the extent of the incorporation of FoPL into food products from 2019 to 2020 through secondary data analysis of the SFDA database. Furthermore, the data from 4,335 companies showed that only 1.8% (80 companies) used FoPNL on 119 products. Beverages were the most labeled (30%), followed by dairy (23%) and confectionery (13%). The majority used the Guidelines Daily Allowance system (63%), with 36% using the MTL and 1% adopting the Health Star Rating. Among MTL-labeled products, 65% complied with SFDA's recommendations, with most having low salt, saturated fat, and fat content. However, 40% had moderate sugar, and 42% had high sugar levels (45).

CHAPTER



05

Awareness and Marketing

Chapter 5. Awareness and Marketing

Communication may influence behavioral changes through informational guidance and debunking. Thus, awareness and marketing play important roles in eating behaviors. This chapter describes the marketing reforms and awareness campaigns conducted by the SFDA to promote the adoption of healthy eating habits across the lifespan.

5.1 Marketing of Healthy Food and Beverage

Health and nutrition claims influence individuals' nutritional choices, and when applied appropriately, they can help consumers in selecting healthy products. However, these claims also carry a significant risk of misleading consumers. A systematic review and meta-analysis showed that products featuring health-related claims were more likely to be chosen than identical products without such claims (114,115). In 2023, the regulation "Requirements for Marketing and Advertising of Certain Food Products and Foods Sold Away-from-Home" was introduced as a technical regulation that standardizes the marketing and promotion of healthy foods. While the "Requirements for Health and Nutrition Claims" has been updated to outline the permitted claims and the specific conditions that must be met for their use on food product labels, thereby ensuring that only products with high nutritional value are promoted. (100,116). Under the regulation of "Requirements of Food Products with High Nutritional Value", manufacturers can promote their products as having "high nutritional value" if they meet the established criteria (107). This model acts as a standardized framework for assessing the nutritional value of food products. Such regulations aim to make it easier for consumers to identify healthier options and encourage the consumption of nutritionally beneficial products.

5.1.1 Marketing Restrictions of Unhealthy Foods and Beverages

In 2010, the World Health Assembly (WHA) encouraged all member countries to adopt legislation limiting the marketing of food items with low nutritional value to children and adolescents (117). The promotion of unhealthy food items is known to negatively impact eating habits among youth. Between 2016 and 2021, the SFDA evaluated YouTube channels that were most visited by children and found that HFSS food products were frequently marketed through advertisements, promotional codes, and cartoon characters (118). In 2022, the SFDA introduced guidelines to regulate marketing directed at children and adolescents under 18 years in Saudi Arabia. These guidelines prohibit advertising products labeled as having "low nutritional value" in various settings, including children's television programs, YouTube channels targeting young audiences, movie screenings aimed at children under 18 years, places where children and teens commonly gather (such as schools, parks, and playgrounds), and events specifically targeting children (119).

5.1.2 Surveillance of Marketing of Unhealthy Food Products to Children and Adolescents

In 2020, the SFDA examined major supermarkets in Riyadh to evaluate the adherence of foods and beverages to HFSS regulations. Food products featuring toys or animated characters were also selected. Items such as unflavored milk and sparkling water, which were not considered HFSS, were excluded from the assessment. Products with saturated fat, total fat, and salt content exceeding 10%, 30%, and 1%, respectively, were considered unhealthy. A total of 294 items were assessed, with 91% having at least one nutrient that surpassed the WHO limits for SFAs, fat, or sodium. Furthermore, more than 50% of the products in more than half of the examined food categories exceeded the set limit for sugar (Fig 5.1).

Fig 5.1. Frequency of children's products that exceed the WHO limits for saturated fat, total fat, sugar, and salt

5.2 Awareness of the Public

5.2.1 Awareness Campaigns

The SFDA launched awareness campaigns and published educational guides to provide evidence-based information on nutrition-related topics to the public (Table 5.1). The "Guide to Healthy Nutrition" is a comprehensive guide providing valuable information and guidelines to help individuals adopt healthy eating habits. This guide serves as a roadmap for individuals of all ages to make informed decisions regarding their dietary choices and outlines the suggested food group servings based on individuals' different life stages. For example, the guides address diets designed to target obesity, CVDs, micronutrient deficiencies, and osteoporosis. These recommendations also support cognitive function, maintain muscle mass, and reduce the risk of age-related diseases.

Table 5.1. Examples of Educational Guides for Consumers Published by the SFDA

Guide Name	Year Published	Reference
Guide to Healthy Nutrition	2022	(120)
Vitamins Guide	2023	(121)
Minerals Guide	2023	(122)
Breastfeeding Guide	2021	(123)
Guidelines for Reducing Salt Consumption	2019	(94)
Guidelines for Reducing Sugar Consumption	2019	(124)
Your Food is Wholesome and Healthy	2021	(125)
Not Everything You Hear is True	2021	(126)
Count It Right	2021	(127)
Healthy Food Guide for School Students	2023	(128)
Healthy Recipes for the School Lunchbox	2022	(129)

Abbreviation. SFDA: Saudi Food and Drug Authority

Raising public awareness of the significance of obtaining essential vitamins and minerals from food sources rather than relying solely on supplements is crucial for promoting optimal health and well-being. This led to the publication of two comprehensive guides, the Vitamins Guide and the Mineral Guide, which aim to empower individuals to make informed decisions regarding their diet. These guides enable a comprehensive understanding of each micronutrient's role in the body and the associated health benefits of meeting the recommended daily intake (121,122).

In recognition of the importance of breastfeeding, the SFDA issued the Breastfeeding Guide, which includes essential information on proper nutrition for women during pregnancy and lactation, helping expectant mothers meet their nutritional needs to support their babies' health. The guide also covers practical aspects of breastfeeding, such as safe storage practices and food safety precautions related to breast milk. Acknowledging the challenges faced by working mothers in balancing work and breastfeeding, it provides preparation strategies, feeding schedule management, and guidance on organizing the expression and storage of breast milk in the workplace (123). Figure 5.2 illustrates an example published on the SFDA's social media to raise awareness about breastfeeding.

Fig 5.2. An example of an infographic related to breastfeeding

Educational materials have been published to raise the awareness of the consumers on interpreting nutrition labels, which can encourage them to make healthy food choices and improve their decision-making (Fig. S2). The campaigns included posts on the SFDA media platforms along with publications of guides explaining aspects of the nutritional labels and claims that can appear on nutrition labels (e.g., "low-fat," "high in fiber," or "sugar-free" claims). The SFDA also published instructional materials on traffic light labeling with guidance on how to interpret these color-coded symbols (i.e., red, orange, and green; Fig. S3). These reference cards are useful for summarizing key information on nutritional labels, allowing shoppers to compare and choose products based on their individual nutritional preferences and requirements.

The SFDA has published two guidelines that review reducing salt and sugar consumption (94,124). The salt reduction guide helps identify sodium-rich food sources, calculate the sodium composition of food products, and adopt approaches to minimize salt in food preparation. In addition, this guide provides insight into salt alternatives and guidance for selecting healthier options. The sugar reduction guide was designed to assist consumers in understanding the various types and sources of sugar, highlight the adverse health effects associated with excessive sugar consumption, and outline approaches to minimize sugar intake. It also explains how to determine the sugar content of food items by reading the nutritional information on the product labels (124).

Students need a balanced and diverse diet to provide their bodies with the nutrients required to focus on their education and engage in various activities. Since they spend more than one-third of their day at school, they should also receive one-third of their daily nutritional requirements at school. Parents play a critical role in supporting their children by preparing and providing healthy meals and educating them about making appropriate food choices and serving sizes. Thus, the SFDA introduced the Healthy Food Guide for School Students and launched an awareness campaign on its online platforms prior to each academic year. This guidance manual outlined the daily nutritional needs of students, their daily requirements for vitamins and minerals, descriptions of nutritious meals, and appropriate portion sizes. It also includes guidance on preparing school lunchboxes that are appetizing and nutritionally balanced to meet students' nutritional needs throughout the day. Foods and beverages are classified into three groups (green, orange, and red) based on their nutritional value. Green items are the primary choices for school meals. Foods and beverages in the orange category are not recommended as the primary choices for school meals and should be provided in smaller quantities. Food items from the red category should be excluded because of their low nutritional value (128). The SFDA has also published the Healthy Recipes for the School Lunchbox, which includes examples of healthy and balanced meals for students' lunchboxes. These meals are divided according to the number of school days per week and include instructions on preparation and nutritional composition (129).

5.2.2 Food Trends

Food trends refer to shifts in consumer preferences, behaviors, and consumption patterns regarding the popularity of food and beverages over a certain period. The SFDA monitors these trends and publishes educational materials addressing them (e.g., nutritional values and medical warnings tailored for specific groups such as pregnant women, patients with chronic medical conditions, and children). Fig 5.3 illustrates an example of an infographic posted by the SFDA on social media networks regarding hibiscus tea.

Fig 5.3. An example of an infographic on the contraindications for consumption of hibiscus tea

During Ramadan, the ninth month of the Islamic calendar, Muslims worldwide fast from dawn to sunset and refrain from consuming fluids and food during fasting. The duration of fasting ranges from 12 to 18 hours, depending on the season and geographical location. During this month, individuals may change the quality, quantity, and timing of their meals (130). The SFDA published the Your Food is Wholesome and Healthy Guide, providing a range of options for suhoor (pre-dawn meal before fasting) and iftar (fast-breaking evening meal for Muslims) meals during Ramadan. The guide covers the five food groups with an accompanying list for each group, offering examples of food items that represent a high-quality diet and suggesting portion sizes (125). During Ramadan, numerous seasonal food myths circulate that include misinformation lacking a solid scientific foundation. Such misinformation can influence consumer dietary behavior, leading individuals to make misguided decisions based on inaccurate and unscientific information. To address this, the SFDA introduced an educational guide called "Not Everything You Hear is True" to raise consumer awareness and prevent the spread of misinformation. This guide debunks myths that circulate during the month of Ramadan. This guide provides accurate information to counter each myth (126). The SFDA regularly monitors food-related misinformation on social media platforms to proactively respond and provide appropriate clarifications (Figure 5.4). Another guide published by the SFDA relevant to fasting during Ramadan is Count it Right, which includes information on the calorie content of the most commonly consumed Ramadan dishes, including a wide range of beverages, soups, and desserts (Figure 5.5). This guide is designed to help consumers be mindful of their consumption patterns and make healthier choices (127).

Fig 5.4. An infographic about food-related myths addressed by the SFDA.

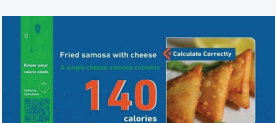


Fig 5.5. A “Calculate it Correctly” guide item

Every year, millions of Muslims worldwide head to the city of Makkah in Saudi Arabia to complete the Hajj rituals (131). Owing to the extreme weather conditions in the city of Makkah and the physical demands of the Hajj rituals, pilgrims are susceptible to acute fatigue and dehydration. The SFDA conducts awareness campaigns during the Hajj season to provide essential information and precautionary measures for pilgrims. In 2022, an awareness campaign took place at King Abdulaziz International Airport in Jeddah and Prince Mohammed bin Abdulaziz Airport in Medina that provided guidance to ensure that pilgrims adopted safe and healthy behaviors right from their arrival. The materials distributed included printed materials, visual aids, and audio clips containing awareness messages (Fig G1). These campaigns covered various areas, including healthy food and food safety, and were available in 12 commonly spoken languages among the pilgrims (i.e., Arabic, English, French, Urdu, Hindi, Bengali, Malay, Indonesian, Turkish, Spanish, Russian, and Chinese). They highlighted the importance of incorporating wholesome foods, staying hydrated by drinking water, and avoiding excessive consumption of energy-boosting drinks, such as coffee and tea. In addition, the campaigns focused on food safety and hygiene. The SFDA collaborated with the authorities in the holy cities of Makkah and Madinah to promote proper practices in meal preparation and ensure the provision of safe and healthy meals that comply with food safety standards. These organized workshops targeted personnel working in food establishments serving meals to pilgrims.

Eid Al-Adha, a religious holiday celebrated by Muslims worldwide following the annual Hajj pilgrimage, is marked by the tradition of slaughtering sacrificial animals, leading to increased meat consumption. The surge in meat consumption also carries an increased risk of foodborne illnesses, CVDs, and colorectal cancer. To address these concerns, the SFDA conducts awareness campaigns that cover various topics related to meat safety, including the identification of external signs indicating that the meat may be unsafe for consumption; the importance of proper meat handling, preservation, and storage practices; recommended storage duration for different types of meat; meat safety during and after cooking; promotion of healthier cooking methods to minimize excessive fat and cholesterol intake; and highlighting the recommended daily intake of protein. Through these comprehensive awareness campaigns and educational initiatives, the SFDA has contributed to ensuring safer and healthier Eid celebrations.

CHAPTER

06

The Impact of Nutritional Policies on Intake and Mortality

Chapter 6. The Impact of Nutritional Policies on Intake and Mortality

Policy analysis enables regulatory bodies to assess the costs and effectiveness of reforms (132). This type of analysis involves evaluating existing policies for their ability to reduce relevant risk factors and the resulting effect on health outcomes. This chapter describes an impact measurement analysis conducted by the SFDA to evaluate the effect of nutrition reforms issued in 2018–2019 on NCD-related mortality.

6.1 Analysis of Nutrition Reforms

Assessing policies in terms of their anticipated consequences and subsequent effectiveness in attaining their objectives is a critical aspect of policy analysis (133). This procedure enables regulatory authorities to select the most cost-effective and efficient policy alternatives to manage a particular issue or risk factor in society. Moreover, it entails evaluating existing policies with respect to their capacity to decrease the targeted risk in society, which consequently alters the risk itself, resulting from the reduction of the risk addressed by legislation.

Assessing policy effectiveness, especially in scientific evaluation, presents challenges. One key difficulty is isolating a policy's impact on reducing a specific risk factor amidst numerous influencing variables (134). Verifying that any risk reduction is due to the policy, rather than external factors, is also problematic. Essentially, determining whether changes in risk factors and risk result from the policy or other factors, such as time, involves issues of causality and causal inference.

Experimental evidence, particularly from randomized controlled trials (RCTs), is considered a robust methodology for addressing questions that require causal reasoning (135). Such studies measure the change in risk after artificially exposing the intervention group to a risk factor and then comparing these changes in risk to a control group that shares all characteristics with the intervention group, except for the exposed factor. This approach helps verify causal considerations, such as Hill's criteria, which include factors that must be met between cause and effect to establish

a causal relationship, such as strength and consistency (136). Although this approach is beneficial for testing individual-based interventions, such as diets and educational interventions, it may be challenging and impractical to apply it on a larger scale for community-based interventions.

Moreover, certain risks, such as mortality rates, pose challenges in terms of evaluating their policy impacts directly. As a result, the causal relationship between the intervention and the risk factor is established through a chain of events, which links the intervention to the risk factor and then to the actual risk. This process is facilitated by dose-response models that connect the risk factor to the risk, thus making causal inference a two-step procedure. To investigate such phenomena, various methodologies have been developed, including structural causal models (SCMs) and graphical models (137). These models are among the methods used to construct causal inference using observable data, which are typically available in such cases. By utilizing these models, a causal relationship can be mathematically demonstrated, as opposed to the conventional approach of causal reasoning proposed by John Mill. In this manner, causality can be mathematically proven for such type of data (135,138).

To implement this model, a causal framework must be established, linking compliance program measures to changes in risk factor exposure and subsequently to risk changes. This should be based on dose-response models supported by systematic reviews and comprehensive studies, including probabilities. The incremental variable approach in quasi-experimental studies is one method for constructing such models (139). This method allows for a computational representation of the country's food system as a complex system and examines the policy's impact on the entire system through a two-step causal chain (policy → risk factors, and risk factors → outcomes). This methodology is notable for creating a counterfactual scenario, which helps determine if the risk rate change is due to the policy or merely the passage of time, thereby offering better insights than simple pre-post studies for policy analysts.

This study employed a quasi-experimental approach with an incremental variable to understand real-world policies and causally model society using data from the policy implementation period, including compliance program data, individual consumption data, and health metrics such as mortality rates. The Food and Drug Authority developed an SCM and conducted quasi-experimental research on healthy food policies enacted between 2019 and 2022.

6.2 Study Design

The SFDA has worked on building SCMs to analyze the impact of healthy food policies implemented under the following regulations:

1- Displaying Caloric Information on Food and Beverage Products in Menus of Food Establishments (88).

2- Incorporating Back-of-Pack Nutritional Labels (100).

3- Banning of Partially Hydrogenated Oils in Food Manufacturing (83).

4- Regulating the Nutrient Composition of Fresh Juices, Nectars, and Fruit Drinks and their Display on Products in Food Venues (81).

5- Establishing a Sodium Limit for Bread Products (70).

The original model algorithm has been developed, evaluated, and published in a peer-reviewed journal (140). The causality model is represented by a graph comprising nodes and edges (Fig 6.1). The variables were classified into four main categories: incremental variables (IV), risk factors (X), outcomes (Y), and confounding variables (Z). Nodes describe the state of transition from one category to another, and edges represent the direction of the relationship.

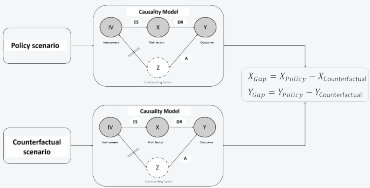


Fig 6.1. The causality model using a quasi-experimental design.

The first node of the model is IV, representing descriptive data on the consumption and purchasing behavior of food goods in society. Probabilistic modeling method was employed to assess dietary exposure by collecting data from food supply chains at various stages that incorporated purchasing data and commodity prices (141). Making direct purchases was impossible owing to the absence of national data on direct consumption. IV was estimated using purchasing behavior data, monitoring programs, and food supply chain data (139). Euromonitor International, a third-party commercial data provider, was used to estimate total market data (142). The analysis included the most likely consumption scenario based on commodity trading and food information, considering significance levels of 95%, 50%, and 2.5%, and utilized a model with a 50% threshold.

The risk factor (X) represents the rate of change in dietary exposure to nutrients. The effect size (ES) of the policy was determined through systematic reviews and meta-analyses that examined these types of policies as interventions (143). Meta-analyses incorporating observational cohort designs and RCTs from diverse geographical regions were selected to ensure a comprehensive assessment of the interventions' weight of evidence (144,145). For policies with specific reference values (e.g., banning PHOs, establishing a sodium limit in bread), the ES was calculated by subtracting the intake prior to policy implementation from the defined value. The third node expresses the change in outcome (Y), which occurs sequentially with the risk factor through a dose-response relationship. Data were extracted from epidemiological studies. The last node represents confounding variables (Z), such as smoking, physical activity, and economic and social factors. These variables were assessed by evaluating their contribution to mortality using dietary exposure and mortality data from the period preceding the legislation (2010–2018) to estimate the contribution of other factors to the outcome of interest. Figure 6.1 presents the simulated scenarios. Xgap and Ygap reflect the changes in risk factors and outcomes, respectively, resulting from policy implementation (Xpolicy and Ypolicy). After adjusting for confounding factors and the counterfactual scenario, the mortality rate was determined if the dietary habits observed during the baseline period before policy implementation in 2018 continued at the same growth rates until 2022. Table 6.1 shows the computational methods and data sources used to derive the different parameters.

Table 6.1. Parameters and Data Sources

Parameters	Database/Equation	Data Source
IV	$IV_{policy} = E_{ALL} \times \beta_{compliance} \times ES$ $IV_{counterfactual} = E_{ALL} \times expected\ growth\ rate$	.
E_{ALL}	$E_{ALL} = E_{unpackaged\ food} + E_{pre-packaged\ food} + E_{oil-sugar}$	.
$E_{unpackaged\ fc}$	$E_{unpackaged\ food} = \sum C_{unpackaged} \times F_{unpackaged}$	.
$E_{packaged\ food}$	$E_{packaged\ food} = \sum C_{pre-packaged} \times F_{pre-packaged}$	.
$E_{oil-sugar}$	$E_{oil-sugar} = \sum \left(\frac{daily\ spending\ on\ single\ ingredient\ foods}{the\ price\ of\ single\ single\ ingredient\ food-ingr}\right) \times CI$	.
$C_{unpackaged}$	GENuS Project Database	[143]
$C_{packaged}$	Euromonitor Database	[75]
$F_{oil-sugar}$	Uniform Distribution for GENuS Project Database	[143]
$F_{unpackaged}$	FAOSTAT, Global Dietary Database	[146]
$F_{packaged}$	Euromonitor Database	[75]
$F_{oil-sugar}$	General Authority for Statistics in Saudi Arabia Database	[147,148]
$\beta_{compliance}$	SFDA's monitoring program	[70,81,83,88,100]
DR	Risk factor and outcome dose-response	[148,150]
ES	Policies targeting a dietary habit: $ES = 1 - \frac{change\ in\ treatment\ group\ \ from\ Meta-analy}{change\ in\ control\ group\ from\ Meta-analysi}$	[150–154]

Abbreviations: C, nutrient composition; DR, dose-response; E, exposure; ES, effect size; F, supply; GASTAT, General Authority for Statistics in Saudi Arabia; IV, incremental variable

To assess the policy scenario, dietary exposure data for both packaged and unpackaged products, as well as single-component products, were collected. To calculate the IV, data on the supply of unpackaged, packaged, and single-component foods were used (Fig 6.2). The next step involved multiplying the calculated dietary exposure value by both ES and legislation-specific values. For the counterfactual scenario, cumulative dietary exposure data were collected between 2010 and 2018, before the implementation of the legislation. These data were used to project the expected increase in the absence of legislation implementation based on the trends and calculations recorded during that period. The values were then entered into the model to represent the IV for the counterfactual scenario.

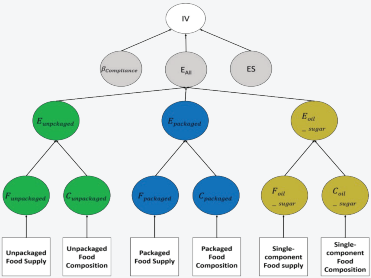


Fig 6.2. The probabilistic modeling methodology.

After ensuring the normality of the data distribution, paired t-tests were used to assess the statistical significance of the differences in intake between the years 2019–2022 and 2022. The IV data were initially in lognormal format, necessitating conversion to a normally distributed data format. Subsequently, tests were independently performed for each year between the scenario and counter-scenario. The significance level was set at $p < 0.05$, and the data analysis was conducted using SPSS version 25.

6.3 Results

Table 6.2 presents information on the sample used for the modeling. The characteristics of the population were derived from the National Census by the General Authority for Statistics and analyzed using the Global Burden of Disease. The analysis revealed an annual mortality rate of 514,247 deaths due to chronic diseases (Table 6.2). Most deaths were associated with heart disease (65%), followed by cancer (15%), kidney disease (10%), liver disease (5%), and diabetes (5%) (155).

Table 6.2. Characteristics of the Sample Included in the Modeling Study

Variable	n (%)
Gender	
Men	15,466,150 (60)
Women	10,362,104 (40)
Total	25,828,254 (100)
Annual number of deaths [a]	
Cancer	79,303 (15)
Kidney disease	50,034 (10)
Liver disease	28,004 (5)
Diabetes	22,684 (5)
Cardiovascular disease	334,222 (65)
Total	514,247 (100)

[a] Vos et al. (2020)

Table 6.3 summarizes the synthesized findings concerning the consumption patterns for unpackaged and packaged goods and the behavioral patterns of consumers within the 15–84-year age group in the Saudi Arabia. The findings indicated that the respondents' mean daily ingestion of nutritional risk factors, namely calories, fats, added sugars, and sodium, exceeded the recommended values set by the SFDA's Third Strategic Map (46).

Table 6.3. Nutrient Exposure Model

Nutrients	50th percentile			Saudi Reference Value
	Total	Men	Women	
Calories (kcal)	3,315	3,311	3,307	2,000
Protein (g)	101	101	99.1	50
Carbohydrate (g)	392	418	393.6	260
Fiber, dietary (g)	37	36.4	36.9	28
Total fat (g)	144	144	143	70
Saturated fats (g)	33.8	33.9	33.6	20
Monosaturated fats (g)	39.9	40.1	39.6	-
Polyunsaturated fats (g)	43.8	43.4	43.6	-
Sodium (mg)	2,518	2,546	2,500	2,400

Table 6.4 presents the estimated impact of nutrition legislation on total, saturated, and TFA intakes. (Table 6.5) displays the effects of the reforms on sodium and calorie intakes. The changes are presented for 2019 to 2022, compared with the 2018 intake. Total fat and SFA intake were assessed in association with the regulations to incorporate back-of-pack labels and display nutritional information on products. The intake decreased by 9% in 2019 and reached 11% in 2022 (Table 6.4). The reduction in SFA is more significant, starting with a 32% decrease in 2018 and reaching 40% by 2022. Trifluoroacetic acid was the nutrient closest to the target. In the first year after implementing the trans-fat regulation, which established a ban on PHOs in food manufacturing, TFAs intake decreased by 97% (Table 6.4) (83). There was no significant change in caloric intake due to the regulation to incorporate back-of-pack labels and display nutritional information in food venues. This change ranged from 0.3% in 2018 to 0.5% in 2022. Finally, the change in sodium intake was meaningful after establishing a sodium limit in bread and reinforcing the labels on the products. This reduction was 44% in 2019 and decreased slightly to 42% in 2022.

Table 6.4. The Impact of Nutritional Legislation on Fat (Total, Saturated, and Trans) Consumption (g per capita) by Year

Nutrient	Legislation Code	Recommended Benchmark	Baseline	2019	2020	2021	2022
Total Fat	SFDA 2233 Regulation for Incorporating Back-of-Pack Nutritional Labels	70 g	147 g	-9.98 g	-10.20 g	-10.17 g	-10.07 g
	SFDA 2604 Regulation to Display Caloric Information on Food and Beverage Products in Menus of Food Establishments			-3.12 g	-4.16 g	-6.04 g	-6.48 g
	Total reduction			-13.01 g*	-14.44 g*	-16.86 g*	-16.47 g*
Saturated Fat	SFDA 2233 Regulation for Incorporating Back-of-Pack Nutritional Labels	20 g	34.9 g	-7.80 g	-8.10 g	-8.01 g	-7.88 g
	SFDA 2604 Regulation to Display Caloric Information on Food and Beverage Products in Menus of Food Establishments			-2.24 g	-3.12 g	-4.98 g	-4.88 g
	Total reduction			-10.23 g*	-11.26 g*	-13.04 g*	-12.78 g*
Trans Fat	SFDA FD 2483 Ban of Partially Hydrogenated Oils in Food Manufacturing	0 g	7 g	-6.8 g	-7.0 g*	-6.2 g	-7.0 g*

*p<.05

Table 6.5. The Impact of Nutritional Legislation on Calorie and Sodium Consumption Rates (g per capita) by Year

Nutrient	Legislation Code	Recommended Benchmark	Baseline	2019	2020	2021	2022
Calorie	SFDA.FD 2233 Regulation for Incorporating Back-of-Pack Nutritional Labels	2,000 kcal	3,336 kcal	-5.64 kcal	-5.82 kcal	5.78 kcal	5.70 kcal
	SFDA.FD 2804 Regulation to Display Caloric Information on Food and Beverage Products in Menus of Food Establishments			-6.68 kcal	-6.24 kcal	-6.86 kcal	-8.60 kcal
	Total reduction			-11.32 kcal*	-12.06 kcal*	-15.71 kcal*	-15.38 kcal*
Sodium	SFDA.FD 2233 Regulation for Incorporating Back-of-Pack Nutritional Labels	2 g	3.5 g	-0.107 g	-0.126 g	-0.128 g	-0.131 g
	SFDA.FD 2262 Gulf Technical Regulation: Technical Requirements for the Production of Bread			-1.073 g	-0.965 g	-0.032 g	-0.982 g
	Total reduction			-1.577 g*	-1.486 g*	-1.368 g*	-1.481 g*

*p < 0.05

Overall, the nutritional legislation was successful in achieving the targets for TFAs and SFA by 2022 (Table 6.4). Nevertheless, in 2022, the reforms were far from meeting the targets set for total fat and caloric intake (Tables 6.4 and 6.5). Although the target for sodium intake has not yet been achieved, with an intake of 2.069, sodium intake was 3% away from reaching the target in 2022. Table 6.6 presents the impact of nutritional legislation on NCD-associated mortality rate. The analysis is presented per year per 100,000 deaths. The greatest reduction in the attributed preventable death rate occurred in 2019. The numbers increased minimally thereafter, reaching 176 deaths in 2022, accounting for 0.2% of the total NCD mortality (Table 6.6).

Table 6.6. The Impact of Nutritional Legislation on the Mortality Rate Caused by Non-Communicable Diseases

Legislation	Approximate Reduction in Death Rate Per 100,000 Per Year			
	2019	2020	2021	2022
SFDA.FD 2604 Regulation to Display Caloric Information on Food and Beverage Products in Menus of Food Establishments	-32	-36	-46	-46
SFDA.FD 2233 Regulation for Incorporating Back-of-pack Nutritional Labels	-77	-80	-80	-81
SFDA.FD 2483 Ban of Partially Hydrogenated Oils in Food Manufacturing	-20	-22	-22	-23
SFDA.FD 2362 Regulation for Establishing a Sodium Limit in Bread	-27	-27	-26	-27
SFDA.FD 2573 Regulation of Nutrient Composition in Fresh Juices, Nectars, and Fruit Drinks and Their Display on Products in Food Venues	-37	-39	-44	-46
Total	-155	-165	-175	-176

6.4 Limitations and Strengths

This study has several strengths and limitations. First, it provides a thorough analysis of the effect of nutritional policies on dietary intake and outcomes while considering relevant confounding variables. The study utilized cost-effective methodologies that are commonly used to facilitate comparisons. The approach used to estimate dietary exposure accounts for multi-probability dietary exposure. It entails gathering data on supply chains and food transfers across various supply stages within the entire community. Subsequently, the potential probabilities and consumption patterns were estimated for foods that were consumed in various ways, considering data distribution, uncertainty, and variability, as identified through a literature review. Compared to national dietary surveys, purchase data are not affected by recall bias or social desirability bias and allow for a time series assessment.

However, the estimation of dietary exposure uses supply chain data, which involves determining the most probable scenario when consuming these foods in various patterns. Although this method provides an estimation of the most likely consumption pattern, it is crucial to emphasize that these data remain estimates for the food supply chain, and the most probable scenario is derived from a probability-based analysis. This does not necessarily accurately reflect actual consumption. Moreover, information is usually collected by a private company, and little control can be exerted over the data collection process. The final limitation pertains to the data sources used in the analysis. The relationship between risk factors and outcomes was based on studies conducted outside the Saudi Arabia. Sociocultural aspects such as social stratification, inequalities, and cultural capital can influence consumer choice and the behavior variables included in the models.

CHAPTER

07

Assessing the Journey Through Time

Chapter 7. Assessing the Journey Through Time

This whitepaper provides an in-depth analysis of the nutritional reforms implemented in the Saudi Arabia to reduce the burden of NCD risk factors across the lifespan. In the five years prior to writing the whitepaper, an intensive wave of nutrition legislation had been implemented in the Saudi Arabia, empowering consumers to make healthy dietary choices and reducing the proportion of HFSS foods. This chapter highlights the strengths and weaknesses of the implemented legislation and provides recommendations for future action.

7.1 Successes

Saudi Arabia is one of the countries in the EMR that has implemented a comprehensive strategy incorporating mandatory regulations and elective standards to reduce the dietary intake of TFAs, sugar, sodium, and SFA and to enhance the display of nutrition composition on prepackaged products and meals served in food venues (45). The policy banning the use of PHOs was among the most efficient legislation implemented in the Saudi Arabia. Food manufacturers' adherence to this legislation was considered high (i.e. 80–95%) from 2019 to 2022. The policy analysis based on sales purchases revealed that the estimated intake of industrial TFAs in the Saudi Arabia should be close to zero by 2022—a major achievement given the detrimental effect of TFA intake on cardiovascular health. Another target that was met was the reduced intake of SFA. The reinforcement of back-of-pack labeling, analysis of the nutritional composition of served meals and beverages, and the display of the caloric composition of food items in food venues were associated with an average SFA intake of 12.7 g in 2022, well below the set target of 20 g. Moreover, establishing a sodium limit in bread and reinforcing back-of-pack labeling were associated with a 60% reduction in sodium intake from 2018 to 2022. This reduction has both statistical and public health significance, considering that even a 10% reduction in sodium intake is regarded as the minimum threshold for meaningful public health benefits (156). The success of the reforms can be largely attributed to the commitment of the Saudi Arabia leadership to providing the necessary human and financial support to develop policies, conducting inspection campaigns, and taking corrective measures.

7.2 Limitations and Weaknesses

Despite reductions in TFAs, SFA, and sodium intake, the existing reforms have many limitations and weaknesses, such as redundancy and limited changes in NCD outcomes. First, substantial overlap exists in the strategies used to address NCDs in the Saudi Arabia. The MOH, National Nutrition Committee, Healthy Food Department in the SFDA, and the Saudi Center for Disease Prevention and Control are working to reduce NCD risk factors in ways that do not appear to be complementary. Involving different stakeholders under a single umbrella strategy would be more cost-effective. Moreover, the reforms implemented through 2019 were not associated with clinically significant caloric restrictions. Given that the primary intervention for obesity management is caloric restriction, irrespective of diet, these restrictions may not directly reduce obesity rates (157). Reforms implemented after 2018, which include restricting the marketing of unhealthy food products to children, enhancing product labeling based on their nutritional quality, and including FoPL, are expected to contribute to a reduction in caloric intake in the future.

These limitations also apply to SFDA internal inspection campaigns. These assessments lacked random sampling across the Saudi Arabia and primarily relied on convenience samples obtained from urban areas, such as Riyadh, and regions with SFDA offices. Further, the SFDA did not prioritize regions reporting a low intake of fruits and vegetables based on national surveys, such as AlQasim, Najran, and Hail provinces (12). Thus, these regions were not specifically targeted when designing interventions or inspection campaigns. Using randomized samples for assessments would enhance the external validity of any findings, and prioritizing vulnerable populations and regions would strengthen policy impact evaluations.

The nutrient-profiling models used have also received criticism. The SNPM calculation is cumbersome, especially for individuals with limited nutritional backgrounds. Further, the use of two different nutrient-profiling models (i.e. SNPM and MTL) makes the process more complicated for stakeholders. Similarly, these limitations also apply to labeling. A 2,000 mg sodium meal served in restaurants was used as the cutoff point; however, this amount is quite high and equivalent to the recommended daily sodium intake for individuals, not their intake for one meal, based on the SFDA's Third Strategic Map. Hence, including such labeling on menus would be misleading to consumers, as it suggests that their meal was low in sodium.

7.3 Future Perspectives

Leveraging past successes such as TFAs elimination, the SFDA will continue to apply best practices in nutritional legislation and food product monitoring to create a healthier future for Saudi citizens. The SFDA initiatives will align with the goals of Vision 2030 for a healthy and empowered society (43). Future work will involve strengthening scientific research that can inform culturally relevant nutritional policies and collaborating with different governmental authorities, such as the MOH, Ministry of Education, Ministry of Sports, and Ministry of Culture, to improve policy implementation. Following successful collaborations with the food industry to eliminate TFAs, the SFDA will collaborate with food manufacturers to enhance food reformulation and reduce the composition of sodium, saturated fat, and sugars in the offered foods and beverages. Finally, the focus of the SFDA will be on understanding and improving consumer behavior through research and consumer education.

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Appendix

List of National Nutritional Policies

Name	National Number
Requirements for Health and Nutrition Claims اشتراطات الأغذية ذات الادعاءات الصحية والتغذوية	SFDA.FD 2333:2022
Requirements of Nutritional Labelling اشتراطات البيانات التغذوية على البطاقة	SFDA.FD 2233:2021
Traffic Light Labelling البيانات التغذوية في صورة إشارات ضوئية	SFDA.FD 42:2018
Declaration of Caffeine Content on Food Establishments Menu's Away from Home الإفصاح عن محتوى الكافيين في المشروبات المقدمة في المنشآت الغذائية	SFDA.FD 5023:2023
Labelling of Physical Activities in Menus of Food Establishments Away from Home وسم النشاط البدني في قائمة وجبات للمنشآت الغذائية التي تقدم الطعام للمستهلك خارج المنزل	SFDA.FD 5029:2023
Fresh Juices, Mixes, and Beverages Sold at Juice Stores, Restaurants, and Cafés العصائر الطازجة والخلطات والمشروبات التي يتم بيعها في محلات العصائر والمطاعم والمقاهي	SFDA.FD 2573:2021
Labelling of Food Allergens on Pre-packaged Food الإفصاح عن مسببات حساسية الطعام ضمن بطاقات المواد الغذائية المعبأة	SFDA.FD 5028:2023
Declaring Calories on Food Establishment Menu's Selling Away-From-Home Foods وضع السعرات الحرارية في قائمة وجبات للمنشآت الغذائية التي تقدم الطعام للمستهلك خارج المنزل	SFDA.FD 2604:2021
Declaring Allergens in Food Establishments Menus Selling Away-From-Home Foods الإفصاح عن مسببات الحساسية في قائمة وجبات للمنشآت الغذائية التي تقدم الطعام للمستهلك خارج المنزل	SFDA.FD 2605:2021

List of National Nutritional Policies

Name	National Number
Requirements for Marketing & Advertisements of Some Food Products and Foods are Selling Away-From-Home معايير التسويق والإعلان عن بعض المنتجات الغذائية والأغذية المقدمة في المنشآت الغذائية	SFDA.FD 5022:2023
Nutritional Labelling on E-commerce/Internet Sales البيانات التغذوية في التاجر الإلكتروني/ المبيعات عبر الإنترنت	SFDA.FD 5024:2023
Mandatory Addition of Vitamins and Minerals in Food Stuff الفيتامينات والمعادن الواجب توفرها في المواد الغذائية	SFDA.FD 2539:2022
Infants Formula, Follow-on Formula, and Formula for Special Medical Purposes حليب الرضع وحليب المتابعة والحليب المخصص للاستخدام الطبي الخاص	SFDA.FD 2106:2021
Infants' and Young Children's Food أغذية الرضع وصغار الأطفال	SFDA.FD 355:2023
Pregnancy and Lactation Nutritional Formulas تراكيب الحوامل والمرضعات	SFDA.FD 5025:2023
Marketing Requirements of Food Directed to Children ضوابط واشتراطات الإعلان الموجه للأطفال عن الأغذية	SFDA.FD 2725:2023
Trans Fat الدهون المتحولة	SFDA.FD 2483:2023
Labelling of juice, nectar, and fruit drinks بطاقات عصائر ونكتار ومشروب الفاكهة	SFDA.FD 2577:2021

List of National Nutritional Policies

Name	National Number
General Requirements for Pre-packaged Foods for Special Dietary Use الاشتراطات العامة للأغذية المعبأة ذات الاستعمالات التغذوية الخاصة	SFDA.FD 654:2021
General Requirements for Handling of Foods for Special Medical Purposes اشتراطات عامة لتداول الأغذية المستعملة لأغراض طبية خاصة	SFDA.FD 1366:2021
Salt Limits Guidelines in Food Products الحدود الاسترشادية القصوى للملح في المنتجات الغذائية	SFDA.FD 2612:2022
Gluten-free Foods الأغذية الخالية من الجلوتين	SFDA.FD 1021:2023
Labelling of High-salt Meals in Food Establishments' Menus وسم الوجبات الغذائية عالية المحتوى بالملح في قوائم طعام المنشآت الغذائية	SFDA.FD 5026:2023
Requirements of Food Products with High Nutritional Value متطلبات الأغذية المعبأة ذات القيمة الغذائية العالية	SFDA.FD 5015:2022
Requirements of Meals with Balanced Nutrients Served in Food Establishments Away from Home متطلبات الوجبات الغذائية متوازنة العناصر الغذائية في قائمة وجبات المنشآت الغذائية التي تقدم الطعام للمستهلك خارج المنزل	SFDA.FD 5016:2022
Technical Requirements for the Production of Bread الاشتراطات الفنية لإنتاج الخبز	SFDA.FD 2362:2021

Supplementary Material

Fig S1. Key requirements for labeling fruit juices, nectars, and fruit drinks

Fig S1. Key requirements for labeling fruit juices, nectars, and fruit drinks

Fig S3. Traffic lights healthy shopping card

Fig S4. Guide to read nutrition information

Gallery

Fig G1. An awareness campaign during the 2022 Hajj season

Fig G2. The World Health Organization (WHO) awarding the Saudi Food and Drug Authority (SFDA) a certificate for Best Practices in Industrially Produced Trans Fatty Acids (TFAs) Elimination Policies in 2024

Fig G3. Signing the voluntary commitment agreement on the Strategy of Organizing Healthy Food in 2018

Fig G4. The United Nations (UN) Interagency Task Force on the Prevention and Control of Non-Communicable Diseases (NCDs) award to Saudi Arabia in 2022

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