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Childhood Obesity in Qatar

National policy proposal through multisectoral approaches

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CONTENTS

ABBREVIATIONS

AFP	Ability Friendly Program
Awqaf	Ministry of Awqaf (Endowments) and Islamic Affairs
BFHI	Baby Friendly Hospital Initiative
BI	Behavioral Insight
BMI	body mass index
CDC	Centers for Disease Control and Prevention
COT	Childhood Obesity Taskforce
CSO	civil society organization
DIFI	Doha International Family Institute
EAST	Easy, Attractive, Social and Timely
FAFH	food away from home
FOPL	front-of-package labeling
FTE	full-time equivalent
GCC	Gulf Cooperation Council
HiAP	health in all policies
HMC	Hamad Medical Corporation
MCIT	Ministry of Communications and Information Technology
MEHE	Ministry of Education and Higher Education
MENA	Middle East and North Africa
MM	Ministry of Municipality
MOC	Ministry of Culture
MOCI	Ministry of Commerce and Industry
MOECC	Ministry of Environment and Climate Change
MOL	Ministry of Labour
MOPH	Ministry of Public Health
MOSY	Ministry of Sports and Youth
MSDF	Ministry of Social Development and Family
NCD	Non-Communicable Diseases
NDS	National Development Strategy
NHS	National Health Strategy
NIP	nutrition information panel (back-of-pack nutritional information)
NOTC	National Obesity Treatment Center
NPCD	Nutrition-poor, calories-dense
PE	physical education
PHCC	Primary Health Care Corporation
QDA	Qatar Diabetes Association
QF	Qatar Foundation
SSB	sugar sweetened beverage
UAE	United Arab Emirates
WHO	World Health Organization
WISH	World Innovation Summit for Health
WTO	World Trade Organization
WWRC	Women's Wellness and Research Center

FOREWORD

Obesity has reached epidemic proportions worldwide and given its serious medical implications, it is considered a major public health challenge. Globally, obesity is responsible for approximately 4.7 million premature deaths each year, according to the Global Burden of Disease study. Currently, more than 1 billion people worldwide live with obesity, 39 million of whom are children. Worldwide, the rates of childhood obesity have doubled over the past three decades alone. In Qatar, the prevalence of childhood obesity for children between the ages of 5 and 14 is 27.7 percent. Obesity in childhood often progresses into adulthood, and can lead to other serious health complications such as type 2 diabetes, non-alcoholic fatty liver disease, high blood pressure, and sleep apnea, among others. As such, it is critical that we take immediate, collaborative action.

The multifactorial nature of the disease calls for multisectoral action. Ultimately, addressing the complex problem of childhood obesity means that governments must recognize that impact can be achieved only when cross-sectoral collaboration exists. In Qatar, commitments have been made on a national scale to lower obesity rates through the Qatar National Development Strategies and National Health Strategies. However, as in much of the world, progress and efforts to tackle childhood obesity have often been inconsistent and unconcerted, with little coordination across sectors, resulting in limited impact. Therefore, it is imperative that governments take ownership to effectively implement recommendations and introduce the measures necessary to improve health outcomes.

We hope that this report provides a practical starting point through its proposed actionable framework for policymakers to navigate the challenges related to childhood obesity in Qatar and take collaborative actions toward addressing them.

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EXECUTIVE SUMMARY

Obesity is a public health issue of major concern affecting both developed and developing countries. Over the past few decades, the prevalence of childhood obesity has reached epidemic proportions. This brings with it a series of significant consequences including psychosocial disorders during childhood, and increases the risk of developing other non-communicable diseases (NCDs) such as hypertension, type 2 diabetes, and cardiovascular disease during adulthood. Children with excess weight are more likely to become adults with obesity. The prevalence of childhood obesity has doubled over the past three decades with approximately 340 million children worldwide between the ages of 5 and 19 currently live with overweight or obesity. According to the Global Burden of Disease study, in 2019 over 5 million deaths were associated with overweight or obesity.[1] These trends have resulted in international commitments to reduce obesity and Member States of the World Health Organization (WHO) have since endorsed a target of no increase in childhood obesity by 2025.

Obesity is affected by modifiable factors and to a large extent is preventable. It is not inevitable; rather it arises from the choices we make as societies first and foremost, and as individuals second. Avoiding or preventing obesity is therefore determined mostly by policies that are beyond the scope of medical care. Multisectoral or intersectoral policies and actions present us with a strategic vision to address these social determinants that present a threat to health. Multisectoral action for health means evidence-based actions by various sectors that are collectively required to optimize the health of the population. Essentially, these prevention policies are an integral part of the continuum of services included in universal health coverage and provide support to encourage positive health outcomes on a societal level through successful health services and interventions.

Policy action for health and healthcare is amenable to 'health in all policies' (HiAP) approaches. These approaches build upon decades of studies of multisectoral action and evidence-based public health. Typically, prevention and promotion policies in the health sector cover four main mechanisms:

- Fiscal measures (such as taxes and subsidies).
- Laws and regulations.
- Changes in the built environment.
- Community engagement and informative education campaigns.

This policy report covers these mechanisms within the wider context of a recommended bespoke multisectoral model to address childhood obesity in Qatar. The report also makes policy recommendations to guide the development of effective interventions that promote healthy behaviors and lifestyles.

The report proposes a model that considers six main levels for policy reform. The model takes into account factors including individual and interpersonal considerations, the food environment, the built environment, and behavioral determinants (Figure 1). The policy recommendations presented in Table 1 are intended to serve as the foundation for establishing multistakeholder partnerships. These recommendations and partnerships will be especially important in contexts where collaborations and engagement between the various bodies in Qatar are needed. A more detailed representation of the policy recommendations, with proposed actors and timelines, can be found in the Conclusion (Table 3).

Figure 1. Proposed intersectoral policy model targeting childhood obesity in Qatar

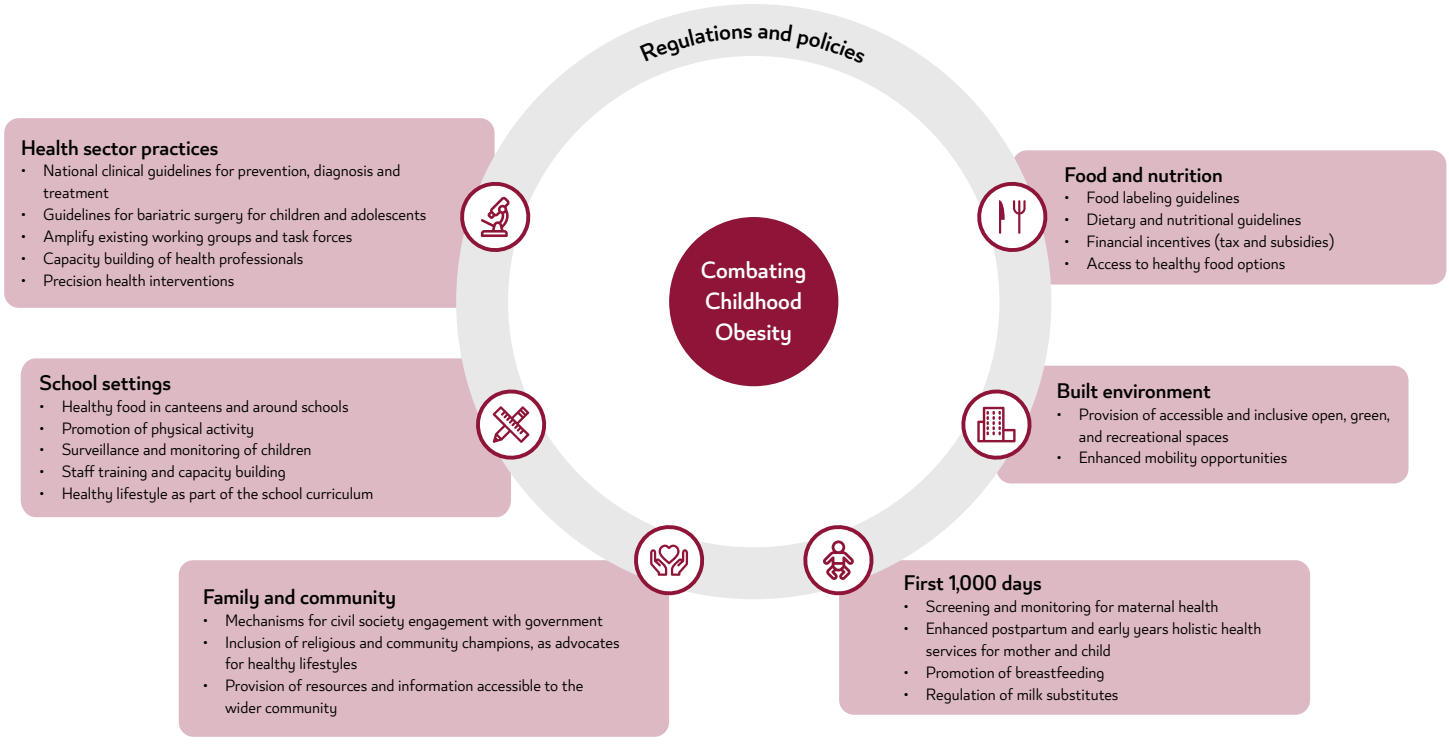


Table 1. List of proposed policies

Food and nutrition	Health sector practices	Built environment
• Develop a framework for front-of-package labeling (FOPL) for Qatar that adopts a nutrient-specific warning system, and mandate its application. • Set guidelines to control and limit advertising of unhealthy food and beverages across all platforms targeting young children and adolescents. • Develop guidelines for food product placement in physical outlets and digital platforms, giving prominence to healthy options and limiting unhealthy food within children's reach. • Continue to communicate the updated Qatar National Dietary Guidelines and develop advocacy programs. • Adopt, endorse, and ensure compliance with national guidelines in restaurants cafes, and vending machines, with a focus on fresh food/products. • Set minimum standards for imported food and establish a governance structure for monitoring. • Evaluate impact of existing excise tax policy in Qatar and explore its expansion based on recommendations from MOPH. • Expand tax guidelines to include taxing unhealthy products such as prepackaged foods and/or foods and beverages that are high in fat, salt, and sugar. • Explore mechanisms to make healthy food more affordable, including fruits and vegetables. • Encourage urban agriculture initiatives, such as community farms, to increase access to fresh produce in urban areas.	• Build on existing multistakeholder task forces and working groups to support with evidence-based guideline development and 'good practice' obesity prevention, screening, and treatment. • Implement, monitor, and track impact of established national clinical management guidelines for preventing and treating childhood obesity. • Develop national clinical guidelines for bariatric surgery for children and adolescents as a last resort and establish a mechanism to review and update the guidelines every five years. • Expand obesity treatment services and enhance integration with primary health service providers. • Strengthen screening for obesity and its risk factors at primary level of care. • Develop comprehensive national training and capacity-building programs for health practitioners. • Enable precision health interventions to help identify and target high-risk individuals to prevent childhood obesity and provide personalized treatments.	• Adopt and implement the Open Space Recreation and Sports Facilities Development Guidelines that encourage physical activity for everyone, irrespective of gender or ability. • Provide accessible facilities and equipment to promote opportunities for physical activity among all children and adolescents. • Scale up the AFP and provide necessary training and knowledge to staff members who work with children to support those with different abilities. • Set guidelines for food-service spaces, and access to healthy and unhealthy food in convenience stores and shops. • Review current city zoning strategies and explore setting buffer zones between schools and fast food outlets and supermarkets within a specific radius. • Increase and improve the walking and cycling network by bridging the gaps and linking them to public spaces.

School settings	First 1,000 days	Family and community
• Improve School Canteen Guidelines and promote their adoption by all schools. • Set nutrition guidelines for foods that students bring from home, with an emphasis on healthy food options that are aligned with Qatar's Dietary Guidelines. • Maintain a School Children Growth Monitoring Program in all schools and institutes and encourage appropriate reporting and communication channels between parents and care providers. • Enhance school policies on bullying to include obesity and weight as potential triggers. • Train school staff to recognize and respond to weight-based bullying and provide resources for supporting affected students. • Develop grade appropriate teaching materials for students on healthy lifestyles to be incorporated into school curriculums. • Train educators and counselors on the drivers of obesity and the use of non-stigmatizing language and imagery. • Develop mental health promotion programs and offer counseling for students, such as mindfulness programs and peer support groups. • Incorporate the updated Qatar National Nutrition and Physical Activity Action Plan in school settings and develop advocacy programs. • Expand access to high-quality sports and physical activity initiatives for educational institutions. • Partner with community organizations and sports clubs to offer diverse and engaging sports and physical activity opportunities for students outside of school hours. • Develop a community school model to utilize school assets and community resources in collaboration with local organizations, business and healthcare providers.	• Enhance screening for maternal obesity to identify women, and at-risk neonates, for education and close monitoring. • Maintain a minimum figure of maternal and pediatric health counselors and educators per 100,000 population. • Mandate that all hospitals provide standardized antenatal and postnatal support and counseling for expecting and new mothers. • Explore partnerships with private healthcare providers to facilitate and expand access to well-baby services for children under the age of 5. • Enhance the implementation of baby-friendly initiative accreditation across healthcare facilities. • Ensure adequate full-time registered lactation consultant staffing for all labor and delivery units. • Sustain nationwide campaigns to promote breastfeeding, supported by continued at-home care. • Provide support for working mothers to breastfeed exclusively for at least six months by extending maternity leave and introduce comfortable and private lactation rooms in all office buildings and public places. • Issue a national code regulating the marketing of breast milk substitutes.	• Expand existing and develop new public health campaigns and make accessible, culturally appropriate resources to offer health education to the community. • Launch national health and nutrition education programs for parents and caregivers. • Leverage networks of civil society organizations to amplify general public awareness campaigns. • Involve religious and community leaders, role models, and advocates in related community events that promote active, healthy habits.

OVERVIEW

Defining childhood obesity

Obesity is defined as an abnormal or excessive accumulation of fat that presents a risk to an individual's health. The most common way to classify overweight or obesity in adults is through the calculation of a body mass index (BMI). In children under the age of 5, obesity is often calculated based on the World Health Organization (WHO) child growth standards.[2] For children between the ages of 5 and 19 years, a child is considered to be affected by obesity if their measurements are greater than two standard deviations above the WHO Growth Reference. WHO, US Centers for Disease Control and Prevention (US CDC), and the International Obesity Task Force each have definitions of overweight and obesity in children and adolescents (Appendix 1).[3] While the exact definitions may vary slightly between global norm-setters, there is broad consensus that childhood obesity occurs when a child's weight gain goes beyond the healthy weight trajectory and is disproportionate to their change in height, posing negative impacts on overall health.[4]

Childhood obesity is highly associated with an increased risk of obesity in adulthood, as well as premature death and disability. Children affected by obesity are more likely to experience breathing difficulties, hypertension, insulin resistance which may lead to diabetes, increased risk of fractures and cardiovascular disease.[5] Obesity alone is responsible for two-thirds of the diabetes epidemic in Qatar; prevention of obesity would prevent most cases of diabetes.[6] Furthermore, obesity and weight stigma can have a wide range of psychological and emotional effects such as anxiety, low self-esteem, poor body image, social isolation, stress, and can lead to eating disorders and suicidal thoughts.[7] Children affected by obesity reportedly experience a higher risk of being bullied in schools, in comparison to those without obesity.[8,9] As such, obesity can also affect a child's educational attainment, leading to potentially lower income in adulthood and affecting their overall quality of life.[5]

Prevalence of childhood obesity

Although childhood obesity was once considered a high-income country problem, overweight and obesity indicators are also on the rise in low- and middle-income countries, particularly in urban areas. Worldwide prevalence rates of childhood obesity have doubled over the last three decades,

and approximately 340 million children (5–19 years) are now estimated to be living with overweight or obesity.[5] Many countries – particularly low- and middle-income countries – are now facing a 'double burden' of disease, attempting to address and direct finite resources toward health programs to manage both communicable and non-communicable diseases related to underweight, malnutrition, and obesity and overweight.[9] Furthermore, while undernutrition is typically associated with being underweight, there is growing awareness that children can be concurrently obese *and* malnourished. The availability of foods that are high in fat, sugar, and salt, that are energy-dense, and poor in micronutrients, can lead to undernutrition with overweight.[10] Nutrition-poor but calorie-dense (NPCD) food is unfortunately available in a variety of formats such as chips, candies, snack bars, etc., and specially commercialized to attract children and force parents to "buy them".

A recent retrospective comparative research study examined childhood obesity trends in Qatar for academic years 2016–2017 and 2019–2020. The study revealed that overweight and obesity rates in children between 5 and 14 years old have increased from 44 percent in 2016–2017 to 49.3 percent in 2019–2020, with 27.7 percent being obese and 21.6 percent overweight (Figure 2).[11] Among male students, obesity rates increased sharply from 26.6 percent to 33.7 percent (Figure 3).[11] Overweight and obesity rates among female students also increased but at a slower rate.[11] The prevalence of obesity across all nationalities within Qatar has been increasing, with a more significant increase among Qatari students (Figure 4).[11]

Figure 2. Overall obesity rate in Qatar

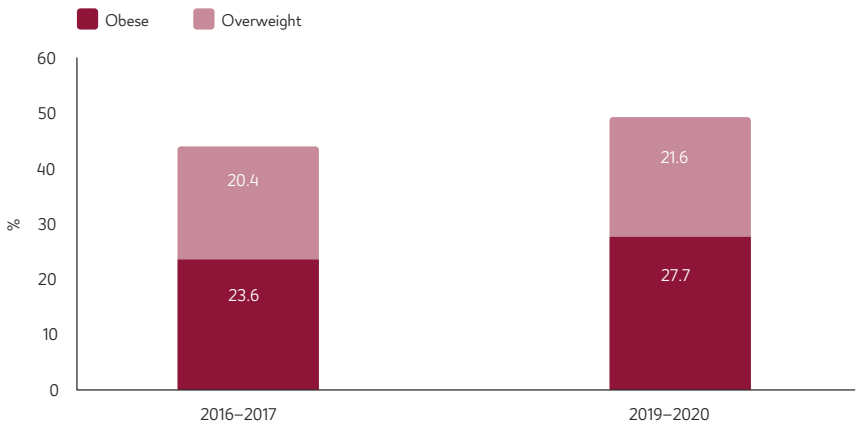


Figure 3. Obesity rates across gender

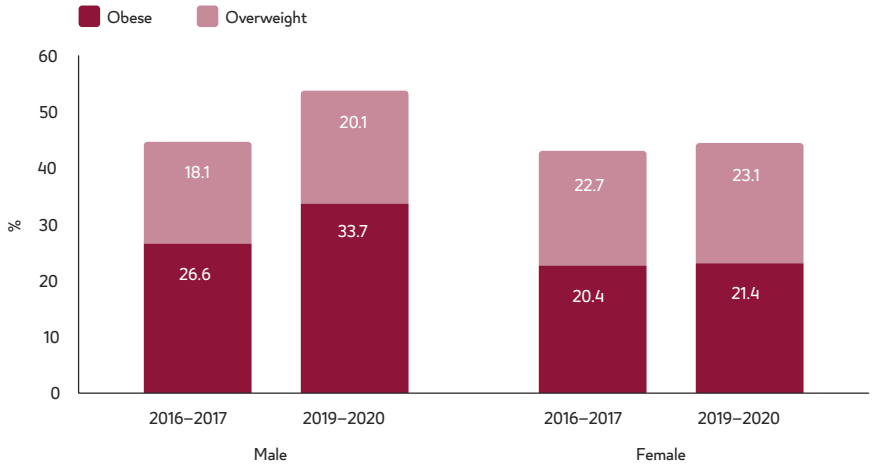
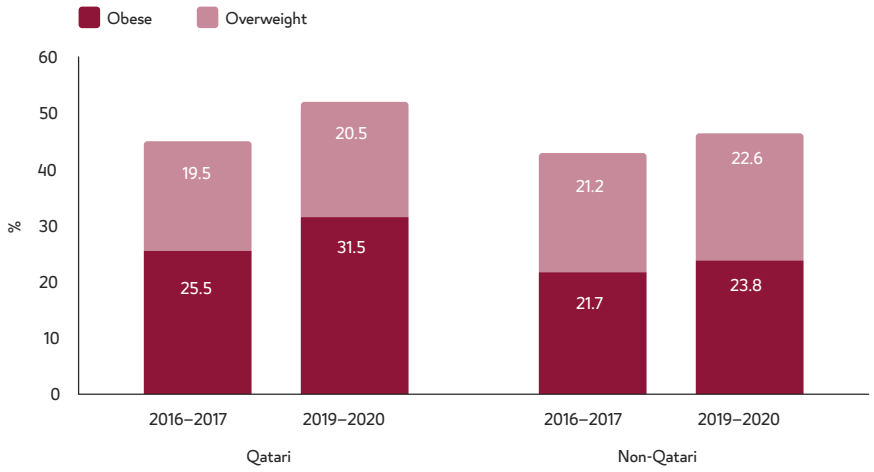


Figure 4. Obesity rates across nationality



COVID-19 AND CHILDHOOD OBESITY

Although many of the restrictive precautionary measures imposed by countries around the world following the COVID-19 pandemic were widely successful in containing the spread of the virus, the indirect negative ramifications on health cannot be ignored.

Responses to the COVID-19 pandemic resulted in major lifestyle changes including physical distancing and stay-at-home orders. School closures for many children worldwide meant that their access to nutritious food as well as physical activity and social networks was threatened. The potential consequences of confinement threaten well-being of children, placing their health at risk. As such, childhood obesity following the pandemic has risen.[12,13] Not only have childhood obesity rates increased across all age groups during the pandemic, but preexisting disparities (across minority groups and socioeconomic status) have also appeared to have worsened.[13] The increased levels of childhood obesity will also likely exacerbate existing inequities in the long term given the high cost of health expenditures and unemployment caused by the disease.

In a study conducted in Saudi Arabia, approximately 40% of children and adolescents reported experiencing difficulties in maintaining a healthy diet during the COVID-19 outbreak. The intake of simple carbohydrates, fried foods, and soft drinks was also shown to have increased during this period.[14]

Similarly, in Qatar, in a study that assessed the impact of quarantine on the diet, physical activity, sleep, and screen time in children aged 5-12, data from 144 respondents showed that only 4.5 percent of children were engaging in at least 60 minutes of physical activity per day when compared to 25.6 percent before quarantine.[15] There was also a significant reported increase in the total number of meals per day, with a specific increase in the consumption of unhealthy foods.[15] Another cross-sectional study conducted between June and August 2022 that assessed the impact of the pandemic related closure of government schools on children and adolescents' dietary habits and physical activity in Qatar showed similar trends. The study revealed a significant decrease in the intake of vegetables, coupled with increases in the overall consumption of fried foods, fast foods, sweets, and soft drinks.[16]

It is recommended that further studies on the short- and long-term health impact of quarantine are further investigated and, that the relevant authorities take these findings into account when implementing any future restrictions to contain the spread of infection.

MULTISECTORAL ENGAGEMENT AND APPROACH

Tackling childhood obesity has been slow to progress and efforts have often been inconsistent and unconcerted. In 2014, the Commission on Ending Childhood Obesity was established by WHO to review, build on, and address existing gaps in strategies and mandates. In a report published in 2016, the Commission described childhood obesity as "reaching alarming proportions in many countries and posing an urgent and serious challenge."[17] Following consultations with over 100 WHO Member States and almost 180 online comments, the Commission developed a set of comprehensive and integrated recommendations to successfully tackle childhood and adolescent obesity. The proposed recommendations aim to address and prevent obesity and emphasize the need for a whole-of-government approach where health cuts across all sectors.[17] The Commission recognized that one of the impediments to effectively implementing those recommendations and lowering childhood obesity is the absence of political will and buy-in from governments to take ownership and introduce necessary measures.

Qatar made a commitment to lower obesity rates through the Qatar National Development Strategies (NDS) 1 and 2,[18,19] which identified overweight and obesity as one of the challenges to a child's health.[20] The MoPH has set national targets in its National Health Strategy (2011–2016 and 2018–2022) and Qatar Public Health Strategy (2017–2022) goals to tackle obesity. Based on these targets, the Qatar National Nutrition and Physical Activity Action Plan has been developed and implemented since 2011 to promote healthy diets and increased physical activity aiming to halt the rise in obesity. Those strategies specified maintaining a healthy population as a goal, to be achieved by increasing physical activity rates and lowering sedentary behaviors to ultimately lower rates of obesity. 'Health in all policies' (HiAP) is an important component of NDS 2, which features an integrated approach for coordination across sectors to address complex policy problems.[21] In October 2019, at the Doha Healthy City for Children Symposium, the "Doha Commitment to a Healthy City, Healthy Children and Healthy Future" was officially forged. This comprehensive document outlined a series of pledges from all participants to make Doha a healthy city for children.[22] This transformative vision aimed to be realized through the establishment of strategic leadership, fostering policy alignment, actively engaging stakeholders, and driving the adoption of a comprehensive "Health in All Policies" (HiAP) framework that embraces principles of equity and takes a holistic life-course perspective. Furthermore, key stakeholders in Qatar including the various ministries,

research institutes, universities, schools, hospitals, and organizations have shown they are willing to engage in this area and introduced small-scale interventions to lower obesity rates. However, these have yet to lead to a reduction in overall childhood obesity rates, and a concerted effort that is anchored in monitoring and evaluation of data is required.

Multisectoral approaches to activities and policies related to the prevention of childhood obesity are crucial to improving overall health outcomes, due to the multifactorial nature of obesity. Although some weight and obesity prevention programs may be efficient, such programs tend to be resource-intensive and often have limited impact. Policy approaches that widen the spread of related initiatives across different sectors could lead to longer-lasting effects.[23–25] To address the complex nature of the problem of childhood obesity in Qatar, we adopt an integrated multisectoral approach in this report. Recognizing that tackling obesity is not the responsibility of a single body or institute, it builds on findings from international best practices, realizing that greater impact could be achieved when multi- and cross-sectoral collaboration exists.

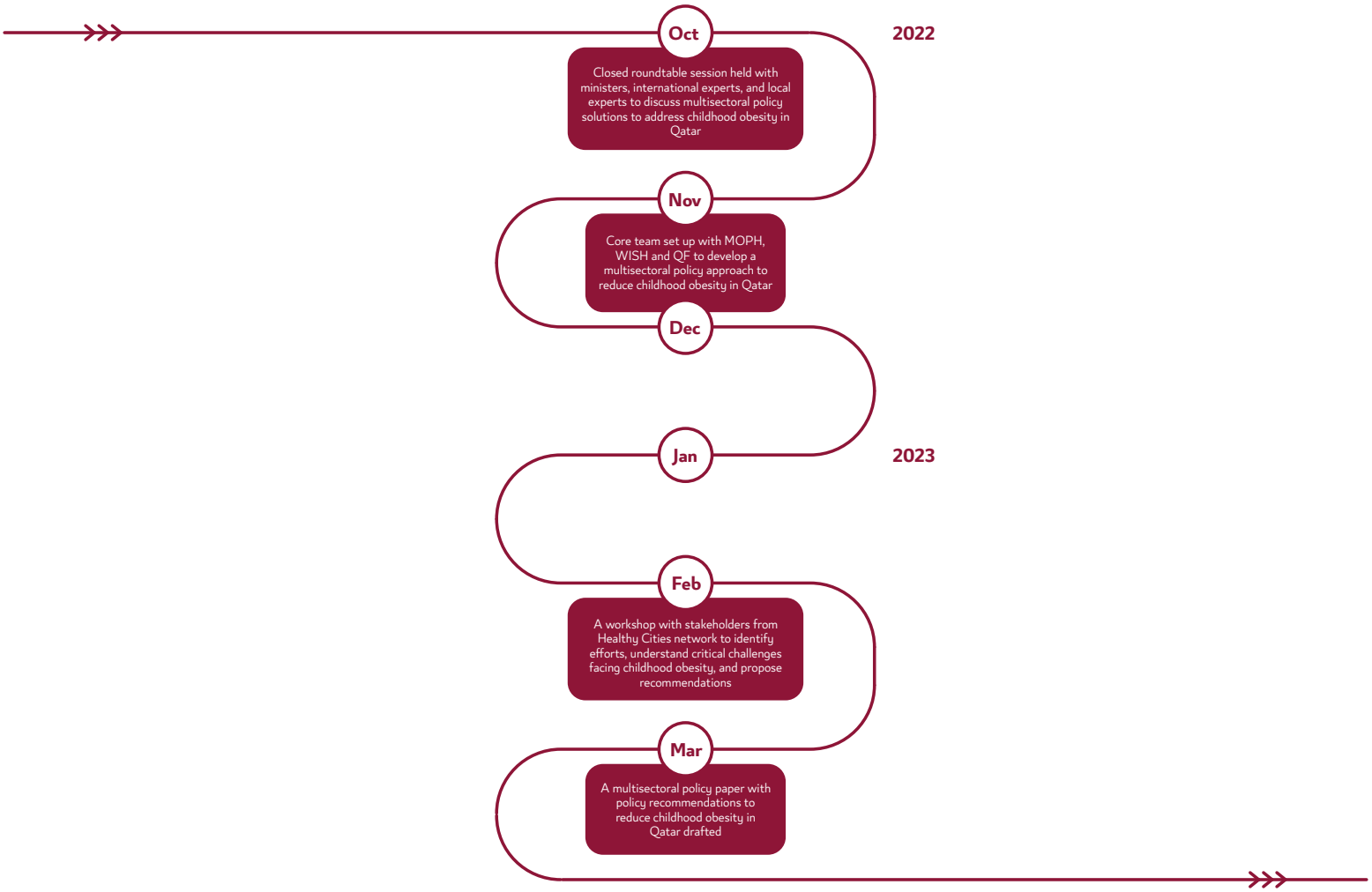
The recent recognition of all eight municipalities in Qatar as Healthy Cities, Qatar Foundation (QF) receiving a Healthy Education City award, and Qatar University a Healthy University award,[26] all affirm Qatar's commitment to continuously improving the health of its people and creating the physical and social environments for a healthy population. WHO's Healthy Cities initiative and approach recognizes the determinants of health and the need to work in collaboration across public, private, voluntary, and community sector organizations. Healthy City status is not an end goal, but a process of continuous improvement. Therefore, the Healthy Cities network presents a vibrant community of professionals from different domains who could be leveraged as a platform to convene multisectoral interactions and develop holistic policies and programs to address policy challenges and national health imperatives, including childhood obesity.

This report is the result of a roundtable discussion held during the WISH 2022 summit, which convened several local and international experts, policymakers, and practitioners to explore solutions to combat the complex and multisectoral problem of rising childhood obesity rates in Qatar. Following the discussion, a core team was formed with representatives from the Ministry of Public Health (MOPH), QF, and QF's Global Health Initiative, WISH, who were tasked with the development of a multisectoral policy approach to reduce childhood obesity in Qatar. The team conducted desktop research on international best practices and a literature review of childhood obesity to propose a tailor-made framework that is appropriate for the specific needs of Qatar. A workshop was then held with members of the Healthy Cities network, with the aim to

identify existing and planned interventions to reduce childhood obesity. Participants also shared some of the critical challenges they face in implementing interventions and proposed recommendations.

This policy report was developed in collaboration and consultation with the participants in the workshop, including high-level representations across sectors. The proposed policies and recommendation were reviewed and endorsed by multiple stakeholders, including MOPH. Figure 5 shows the timeline leading up to the development of this policy report.

Figure 5. Timeline of the workshops, discussions, and development of this report



APPROACHES TO ADDRESSING CHILDHOOD OBESITY

Given the increase in the incidence of childhood obesity, several countries have introduced and trialed different interventions and programs to lower obesity rates. A benchmarking exercise conducted by MOPH with the support of Policy Wisdom in 2018[21] identified case studies from five countries: Finland, Netherlands, Malaysia, Jordan, and Singapore. These countries were selected for their relevance to Qatar's context in terms of climate, lifestyle, eating habits, culture, or religion.[21] The study explored each country's interventions and programs aimed at lowering obesity rates, providing insights to inform proposed intervention programs and policies for Qatar.

The case studies in the MOPH research recognized childhood obesity as a complex problem and identified three main drivers: overconsumption of unhealthy foods and beverages; lack of physical activity; and sedentarism. These drivers are caused by challenges at the individual, familial, and societal levels, and they are habitual, psychological, behavioral, physiological, and cultural in nature. Hence, any efforts to address childhood obesity must be similarly multifaceted and seek to address the challenges at all levels.

International best practices have shown that, because childhood obesity is a complex public health problem, it is best tackled by a holistic approach, enabled by integrated public health policies[27] or an HiAP approach.[21] This would imply intersectoral integration and collaboration between health and non-health sectors to address complicated policy problems that not only achieve improved health outcomes, but also improve results in other areas, such as education, social and family environments, and others.

The benchmarking findings revealed that in three of the case studies – the city of Amsterdam, Finland, and Singapore – an HiAP approach was adopted.[21] Although Jordan did not institutionalize an HiAP approach despite WHO recommendations, the Jordanian case study presents a strong case for community-based programs extending beyond a focus on overweight and obesity to address other non-communicable diseases.

Aside from Malaysia's short-term intervention, all case studies included a long-term, adaptable, multipronged approach to the three main contributors to childhood obesity. All case studies used multiple implementation channels, yet schools were recognized as essential for program implementation in each country. For example, all five countries introduced policies related to healthy meals in schools. In Amsterdam, Finland, and Singapore,

bans on junk food and restrictions on the types of foods allowed to be sold in schools were introduced, while in Malaysia and Jordan, there was an emphasis on healthy foods and meals at school canteens.

All explored interventions had a positive impact, at varying degrees, on lowering rates of childhood obesity and improving healthy eating behaviors and lifestyles, as well as increasing access to healthy food outlets. The results were more prominent in countries that rolled out long-term plans and targeted strategies: Netherlands, Jordan, Finland, and Singapore. A decrease in obesity rates has been noticed in these locations, although the rate of change has stagnated in some, such as the city of Amsterdam, for example. This indicates that change takes time and there are other factors that can contribute to accelerating or slowing progress. Therefore, there must be an agile monitoring and evaluation mechanism that adjusts to changes and factors that could impact a country's obesity intervention. Appendix 2 presents an update on this MOPH benchmarking exercise.

INCORPORATING BEHAVIORAL INSIGHTS (BI) INTO POLICY

While health education and dietary guidelines are of extreme importance, decisions about food consumption are not always actively or deliberately taken based on the knowledge of what constitutes as healthy and what does not. Choices related to food intake are often instinctive, almost 'automated' responses to the surrounding environment. Most modern, urban environments are increasingly designed in a way that encourages the consumption of calorie-dense foods. Food kiosks and vending machines selling unhealthy foods on streets, exposure to advertisements for sweets and sugary drinks are examples of how children are faced with often face a conscious or unconscious peer pressure to eat foods that contain high calories.

This interaction between the food environment and children's psychology is likely a big contributing factor to childhood obesity, and acknowledging this relationship is a crucial step toward developing more effective policies to reduce obesity.[28]

To address the obesogenic environment and reduce the global childhood obesity burden, multiple policy levers are necessary.[29] Policies that are informed by BI have proven to be effective at improving children's diets. Systematic reviews have shown that using BI interventions were effective at modifying diet-related outcomes in children in 74 percent of all interventions.

BI is a broad term that encapsulates research on human behavior in the context of different disciplines such as psychology, sociology, economics, and neuroscience. Drawing on a range of theoretical frameworks from behavioral economics and other social sciences, BIs can provide a more comprehensive understanding of factors that influence human behavior. It serves to provide an understanding on how humans make the choices they do, taking into consideration experiences and external influences.[30]

Another BI approach is nudge theory which aims to influence behavior through subtle changes to the environment without actively restricting the options available. By doing this, the cognitive biases in the decision-making process are reduced, facilitating the adaptation of self-interested behaviors such as eating healthy or being physically active.[31]

Even the most subtle of nudges have been shown to be highly effective in facilitating positive behavioral changes. In New Mexico, USA, a simple alteration in the design of shopping trolleys was shown to influence an increase in sales of healthy foods.[32] Researchers marked a yellow line using duct tape across the width of a shopping trolley and placed a sign asking shoppers to put fruits and vegetables in front of the line and all other products behind the line. As a result, an increase of 12.4 percent in the sales of fruits and vegetables was observed.[32]

As part of the legacy component of the Healthy 2022 World Cup project, the State of Qatar in collaboration with the WHO and the Federation Internationale de football association (FIFA) used BI approaches to encourage fans to make healthier choices by providing healthier food options and environments. Food environments refer to the physical and economic conditions that influence people's dietary preferences and choices. Healthier food environments enable people to adopt and maintain healthy dietary practices. The collaboration ensured that roughly 30 percent of all menu items served at the event stadiums and around 20 percent at fan festivals had a healthy nutritional profile according to WHO standards.[33] In addition, BI techniques were incorporated to make the healthier menu options appear as the most attractive and easiest choices. Healthy eating was also communicated to fans through media channels.[33]

In general, the most promising BI approaches have involved the use of incentives, changing defaults, and modification of the physical environment.[34] Simply providing information alone was shown to be the least effective approach. More research on BI interventions is needed and should focus on providing evidence of the sustainability of their outcomes. In order for them to better inform policy, forthcoming interventions should have bigger sample sizes and longer study durations to detect any meaningful differences in sociodemographic characteristics, and to capture the overall sustainability of behavioral change. Cost-effectiveness should also be captured, therefore, there is also a need for the documentation and analysis of the cost of different interventions.

It is recommended to explore incorporating BI across all levels of policy and program design. The Easy, Attractive, Social and Timely (EAST) framework is a simplified way of applying BI to policymaking and enabling positive behavioral change 4:[35]

1. Easy

For example, by making the healthy choice the default, reducing the 'hassle' of eating healthily, or simplifying and shortening messges on healthy nutrition.

2. Attractive

For example, by attracting consumers' attention to specific features of food production, personalising messages to encourage physical activity, and providing incentives to people performing specific behaviors.

3. Social

For example, by highlighting that many people already perform the desired behavior, involving the social network of the target population, or encouraging people to publicly commit to performing certain behaviors.

4. Timely

For example, by prompting people to make healthy food choices when they are most likely to follow the prompt, highlighting the immediate rather than future benefits of a healthy diet, or supporting people to plan in advance.

Source: Applying behavioral insights to tackle childhood obesity in North Macedonia, UNICEF[36]

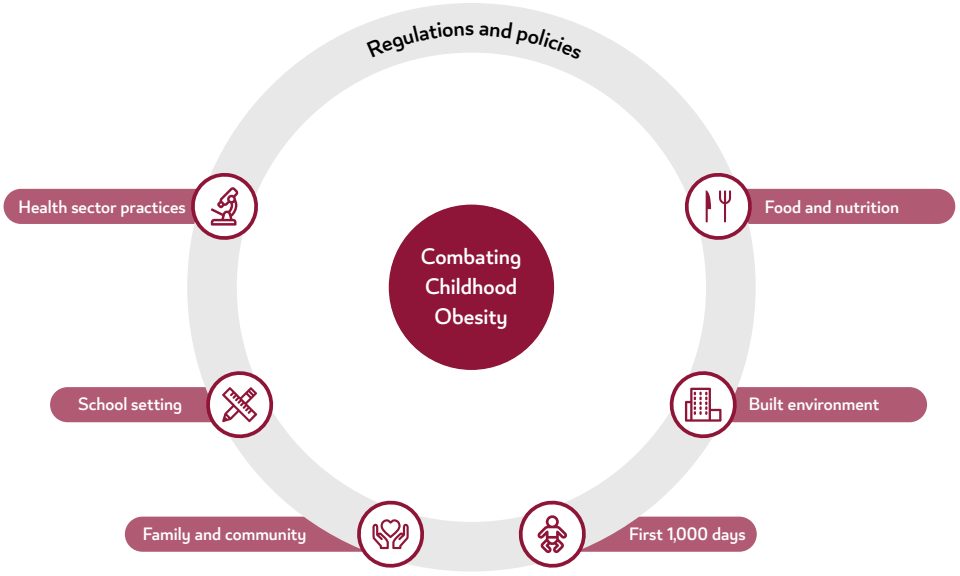
A BESPOKE MODEL TO ADDRESS CHILDHOOD OBESITY IN QATAR

A social-ecological model provides a framework for understanding the factors that influence an individual's behavior and lifestyle choices. It allows for a comprehensive understanding of the complex factors that contribute to behavior and can inform the development of effective interventions to promote healthy behaviors and lifestyles.

The proposed model considers various dimensions, from individual and interpersonal factors to the environment and policy dimensions. Within the individual dimension, research often investigates behavioral determinants related to major life events, habits, sedentary behaviors, such as watching TV or playing video games, and mobility opportunities.[37]

A proposed bespoke model for Qatar is presented in Figure 6. The following sections of this report are structured following each of the different segments of the model. Each segment is analyzed in the Qatari context, benchmarked following research and review of international experiences, and policy recommendations are suggested based on applicability to Qatar's context, leveraging insights from local and international experts and stakeholders.

Figure 6. Proposed intersectoral policy model targeting childhood obesity in Qatar



The first 1,000 days of a child's life provide a unique opportunity to build the foundations for optimal health, neurodevelopment, and growth across the life span. Breastfeeding, for example, is more than just a feeding method; it is a behavior that can enhance the health and wellbeing of both the mother and child. Similarly, physical activity and healthy eating habits are crucial for the proper growth and development of children and adolescents.[38] Children who engage in active and energetic behaviors are more likely to maintain their active lifestyles into middle and late adulthood, whereas those who lead sedentary lifestyles as children are more prone to becoming sedentary adults. Thus, it is also important for children and young people to engage in physical activity from an early age, and to increase their active transportation (eg, walking or cycling).[39] Additionally, they should engage in 'free-range activities' without adult supervision, which may include playing outside, exploring their surroundings, and participating in sports or other physical activities.[39] The school setting can provide a critical space to promote such activities, enhance awareness and build sustainable lifestyle behaviors. Guidelines and policies, and national awareness programs to promote healthy food and nutritional choices, are essential to empower citizens in making lifestyle choices. Access to healthy food options and green and open spaces is vital, and urban planning can play a pivotal role in enabling access to and time spent in nature. Family and community play an important role in promoting the behaviors and choices of our children and must be looked at as enablers of good health. Clinical practices are essential in ensuring the prevention of childhood obesity at the earliest possible opportunities, identifying those at risk, and treating those diagnosed.

PROPOSED INTERVENTION AREAS AND POLICIES

The role of food and nutrition

National and regional governmentally developed and implemented food policies are influenced by a multitude of factors including tradition, culture, the political system, and stakeholder (eg, business and civil society) support. Through synergistic interactions and the interoperability of policies from different constituent systems, successful behavior and environmental change can be achieved over time. Food policies should be designed to change the context or environment in which the undesirable dietary behaviors or patterns occur. As such, these changes to the environment must address the food system in a way that creates healthy food environments to sustain the desired behavioral changes.

It is extremely challenging to provide an exhaustive list of all relevant food policies that are implemented by countries worldwide to prevent obesity. However, research helps to provide a better understanding of these global best practices and can present numerous evidence-based examples of what worked well, what did not, and why.

Food labeling

Back-of-pack nutritional information (nutrition information panels, or NIPs) has been made widely available to consumers, but the detailed numerical nutritional information is often considered difficult to understand. As such, WHO recommends the implementation of front-of-package labeling (FOPL) as one of the 'best-buy' measures to help protect against the increasing prevalence of NCDs.[40] The primary objective of FOPL is to support consumers in making better informed, healthier choices.[41,42] Although FOPL has been recognized as a powerful tool to promote both human rights and public health in response to the global NCD epidemic, a universally accepted FOPL system does not yet exist.

FOPL systems differ in the extent, format, and type of nutritional information they present to consumers. Governments around the world have employed a range of FOPL schemes, as outlined in Table 2.

Table 2. Types of front-of-package labeling schemes

Endorsement logos (eg, Keyhole, Choices)	• Nutrient levels combined to give an overall assessment of absolute healthfulness • Positive evaluative judgement only (on better-for-you foods) • Products are eligible to carry the endorsement symbol only if a nutrition standard is met • Nutrient cut-off points binary (ie, if a product meets the standard it can carry the label).
Summary indicator systems (eg, Health Star Rating, Nutri-score)	• Nutrient levels combined to give an overall assessment of relative healthfulness • Both positive and negative evaluative judgements (graded directive assessment of food overall) • Can appear on all eligible products • Nutrient cut-off points graded (eg, high, medium, low).
Nutrient-specific warning labels (eg, Chilean warning label)	• Information on individual nutrients kept separate • Products that exceed a nutrition standard identified (negative judgements of worse-for-you foods) • Nutrient cut-off points binary (ie, if a product exceeds the threshold, it must carry the label).
Nutrient-specific interpretive label	• Information on individual nutrients kept separate • Both positive and negative evaluative judgements (graded directive assessment of nutrients) • Nutrient cut-off points graded (eg, high, medium, low).

Source: WHO.[40]

Food labeling systems are inherently difficult for people to comprehend. Simpler 'warning' or 'traffic light' systems for FOPL are intended to provide easy, clear information to buyers. Governmental interventions mandating FOPL have proven effective in enabling consumers to make healthier choices and discouraging consumption of unhealthy food items. Comparative scientific studies have shown nutrient-specific warning labeling to be the most effective system when compared with others, including endorsement and informative systems such as Guideline Daily Amounts.[43]

Available research evidence shows that all forms of marketing consistently influence food preference, choice, and purchasing in children and adults, whether through advertisement, price promotion, or proliferation of unhealthy food outlets. The difficulty of making healthy food choices is compounded by lack of awareness of the composition of food items and complex or difficult food labels, which are often small in font size, at the back of packages, or hidden by advertisements. Simple calorie labeling in the places where food choices are made (the 'point of food choice') for the out-of-home food sector would provide basic information to enable healthier choices.

Food labeling and food packaging were highlighted in a 2013 WISH report,[44] which noted that consumers face difficulty understanding the calorific content of foods or accurately counting calories. A policy report to address this was launched at WISH 2022 titled: *The Potential of a Front-of-Package Labeling System for Qatar*,[43] which provides policy recommendations for how Qatar can learn from global and regional experiences to supplement its existing regulation and adopt a tailored FOPL system while dismantling targeted and often misleading marketing tactics, anchored in protecting the human right to health.

In 2022, Brazil implemented an improved and mandatory FOPL system, to be launched in 2024. Under the new regulation, nutritional labeling will use simple icons and will be placed on the front of packaged food to alert a consumer of high levels of sugar, fat, and salt.[45,46] This recognizes the difficulties associated with reading labels and ensures a customer's right to information and transparency to make a conscious food decision.[47] EU countries are also subject to international food standards and guidelines set by the Codex Alimentarius Commission (Codex), which supports national policy development and trade and sets a framework for nutrition labeling. Codex is currently developing a set of guiding principles to help consumers make healthier choices. While not endorsing any scheme in particular, Codex aims to provide an overall reference framework for the design and implementation of FOPL.[48]

The report highlights that currently Saudi Arabia and the United Arab Emirates are the only Gulf Cooperation Council (GCC) countries to have taken steps to remediate this issue with the introduction of a traffic light labeling system.[48] Saudi Arabia adopted the traffic light system, with thresholds for saturated fat, total sugars, and salt. The labeling system comes as part of the country's ongoing efforts to empower consumers to make healthy choices, and to lower obesity and other NCD incidences.[49–51] The UAE introduced an FOPL traffic light system for fats, sugars, and salt on prepackaged foods as part of its National Program for Happiness and Wellbeing.[52] The systems in both countries are implemented on a voluntary basis, and currently there are no mandatory front-of-package warning labeling systems in the region.

The case for simpler food labeling policies can be framed under a human rights framework approach. This requires prioritizing the adoption of measures that make it easier for people to make healthy decisions and discouraging the consumption of ultra-processed foods which contribute to the development of diseases and premature deaths. Adopting an FOPL scheme or other scheme like a traffic light warning system would allow Qatar to fulfill its human rights obligations, as such systems help to inform customers' nutritional decisions and food choices.

The adoption of a FOPL system in Qatar is not without challenges and will likely meet resistance from the industry, particularly in terms of international trade and investment law arguments. However, the World Trade Organization (WTO) recognizes states' right to legislate and take measures they deem necessary to protect the health and life of their citizens. Therefore, the adoption of measures that establish special requirements for the labeling of unhealthy food products should not be seen as a barrier to trade.

Digital marketing

Digital marketing of food and beverages has become more targeted toward children, and food and beverage companies design their marketing strategies using tactics that appeal to children's emotional preference, such as striking graphics, visual design, and cartoons. Research suggests that children younger than 8 are not fully able to distinguish fantasy from reality and become emotionally invested.[53]

Countries' human rights obligations – under the Convention on the Rights of the Child[54] and the International Covenant on Economic, Social and Cultural Rights[55] – to respect, protect and fulfill the right of children to privacy, health, information, education, and adequate food, must meet the current global realities of digital personal data use and the use of targeted marketing gimmicks on children. This includes requiring service providers not only to limit any collection, processing, and retention of children's data, but also to respect, protect, and fulfill the rights of the child in the digital environment.[56] Digital marketing strategies of highly processed food and beverage products that are high in fats, sugars, and salt must be regulated to avoid targeting children. This can be done via the setting of guidelines limiting or banning the use of characters, public figures, or famous sports personnel for advertisement or endorsement of unhealthy foods.

Nutrition guidelines

Countries around the world have developed dietary guidelines over the past two decades, aimed at increasing public awareness of basic nutritional needs and facilitating nutrition education across multiple settings. Over 60 countries spanning all continents have created their own national dietary guidelines.[56] These guidelines generally provide authoritative advice, for children and adults, on positive dietary habits that promote health and reduce the risk of onset of major chronic diseases. These, in turn, serve as the foundation for governmental food programs as well as national nutrition education programs.

Examples of such guidelines include the promotion of fruit and vegetable consumption due to the associated health benefits, particularly in helping to reduce the risk of diet-influenced diseases and obesity. Diet campaigns in countries such as the United States, Australia, Argentina, Brazil, Chile, Mexico, Canada, and New Zealand promote the increase of daily consumption of fruits and vegetables among their populations.[57] In the United States, the '5 A Day' program encourages people to consume at least five servings of fruits and vegetables a day. These programs are often funded through national and local governments.

Qatar Dietary Guidelines were published in 2015 with the aim to achieve an overall healthy lifestyle, improve health and dietary education, and prevent NCDs.[58] The guidelines highlighted eight recommendations:

- Eat a Variety of Healthy Choices from the 6 Food Groups.
- Maintain a Healthy Weight.
- Limit Sugar, Salt, and Fat.
- Be Physically Active.
- Drink Plenty of Water.
- Adopt Safe and Clean Food Preparation Methods.
- Eat Healthy while Protecting the Environment.
- Take Care of your Family.[58]

The Guidelines have been updated and published,[59] and they have been complemented by educational drives to support the community, parents, and children to read, comprehend, and adopt these messages to make a healthier food choice.

Menu nutrition labels for restaurants, cafes, and cafeterias

Studies have shown that consumers often increase their calorific intake when eating outside the home. This is because foods in restaurants or other food outlets contain, on average, higher calorific value, sodium, and saturated fat, and less nutritional values and fiber[60] than foods eaten in the home, which in most cases consumers are not aware of.[61] In the United States, consuming food away from home (FAFH) is a public health concern as it has been noted that a person consumes one-third of their daily calories from food prepared outside of the home.[62] The expansion of nutrition labeling to cover food options served at restaurants has long been considered an area of concern for public health advocacy groups,[61,62] as it would empower diners to make informed decisions in FAFH settings, as well as influence the calorific content of meals served in restaurants.[63]

The Food & Beverages Guidelines for Cafeterias and Vending Machines was developed in 2017 and was initially targeting cafeterias and vending machines in healthcare facilities. The guidelines were then expanded to be suitable in workplaces, and the aim of the guidelines is to increase and promote healthy food and beverage choices in healthcare facilities and workplaces. Using the 3 colors of the traffic light system (red, yellow, and green), consumers have the right to know and to make informed decisions on what foods and beverages to choose.[64] Items within the red category (ie, high in fat, salt, and sugar) are banned from vending machines, and limited to 20 percent of stock within cafeterias.[64]

The Ministry of Commerce and Industry (MOCI) plays an important role in encouraging healthy eating habits and protecting consumers' rights. In 2017, MOCI launched an initiative that obliges food providers and suppliers, when offering any food products or commodities, to use Arabic language typed on its packages clearly, and to display the ingredients and all related information.[65] Further, in 2018 MOCI, in collaboration with MOPH, launched an initiative to regulate the display of nutritional information of food products. The initiative consisted of two obligations: a general one that requires all restaurants, cafes, and food outlets to include in the 'food description' the country of origin and whether the meal consists of meat, chicken, fish, or others.[66] The second obligation mandated displaying the calorie count on all food and beverages served at franchised restaurants and cafes operating more than five branches in Qatar, as well as food offered in cinemas.[67] This 'Calorie Display Initiative' aimed to empower consumers with knowledge regarding the negative health impacts of overconsumption of sugar, salt, and unhealthy fats. It was piloted for six months, after which it became a compulsory requirement.

Excise taxes

It has been proven that there is a link between the consumption of sugar-sweetened beverages (SSBs) and incidences of obesity among children and adults.[68] Regulation and policies can contribute to shaping individuals' eating and consumption behaviors.[69] Research shows that taxing SSBs, for example, has contributed to decreasing the rate of households actually purchasing them, especially when a high-tax scheme is applied; obesity prevalence has reduced as a result.[70,71] This is more prominent in low- and middle-income countries where the community's purchasing behavior is affected by changes in prices of commodities.[72] The literature also proposes exploring a combination scheme, where the introduction of an excise tax is complemented by subsidies for healthy food.[73] Qatar introduced excise taxes which are applicable to foods deemed to be harmful to either health or the environment, including 50 percent on soft drinks and 100 percent on cigarettes and 'energy' drinks.[74] The tax

could potentially be expanded to include other unhealthy products such as prepackaged foods and/or foods and beverages that are high in fat, sugar, and salt content.

Proposed food policies

- Develop a framework for front-of-package labeling (FOPL) for Qatar that adopts a nutrient-specific warning system, and mandate its application.

- Set guidelines to control and limit advertising of unhealthy food and beverages across all platforms targeting young children and adolescents.

- Develop guidelines for food product placement in physical outlets and digital platforms, giving prominence to healthy options and limiting unhealthy food within children's reach.

- Continue to communicate the updated Qatar Dietary Guidelines and develop advocacy programs.

- Adopt, endorse, and ensure compliance with national guidelines in restaurants cafes, and vending machines, with a focus on fresh food/products.

- Set minimum standards for imported food and establish a governance structure for monitoring.

- Evaluate the impact of existing excise tax policy in Qatar and explore its expansion based on recommendations from MOPH.

- Expand tax guidelines to include taxing unhealthy products such as prepackaged foods and/or foods and beverages that are high in fat, salt, and sugar.

- Explore mechanisms to make healthy food more affordable, including fruits and vegetables.

- Encourage urban agriculture initiatives, such as community farms, to increase access to fresh produce in urban areas.

The role of health sector practice

Clinical practice guidelines

Clinical practice guidelines act as frameworks that inform pediatricians and other healthcare providers about the expected standard of care for the evaluation and treatment of children who are overweight or obese, and the appropriate management of obesity-related comorbidities. They ensure consistency in standards and quality of care for obesity management, prevention, and treatment. They are based on an in-depth, comprehensive review of the available evidence, including controlled and comparative effectiveness trials and high-quality longitudinal epidemiologic studies.[75] Guidelines should aim to ensure obesity is first prevented; and, if it does occur, that it is promptly addressed, reversed, or does not worsen. They should also aim to empower and incentivize physicians and patients to optimize behavioral and lifestyle interventions before pharmacological therapy.

Recently, the American Academy of Pediatrics came under serious scrutiny after issuing updated recommendations and guidelines for the treatment of childhood obesity. These updated recommendations represent the first significant changes to the organization's guidelines for obesity treatment in 15 years. The guidelines focus on the treatment of obesity as opposed to its prevention, advocating for comprehensive nutritional support, behavioral therapy, pharmacotherapy, and in the case of severe obesity, metabolic and bariatric surgery for teenagers above the age of 13.[76–78]

Bariatric surgery should be considered as a last-resort option for post-pubertal adolescents suffering severe to extreme obesity as well as severe comorbidities, in cases where lifestyle interventions are inefficient, and provided that a set of predefined criteria are met.[79] Furthermore, a comprehensive treatment of obesity – that includes holistic measures such as psychological support – must be employed.

Building on the National Health Strategy (2018–2022),[18] and having prioritized 'precision health', Qatar has identified childhood obesity as a focus area that requires an interdisciplinary effort. The clinical guideline for the treatment of childhood obesity in Qatar was introduced in 2019.[80] The guideline covers several key areas including clinical presentation and assessment, screening, recommended clinical investigations, primary care management, school awareness and involvement, specialist care referrals, pharmacological treatment, and bariatric surgery eligibility criteria.[80]

The role of healthcare professionals

Healthcare professionals have an important role to play when it comes to the education of young patients and their caregivers on improving nutrition, limiting screen time, and increasing levels of physical activities. They often have the ability to recognize and identify at-risk youth who, along with their caregivers, can benefit from personalized and reliable sources of health information. According to a scoping review on obesity prevention published in 2019, some of the main barriers to healthcare-based obesity prevention were the beliefs and perceptions of healthcare professionals toward obesity, in addition to the practical barriers that included lack of time, resources, and clinical guidelines.[81–83] Healthcare professionals may lack the confidence and knowledge on the appropriate integration of obesity prevention into clinical care, and some health professionals may feel that it does not fit their role.[84] Although healthcare professionals are aware of the implications of excess weight on overall health, there could be a general perception that their role is limited, given the lack of patient motivation to make the necessary lifestyle changes.[85]

Given these factors, studies have shown that patients are often not told that they are overweight and the health consequences are not discussed until patients are already classified as obese.[86–88] It is therefore crucial that we empower and strengthen the role of healthcare providers in the identification of the early risk factors for obesity (including psychological presentation and lifestyle) and equip them with the guidelines required for appropriate intervention. In Qatar, annual training of trainers workshops are held to train dietitians, physicians, health educators and nursing staff to unify nutrition-related messages across the country ensuring that they are in line with Qatar's Dietary Guidelines.[89]

Health sector coordination

Health services operate as a complex system of people, processes, settings, activities, and structures. Systems are often nested within other systems, with different dynamics constantly at play. As such, searching for solutions requires identifying different causes as well as multiple points for intervention and being cognizant of various unintended consequences that may occur.[90]

In December 2021, the newly established Qatar National Taskforce on Obesity – under MOPH and with representatives from MOPH, HMC, PHCC, Qatar University, Sidra Medicine and Qatar Diabetes Association (QDA) – convened for the first time to discuss the challenge of obesity in Qatar. The task force produced a white paper consolidating the key actions taken so far and proposing recommendations going forward.[91]

At QF, the Childhood Obesity Taskforce (COT) was formed in 2022 to bring together health experts, medical practitioners, national leaders and policymakers to strengthen coordination and action to reverse the growing trend of childhood obesity in Qatar. The COT functions as an advisory body that helps create and steward high-impact responses and policy action. As part of its remit, the task force will raise the profile of the issue of childhood obesity in Qatar by analyzing population and neighborhood data trends and examining social determinants, nutritional profiling, and phenotypic determinants and genetics. The COT also aims to analyze existing interventions (clinical as well as social and behavioral), to identify gaps and opportunities for collaboration and engagement at a policy level.

A National Obesity Treatment Center (NOTC) was established at Hamad Medical Corporation (HMC) with an aim to streamline the care of people living with obesity through the provision of holistic inter-professional medical care.[91] The NOTC is considered one of the largest centers of its kind in the world, with approximately 20,000 patient visits annually. It is equipped to investigate and manage obesity and its complications.[91] However, while a state-of-the-art center is a significant advance in the care of people with obesity in Qatar, there is opportunity to extend and expand the scope of its work through more integrated collaboration with primary care and other sectors.

To overcome the existing challenges related to obesity and its associated health complications, it is crucial to improve the coordination of processes within the health sector. This includes strengthening the role of the primary care sector in Qatar and developing clinical referral pathways that are clear and efficient, to achieve a seamless patient journey through the healthcare system. This improved continuity and coordination of care is imperative to improving patient outcomes and overall experience.

Proposed health sector practice policies

- Build on existing multistakeholder task forces and working groups to support with evidence-based guideline development and 'good practice' obesity prevention, screening, and treatment.

- Implement, monitor, and track impact of established national clinical management guidelines for preventing and treating childhood obesity.

- Develop national clinical guidelines for bariatric surgery for children and adolescents as a last resort and establish a mechanism to review and update the guidelines every five years.

- Expand obesity treatment services and enhance integration with primary health service providers.
- Strengthen screening for obesity and its risk factors at primary level of care.
- Develop comprehensive national training and capacity-building programs for health practitioners.
- Enable precision health interventions to help identify and target high-risk individuals to prevent childhood obesity and provide personalized treatments.

The role of the built environment

Urban sprawl is generally defined as the expansion of built land. This growth can sometimes outstrip the speed of population growth, which often leads to the suboptimal use of land resources and energy.[92,93] In addition to its effects on climate and land, urban sprawl also comes with its own set of public health challenges, the most significant of which is that it can discourage residents from walking. Furthermore, urban sprawl can also discourage child residents from outdoor physical activity due to safety concerns.[94]

Urban layout

Urbanization is considered one of the most important factors of an obesogenic environment.[95] Studies that have assessed the potential drivers of the increase in frequency of obesity have identified a correlation between obesity and urbanization.[95] Social environments that are inadequate and buildings that restrict physical activity can lead children into an inactive lifestyle. Therefore, it is imperative that urban planning efforts consider public health repercussions and the associated risk of obesity.

Restrictions to physical activity can be caused by multiple factors such as low connectivity,[96] high automobile dependence, and disincentivized physical activity.[97] Alternatively, walkable neighborhoods are those that encourage and facilitate physical activity such walking or cycling to workplaces and different amenities such as schools, parks, youth centers, and shopping malls.[98]

Studies from the United Kingdom, Australia, and the United States have demonstrated that residing in areas with public open places within close proximity was associated with increased physical activity and improved

health across all age groups.[99] However, these studies also showed that access to public open places varied by social group, which is in line with the broader themes of environmental injustice. There is evidence that the current distribution of green spaces such as parks benefits those in higher-income groups and white ethnic groups disproportionately. Depending on the socioeconomic level of neighborhoods, the access to, and quality of, parks may differ.[100] These findings have significant implications for policy reform, particularly in lower-income settings.

Despite Qatar's hot and arid climate, which could create some limitations on children's play time and ability to participate in outdoor activities, Qatar has advanced significantly in terms of built infrastructure over the last decade. Strategies have focused on building healthy urban environments, including an open spaces development strategy developed by the Ministry of Municipality.[101] While important, the built environment cannot work in a vacuum. Access to nature has been highlighted in many reports as a critical component to develop healthier, active, and conscious individuals.[102] Further, walkability and mobility have been encouraged with the development of public transport, including the metro and light rails, cycling lanes that have been established around the country, parks, green spaces, and more. These initiatives help to promote more active lifestyles and nudge behavioral changes.

Inclusive urban design

Children aged 2–15 with a limiting long-term illness or disabilities were found to be significantly more likely to be obese than those without. This difference was also shown to increase with age,[103] and depression levels.[104] For this specific population, being overweight or obese can increase the risk of developing secondary complications related to mobility, physical activity fatigue, pressure sores, pain, social isolation, and depression. While the risk of obesity among children and adolescents with disabilities may be a result of personal characteristics and factors, such as genetic or metabolic complications, levels of physical activity, or diet, environmental factors such as inaccessible neighborhoods can play a critical role.[105] As such, it is imperative that policymakers consider accessibility and inclusive design as a key factor for urban planning and design, and establish collaborative partnerships with community organizations, parents, schools, and healthcare providers, to ensure that all children have access to resources.

Inclusive programs that target children with different abilities can be implemented to ensure inclusive physical activity options for all children. At QF, the Ability Friendly Program (AFP) is an initiative that supports people of all abilities to engage in sporting and developmental activities. It includes specialized camps, football, and swimming classes tailored to

the participants' individual needs. These activities are delivered across Qatar in Education City, Qatar Academy Al Khor, and Al Wakra, five days a week, for children and adults.[106] There is potential to scale up this program to a national level, providing greater access for obese and overweight children with special needs to be physically active.

Healthy food access

Studies have shown that local food options and environments can have significant influences on dietary patterns. The location of supermarkets, grocery stores, and farmers' markets, in contrast to fast food outlets or convenience stores that sell processed foods and foods with high fat and sugar content, is of extreme importance. Statistics from the USA show that 23.5 million people living in urban neighborhoods or rural towns have limited access to fresh, affordable, and healthy foods.[107] Food deserts, defined as areas with limited access to fresh fruits, vegetables, or other whole foods, are typically found in socioeconomically deprived areas or ethnic minority neighborhoods.[108–110]

Access to healthy food options in or around specific environments, like schools, is vital. Many children rely on their schools for at least one meal, and considerable research has focused on this area over the past few years.[111] A study conducted in the Netherlands found that unhealthy food options (such as SSBs and snacks with high fat or sugar content) were more often found in close proximity to schools when compared with healthy options. The study also showed that fast food outlets were more often found in the vicinity of secondary schools within lower socioeconomic status neighborhoods (28.6 percent) than in higher socioeconomic status neighborhoods (11.5 percent).[112] Therefore, urban layout policies would position city planners to play a role in supporting the overall health and wellbeing of the community. This could be achieved by ensuring that access to unhealthy food is not within close reach and proximity to school children and young adults, for example.

Proposed policies targeting the built environment

- Adopt and implement the Open Space Recreation and Sports Facilities Development Guidelines that encourage physical activity for everyone, irrespective of gender or ability.

- Provide accessible facilities and equipment to promote opportunities for physical activity among all children and adolescents.

- Scale up the AFP and provide necessary training and knowledge to staff members who work with children to support those with different abilities.

- Set guidelines for food-service spaces, and access to healthy and unhealthy food in convenience stores and shops.

- Review current city zoning strategies and explore setting buffer zones between schools and fast food outlets and supermarkets within a specific radius.

- Increase and improve the walking and cycling network by bridging the gaps and linking them to public spaces.

The role of school settings

Schools play a crucial role in a child's life by shaping their education and behaviors.[113] On average, children spend about one-third of their time in schools, making schools an ideal environment for the promotion of healthy habits, both directly, through nutrition and physical education, and indirectly, through the food offered and marketed within schools. School interventions could enhance the desirability and acceptability of healthy foods and encourage healthy eating habits from a young age.

School food environments

School food environments shape "when and where children obtain food and the types of options available during the school day."[114] Over the past few years, countries in the GCC have implemented initiatives and programs to promote healthy school environments.[115–119] Recently, Saudi Arabia issued a ban on selling junk food in school canteens, including soft drinks and energy drinks, chips (crisps), and chocolates, among other products. It has outlined clear and specific guidelines and criteria for the food and beverages allowed in school canteens, with an emphasis of providing healthier options. This comes as part of Saudi's Health Transformation Program, Vision 2030.[120] Dubai issued guidelines for schools to promote food and nutrition education, and healthy eating behaviors and strategies.[119] The guidelines are part of the UAE's National Agenda 2021 emphasizing the reduction of NCDs in the country, with a focus on decreasing obesity, particularly among children.[119]

In Qatar, the School Canteen Committee under the Ministry of Education and Higher Education developed a set of guidelines for school canteens.[121] The School Canteen Guidelines are mandatory in governmental schools

and voluntary in private schools. The guidelines ban the sale of chocolates and candies, energy drinks and carbonated drinks, as well as processed meat and foods high in fat, salt, and sugar. The guidelines mandate the sale of salads, juices, and fresh fruits and vegetables. Further, the School Canteen Guidelines can be extended to also cover lunchboxes and food that children bring from home.

Under the *Sahtak Awalan* – 'Your Health First' – campaign, a Healthy Schools initiative was launched to support children at all QF schools by serving them the healthiest meals possible during their lunch breaks. The healthy, nutritional, multicourse menu was devised by an entity member at QF and is being cooked in on-site kitchens. The aim of this initiative is to create healthy eating habits at a young age, potentially improving the health of an entire generation and preventing obesity, diabetes, and heart disease in years to come. Along with the healthy lunches, there are facts about nutrition and interactive displays in each of QF's school canteens, reinforcing the healthy eating message. In high schools, there is information showing students how to calculate their BMI, and information on the health benefits of certain foods. To encourage younger children to eat healthily, *Sahtak Awalan* devised a reward system whereby children receive stamps in a book whenever they choose a healthy option, and after collecting a certain number of stamps, receive a badge.

Student wellbeing

The school setting presents an environment where obesity-preventative interventions could be launched. A school nurse is well positioned to play a crucial role in managing childhood obesity in schools,[122] shaping school policies with respect to healthy lifestyles and healthy food options in schools. In Qatar, in partnership with MOPH, schools take part in an annual growth monitoring program to measure the physical growth of all students.[123] School nurses are trained on how to accurately take body measurements and plot the values on the growth monitoring charts. Based on the results, nurses refer students who are obese or stunted to a health center and inform their families. This aligns with the literature, which emphasizes the need for follow-up assessments for students identified as obese or overweight to help schools identify students who might be at risk of developing diabetes and other health concerns as a result of being overweight or obese.[124] Such assessments and programs must be conducted in a respectful, private, and professional manner to avoid peer pressure and bullying, which can lead students to develop eating disorders or depression.

Studies have suggested a bidirectional relationship between obesity and depression.[125,126] In addition, weight gain is a possible side effect of most antidepressants, whereby one in four patients typically gain 4.5kg or

more.[127] Another major contributing factor is sleep, whereby people who sleep less, or suffer from a sleep disorder, have a higher risk of weight gain and obesity than people who get adequate sleep (7–8 hours a night).[128] As such, there are various unique ways in which school psychologists can also contribute, within the school setting, to help combat childhood obesity and its related issues.[129]

Furthermore, it is important to keep parents involved throughout the process by sharing screening results and information about their children's BMI[130] after being plotted on the growth chart, and engaging them in follow-up programs or interventions. One of the challenges a school nurse might face when operating a BMI screening program is that parents might not accept or comprehend the severity of a high BMI of their child.[131] Besides providing students with health education materials, student referral channels need to be established with health centers, and a school nurse has to regularly follow up with parents and the care providers to ensure that the at-risk students are receiving the care they need. One of the challenges is that children's growth data are not integrated between government and private schools and the Primary Health Care Corporation (PHCC). Growth data for students in government schools are uploaded to (and available from) the PHCC system, since the nurses are also PHCC employees. However, although private schools' nurses perform the referral process when needed, growth data are not integrated with the PHCC systems as nurses do not have access. Therefore, it is important to ensure system integration between all school nurses and PHCC centers to guarantee that growth data of all students is documented and that they also receive the support they require. Furthermore, parental awareness sessions on the risks of high BMI and excess weight to the health of their children may be incorporated in schools.

Physical activity in schools

It is recommended by international health organizations that children and adolescents spend 60 minutes or more a day engaging in moderate-to-vigorous physical activity that they enjoy and is appropriate for their age,[132] guidance that is also endorsed by the Qatar National Physical Activity Guidelines.[133] The physical activity options could vary, ranging from strengthening exercises to aerobic activities.[134]

There is strong evidence that regular physical activity is associated with numerous health benefits for children, including reducing BMI,[135] improving students' cognitive skills, and reducing symptoms of depression and anxiety. Active children tend to also have active lifestyles in

adulthood. To promote physical activity among children, schools and parents should work together to ensure that children have opportunities to be active daily.

In Qatar, the recommendations suggest that students in grades 1–9 have two sessions a week for physical education (PE) and students in grade 10 onwards have one session per week for physical education. However, some countries such as Australia and Canada recommend a minimum of 30 minutes of physical activity daily during school hours, which can be achieved through active breaks, PE classes, extra-curricular clubs, and other sports events.[136,137] The remaining 30 minutes of the recommended 60 can be supported by parents and caregivers outside of school time through activities like walking, cycling, or playing sports.[138]

Despite the available evidence, an article published in 2017 ran a self-administered questionnaire and revealed that about 75 percent of school students in Qatar fail to reach the recommended daily level of 60 minutes' physical activity.[139] Additionally, roughly 55 percent of children engage in extended periods of sedentary activities (more than two hours), such as watching television and playing video games.[140] The small amount of time devoted to high-intensity physical activity indicates that it is necessary to reassess the physical education provided to primary school children in Qatar.[141] In a school setting this could mean increasing the frequency of PE classes per week, ensuring that all students participate in physical activity programs by making them mandatory, and considering the lesson plan of each session to keep all students physically active.

A self-reported physical activity survey in Qatar is completed annually by a registered population. It collects data on the duration, intensity, and type of physical activity they engage in. This will provide guidance for the planning of programs to enhance physical activity.

Health education

Studies have shown that obesity in childhood is linked to parental health literacy, while obesity in adolescents is notably correlated with the adolescents' health literacy.[142] Research conducted in the past decade has suggested that implementing the concept of the 'health promoting school', holds promise as a strategic framework to attain the desired outcomes of health literacy.[143] Through the concept of the 'health promoting school', the WHO has recognized schools as an optimal environment for health literacy interventions given that children and adolescents typically consume between one-third to one-half of their daily food intake during the school day.[144,145] Recent research has highlighted the importance of promoting food literacy, particularly within

secondary education, as a means to instill healthy dietary habits and enhance students' understanding of health-related concepts.[146] Studies investigating the implementation of health-promoting strategies in schools indicate that nutrition programs aligned with this approach can lead to higher consumption of nutritious foods such as high-fiber items, healthier snacks, water, milk, as well as fruits and vegetables among participants.[143] While initial investigations into food literacy programs and interventions have shown to have a positive impact on nutrition literacy and culinary skills, sustained improvements in long-term dietary habits have been limited, and therefore more research is needed in this area.[147,148]

In Qatar, efforts have been made to improve food literacy in schools. For Example, the Health Promotion Department within MOPH develops and disseminate information, education and communication materials including posters, brochures and leaflets for different age groups covering different nutrition topics. As well as delivering interactive sessions and lectures for students at schools. Moreover, an online platform has been developed to act as an online library to raise the awareness of the school community (parents, students, teachers, and nurses) about the different health topics including nutrition. The platform will be launched before the end of this year. Also, the Health Promotion Department at MOPH is currently developing a dietary guideline for children and adolescents (6-19 years old) where the content of this guideline will be disseminated in schools.

Proposed policies targeting school settings

- Improve School Canteen Guidelines and promote their adoption by all schools.
- Set nutrition guidelines for foods that students bring from home, with an emphasis on healthy food options that are aligned with Qatar's Dietary Guidelines.
- Maintain a School Children Growth Monitoring Program in all schools and institutes and encourage appropriate reporting and communication channels between parents and care providers.
- Enhance school policies on bullying to include obesity and weight as potential triggers.
- Train school staff to recognize and respond to weight-based bullying and provide resources for supporting affected students.

- Develop mental health promotion programs and offer counseling for students, such as mindfulness programs and peer support groups.
- Develop grade appropriate teaching materials for students on healthy lifestyles to be incorporated into school curriculums.
- Train educators and counselors on the drivers of obesity and the use of non-stigmatizing language and imagery.
- Incorporate the updated Qatar National Nutrition and Physical Activity Action Plan in school settings and develop advocacy programs.
- Expand access to high-quality sports and physical activity initiatives for educational institutions.
- Partner with community organizations and sports clubs to offer diverse and engaging sports and physical activity opportunities for students outside of school hours.
- Develop a community school model to utilize school assets and community resources in collaboration with local organizations, business and healthcare providers.

The first 1,000 days

Maternal and pediatric care

The first 1,000 days (from conception to a child's second birthday) are widely considered to be the most formative in a child's development, where health behaviors can be heavily influenced. For example, the most excess weight gain before a child hits puberty occurs before children reach 5 years of age. According to WHO, the number of obese children below the age of 5 increased by 10 million between 1990 and 2013, from 32 million to 42 million.[149]

At the level of primary care, the PHCC in Qatar has introduced a well-baby clinic service that is implemented across all primary healthcare centers. This service is available to all children under 5 years in Qatar. Based on international standards, it includes a comprehensive package of both health promotion and curative care, including routine immunization programs (mandated by MOPH), developmental milestone assessment, nutritional assessment, and growth monitoring, among other things. The program also incorporates breastfeeding guidance and practices and

promotes appropriate introduction to complementary feeding during the first year of life. The aim of this program is to improve and maintain the overall health status of this age group.[150]

MOPH, in coordination with relevant stakeholders, developed Qatar Dietary Guidelines for Mother and Child, with the aim of promoting the health of women, pregnant women, new mothers and their children from birth to the age of 5 years. The guidelines provide recommendations to improve the nutritional and health status of women and mothers during pregnancy and lactation, including breastfeeding advice, the introduction of appropriate complementary feeding after 6 months of age, and dietary recommendations for young children.

Implementing policies to enhance established antenatal care and post-partum interventions in Qatar can have a great impact in improving breastfeeding practices in the country and enhancing consistency in standards of care to prevent maternal obesity and monitor related risk.

Breastfeeding

Breastfeeding is a natural and essential feeding pattern that not only establishes an emotional and physical bond between mothers and babies, but can also contribute to reducing social, behavioral, and metabolic issues in children and into adulthood.[150] Studies have shown that infants that had the lowest risk of obesity were those who fed directly from the breast for the first three months of life. Breastfeeding is not without challenges. Maternal obesity (mothers with a BMI above 30) may cause a delay in breastfeeding initiation and reduce the amount of time that a mother breastfeeds.[151] Complications related to breastfeeding may also exacerbate the incidence or severity of maternal psychiatric illness. Therefore, it is imperative that women have convenient access to adequate and reliable mental health services postpartum as part of a routine medical health check.[152]

In Qatar, a 2018 study revealed that only 24 percent of mothers exclusively breastfed their children in the first six months of life.[153] Some of the challenges facing nursing mothers include the lack of knowledge about breastfeeding, availability and accessibility of formula milk, and nursing mothers returning to work.[153] Postpartum maternal care was a focus area of the Qatar National Health Strategy (NHS) 1 (2011–2016) with a number of recommendations for improving parental and postpartum care services, promoting breastfeeding for the first six months, and developing nutritional guidelines for newborns, infants, and children.[154] Similarly, NHS 2 (2017–2022) focused on maternal and children's health, recommending programs and initiatives including national campaigns to

promote breastfeeding.[155] Public and private healthcare providers are well spread across the country and offer access to maternity services to a substantial part of the population. In addition, Hamad Medical Corporation (HMC), the country's public healthcare provider, launched an online portal housing resources and services for pregnancy, breastfeeding, newborn and young children's health.[156]

Lactation consultants are certified health professionals who specialize in breastfeeding support for mothers. They often provide their services to new mothers in the hospital setting during the baby's first 24 hours of life, but their help can be provided during pregnancy in preparation for birth, or at any time during the breastfeeding journey.[157] Lactation consultants can help with issues related to milk supply, pain during nursing, breastfeeding position, and other common problems.[158] In Qatar, the Women's Wellness and Research Center (WWRC), a member of HMC, adopted the principles of WHO's Baby Friendly Hospital Initiative (BFHI), which is part of a WHO and UNICEF program to protect, promote, and support breastfeeding in facilities providing maternity and newborn services.[159] As part of this initiative, the WWRC offers a lactation clinic service to support mothers experiencing issues with breastfeeding.[160] The clinic currently runs from Sunday to Thursday, from 7am to 3pm.[160] However, there is an urgent need for the expansion of these services to further improve access. Based on the available evidence, breastfeeding support should be available around the clock, seven days a week.[161] In addition, at any tertiary care facility, there should be 1.3 full-time equivalent (FTE) lactation consultants per 1,000 live births per year in the inpatient setting. In the inpatient setting of a neonatal intensive care unit, this increases to approximately 4.3 FTEs per 1,000 infants.[162]

Since 2016, MOPH has been implementing the BFHI as one of the initiatives of the National Nutrition and Physical Activity Action Plan, which seeks to enhance maternal and child nutrition and lower the number of preventable deaths from non-communicable diseases linked to malnutrition and inactivity.[163]

The implementation of BFHI includes training of healthcare professionals on the initiative's 10 steps to promote breastfeeding and covers all public and private hospitals as well as PHCC centers including training of national assessors and lactation counselors. In addition, MOPH has issued a ministerial decree for the accreditation of baby-friendly hospitals.

PHCC provides breastfeeding support through midwifery clinics, WHO-certified lactation counselors, and postnatal home care teams that operate from all primary healthcare centers in Qatar. PHCC is also working toward obtaining Baby Friendly Initiative accreditation for its facilities.

Proposed policies targeting the first 1,000 days

- Enhance screening for maternal obesity to identify women, and at-risk neonates, for education and close monitoring.
- Maintain a minimum figure of maternal and pediatric health counselors and educators per 100,000 population.
- Mandate that all hospitals provide standardized antenatal and post-natal support and counseling for expecting and new mothers.
- Explore partnerships with private healthcare providers to facilitate and expand access to well-baby services for children under the age of 5.
- Enhance the implementation of Baby Friendly Initiative accreditation across healthcare facilities.
- Ensure adequate full-time registered lactation consultant staffing for all labor and delivery units.
- Provide support for working mothers to breastfeed exclusively for at least six months by extending maternity leave and introduce comfortable and private lactation rooms in all office buildings and public places.
- Sustain nationwide campaigns to promote breastfeeding, supported by continued at-home care.
- Issue a national code regulating the marketing of breast milk substitutes.

The role of the family and community

Adopting a multisectoral approach will require collaboration between national and local government, families and communities, schools, healthcare professionals, industry, and academia, in order to deliver the results necessary to tackle childhood obesity. This report demonstrates that childhood obesity is 'everyone's business', rather than just that of the health and social care sectors.

Family-based interventions

Parents play a crucial role in setting healthy environments for their children, and research has shown that there is a strong correlation between "parenting practices and children's eating habits."[163] Family-based interventions play a role in preventing childhood obesity[164] because they target changing eating and lifestyle behaviors and setting parents as role models for their children.[165] Programs could vary in format and duration, and could be held with children and caregivers together or separately, depending on the goal of the intervention.[165]

In the UK, 'Families for Health' is a 12-week family-based program designed to reduce obesity rates among children aged 7 to 13.[166,167] The program ran parallel sub-programs for obese children and their parents addressing

topics including parental skills, children's wellbeing, and healthy lifestyle.[167] A before-and-after assessment revealed a drop in BMI scores and sedentary behaviors, and improvement in daily step-count, overall eating habits, and quality of life.[167]

The Doha International Family Institute (DIFI) conducted research on adolescents' wellbeing in Qatar. The study, which will be published in 2023, included a review of families' eating and physical activity habits. Once published, it will be essential to use the data and results to design FBIs that are relevant to Qatar's context. This will be important given that healthy eating habits can be encouraged by the family during mealtime interactions. Another aspect of the DIFI study is that it also highlights the importance of engaging in physical activity as a family as a way to strengthen family ties and enhance children's wellbeing. These findings provide opportunities for FBIs in Qatar to enhance healthy behaviors.

Some of these interventions could include the creation of safe spaces (digital or physical) for families to learn, collaborate on solutions, and share lessons learned on experiences in dealing with childhood obesity; interventions that encourage families to consume their meals together to promote better eating habits; promote awareness among families and communities on their genetic predisposition to obesity and other risk factors. To be successful, FBIs can build on findings from existing research and engage the families in their design and implementation, and leverage common media outlets and channels, including social media platforms.

Civil society organization engagement

Civil society organizations (CSOs) are vital actors in the mobilization of communities, advocacy, and supporting the accountability efforts of public and private institutions. They can play a significant and central role in influencing the social, political, and moral agendas of national governments to fulfill their commitments to ending childhood obesity.[168]

CSOs can help ensure that nutrition programs and policies are accessible, representative, and impactful. In order for them to do this, it is vitally important to strengthen their capacity and improve their coordination so that they may monitor effectively and ensure accountability to the commitments made.[169] Governments should also consider providing opportunities for formal participation of members of civil society in the policymaking, implementation, and evaluation processes.

Currently, several governments around the world require or encourage CSO participation in the decision-making process. Particularly in low- and middle-income countries, CSOs provide services to supplement government services. Given the far-ranging social determinants of health and societal development, collaboration across a range of societal actors, sectors, and geographical boundaries in policymaking is vital. However, despite the convincing imperative and successful examples of CSO participation worldwide, there remain growing concerns about the nature, effects, and cost of these initiatives, as well as the existing evaluation criteria and availability of empirical data on participation.

There are a number of ways in which CSOs enable, engage with, and influence research and policy. CSOs can take on the role of evaluating research that is conducted by other entities. In the case where policies affect underprivileged communities, CSOs can go beyond traditional research and scientific evaluation criteria to determine consciousness about potential inequalities and injustices. CSOs can also conduct research themselves or communicate research outcomes to the public.

In Qatar, the establishment of a CSO is considered a complicated process; in order to register, potential founders must fulfill several burdensome requirements.[170] As a result, there are only a few CSOs that make a contribution to the health system and policymaking in the country. One of these is the Qatar Diabetes Association (QDA). QDA provides programs that promote an overall healthier lifestyle, not just for diabetic patients. The association works on promoting lifestyles that play a role in diabetes prevention, through nutrition and exercise programs.[171] One such program is the Al Bawasil Camp, that creates an "educational, safe, and fun environment" for children with diabetes across the Middle East and North Africa (MENA) region. Although the camp focuses on diabetes management, there are nutrition-related programs such as learning about carbohydrate counting and healthy food choices.[172]

QDA also conducts several programs that are specifically tailored for obese children and adolescents. An example of such a program is the Diabetes Prevention Camp for overweight and obese children who are considered high-risk for developing diabetes.[173] The camp is typically conducted over the course of three days across different locations in Doha, spanning various municipal youth facilities such as sports clubs, and is supervised by QDA nurses and dieticians alongside non-health professional volunteer assistance. The program includes physical activities such as swimming and football, as well as workshops on diabetes awareness and healthy eating. The camp also offers psychosocial support and workshops on enhancing self-confidence.[173]

Advocacy in an Islamic religious setting

Islam places great emphasis on the significance of health and wellbeing, and Muslims have acknowledged the importance of leading a good and healthy life based on Islamic teachings.[174] Reviewed studies suggest that the guidelines of Islamic religion and beliefs primarily focus on improving lifestyle factors and dietary habits.[174] Adhering to Islamic dietary guidelines and lifestyle has been emphasized as a means of reducing the risk of diseases.

Making use of Islamic religious settings in childhood obesity prevention interventions could be a feasible and acceptable approach.[175] A lack of Islamic narrative in health promotion plans and policies may hinder the successful delivery of any intervention in Muslim communities.[176] To counter this, Islamic religious settings such as mosques, Muslim community and sports organizations, youth centers, or women's circles for studying Islam can be effective venues for implementing after-school and community-based health promotion interventions[175] and have a significant impact on shaping the life choices of the community in Muslim-majority countries such as Qatar.[175] These settings can be used to educate and encourage healthy lifestyles, including promoting healthy eating and physical activity. The available evidence suggests that there is high reach through Islamic religious settings where most health promotion interventions are already targeting physical activity.[177] Islamic religious settings can be used to advocate for and effectively disseminate evidence-based recommendations on physical activity and healthy diets, along with Islamic teachings on healthy living, to a receptive audience, including children, parents, families, and communities.

Proposed policies targeting the community and family

- Expand existing and develop new public health campaigns and make accessible, culturally appropriate resources to offer health education to the community.
- Launch national health and nutrition education programs for parents and caregivers.
- Leverage networks of civil society organizations to amplify general public awareness campaigns.
- Involve religious and community champions, role models, and advocates in related community events that promote active, healthy habits.

CONCLUSION

Obesity remains one of the biggest public health challenges of our time. Given the complexity of the problem, an 'all-of-society', multisectoral approach is imperative to achieving the ultimate goal of effectively reducing childhood obesity. Comprehensive programs that are coordinated at all levels – including food systems, education, public health, urban planning, medical, societal, parental, individual, and national levels – are required. As outlined in this report, we propose that governments, health system leaders, and policymakers across sectors consider the proposed framework for tackling childhood obesity in Qatar. The individual policy recommendations are listed in the table below, and categorized by area of intervention, type of policy, and time horizon (where 'short term' implies over the next 12 months, and 'long term' between 12 and 36 months). We also propose specific entities to lead each initiative.

The next steps will require advocating for the proposed policies; identification of priorities to enable setting up of working groups; and testing and piloting of interventions, which the core team will support. Ultimately, all parties will need to work together in coordinated efforts to fully amplify impact.

Table 3. Proposed policies, actors and timelines

Area of intervention	Proposed policy	Policy lever	Proposed owner	Time horizon
Food and nutrition				
Food labeling	• Develop a framework for front-of-package labeling (FOPL) for Qatar that adopts a nutrient-specific warning system, and mandate its application.	Guidelines/ regulations	MOPH/MOCI	Long term
Digital marketing and media advertisement	• Set guidelines to control and limit advertising of unhealthy food and beverages across all platforms targeting young children and adolescents.	Guidelines/ regulations	MCIT/MOPH	Long term
Food product placement	• Develop guidelines for food product placement in physical outlets and digital platforms, giving prominence to healthy options and limiting unhealthy food within children's reach.	Guidelines/ regulations	MCIT/MOCI/ MOPH	Long term
Nutrition guidelines	• Continue to communicate the updated Qatar National Dietary Guidelines and develop advocacy programs.	Guidelines/ awareness	MOPH	Short term
	• Adopt, endorse, and ensure compliance with national guidelines in restaurants cafes, and vending machines, with a focus on fresh food/products.	Legislation	MOCI/MM/ MOPH	Short term
	• Set minimum standards for imported food and establish a governance structure for monitoring.	Legislation	MOCI/MOPH	Long term
Excise tax	• Evaluate impact of existing excise tax policy in Qatar and explore its expansion based on recommendations from MOPH.	Evaluation	Tax Authority/ MOCI	Short term
	• Expand tax guidelines to include taxing unhealthy products such as prepackaged foods and/or foods and beverages that are high in fat, salt, and sugar.	Regulations	Tax Authority/ MOPH/MOCI	Long term
Accessible healthy food	• Explore mechanisms to make healthy food more affordable, including fruits and vegetables.	Financial incentives	MOCI	Long term
	• Encourage urban agriculture initiatives, such as community farms, to increase access to fresh produce in urban areas.	Access	MM/MOECC	Long term

Area of intervention	Proposed policy	Policy lever	Proposed owner	Time horizon
Health sector practices				
Clinical practice guidelines	• Build on existing multistakeholder task forces and working groups to support with evidence-based guideline development and 'good practice' obesity prevention, screening, and treatment.	Guidelines	MOPH	Short term
	• Implement, monitor, and track impact of established national clinical management guidelines for preventing and treating childhood obesity.	Evaluation	MOPH	Short term
	• Develop national clinical guidelines for bariatric surgery for children and adolescents as a last resort and establish a mechanism to review and update the guidelines every five years.	Guidelines	MOPH	Short term
Health sector coordination	• Expand obesity treatment services and enhance integration with primary health service providers.	Access	MOPH	Long term
	• Strengthen screening for obesity and its risk factors at primary level of care.	Quality improvement	MOPH	Short term
Role of healthcare professionals	• Develop comprehensive national training and capacity-building programs for health practitioners.	Capacity building	MOPH	Long term
Precision health	• Enable precision health interventions to help identify and target high-risk individuals to prevent childhood obesity and provide personalized treatments	Guidelines	MOPH	Long term
Built environment				
Accessible and inclusive spaces for physical activity (indoor and outdoor)	• Adopt and implement the Open Space Recreation and Sports Facilities Development Guidelines that encourage physical activity for everyone, irrespective of gender or ability.	Access	MM/MOSY	Long term
	• Provide accessible facilities and equipment to promote opportunities for physical activity among all children and adolescents.	Access	MM/MOSY/ MEHE	Long term
	• Scale up the AFP and provide necessary training and knowledge to staff members who work with children to support those with different abilities.	Capacity building	QF/MOSY/ MEHE	Long term

Area of intervention	Proposed policy	Policy lever	Proposed owner	Time horizon
Food outlet guidelines and zoning	• Set guidelines for food-service spaces, and access to healthy and unhealthy food in convenience stores and shops.	Guidelines	MOCI/MOPH	Short term
	• Review current city zoning strategies and explore setting buffer zones between schools and fast food outlets and supermarkets within a specific radius.	Quality improvement	MM	Long term
Micro-mobility	• Increase and improve the walking and cycling network by bridging the gaps and linking them to public spaces.	Infrastructure	MM	Short term and long term
School settings				
School food environments	• Improve School Canteen Guidelines and promote their adoption by all schools.	Quality improvement	MEHE/MOPH	Short term
	• Set nutrition guidelines for foods that students bring from home, with an emphasis on healthy food options that are aligned with Qatar's Dietary Guidelines.	Guidelines	MEHE/MOPH	Short term
Student wellbeing	• Maintain a School Children Growth Monitoring Program in all schools and institutes and encourage appropriate reporting and communication channels between parents and care providers.	Screening and monitoring	MEHE/MOPH	Long term
	• Enhance school policies on bullying to include obesity and weight as potential triggers.	Guidelines	MEHE/MOPH	Short term
	• Train school staff to recognize and respond to weight-based bullying and provide resources for supporting affected students.	Capacity building	MEHE/MOPH	Short term
	• Develop mental health promotion programs and offer counseling for students, such as mindfulness programs and peer support groups.	Awareness	MEHE/MOPH	Short term
	• Develop grade appropriate teaching materials for students on healthy lifestyles to be incorporated into school curiums.	Capacity building	MEHE/MOPH	Short term
	• Train educators and counselors on the drivers of obesity and the use of non-stigmatizing language and imagery.	Capacity building	MEHE/MOPH	Short term

Area of intervention	Proposed policy	Policy lever	Proposed owner	Time horizon
Physical activity	• Incorporate the updated Qatar National Nutrition and Physical Activity Action Plan in school settings and develop advocacy programs.	Guidelines	MOPH/MEHE	Long term
	• Expand access to high-quality sports and physical activity initiatives for educational institutions.	Access	MEHE	Long term
	• Partner with community organizations and sports clubs to offer diverse and engaging sports and physical activity opportunities for students outside of school hours.	Access	MEHE/MOC/ MOSY	Long term
	• Develop a community school model to utilize school assets and community resources in collaboration with local organizations, business, and healthcare providers.	Guidelines	MOEHE/MOSY	Short term
First 1,000 days				
Maternal and pediatric care	• Enhance screening for maternal obesity to identify women, and at-risk neonates, for education and close monitoring.	Screening and monitoring	MOPH	Short term
	• Maintain a minimum figure of maternal and pediatric health counselors and educators per 100,000 population.	Guidelines	MOPH	Long term
	• Mandate that all hospitals provide standardized antenatal and postnatal support and counseling for expecting and new mothers.	Legislation	MOPH	Long term
	• Explore partnerships with private healthcare providers to facilitate and expand access to well-baby services for children under the age of 5.	Access	MOPH	Short term
	• Enhance the implementation of Baby Friendly Initiative accreditation across healthcare facilities.	Access	MOPH	Long term

Area of intervention	Proposed policy	Policy lever	Proposed owner	Time horizon
Breastfeeding	• Ensure adequate full-time registered lactation consultant staffing for all labor and delivery units.	Knowledge sharing	MOPH	Short term
	• Provide support for working mothers to breastfeed exclusively for at least six months by extending maternity leave and introduce comfortable and private lactation rooms in all office buildings and public places.	Legislation	MSDF/MOL	Short term
	• Sustain nationwide campaigns to promote breastfeeding, supported by continued at-home care.	Awareness/ behavior nudging	MSDF/MOPH	Short term
	• Issue a national code regulating the marketing of breast milk substitutes.	Legislation	MOCI/MOPH	Long term
Family and community				
Family-based interventions	• Expand existing and develop new public health campaigns and make accessible, culturally appropriate resources to offer health education to the community.	Awareness	MOPH/MOC/ MEHE/MSDF	Long term
	• Launch national health and nutrition education programs for parents and caregivers.	Capacity building	MSDF/MOPH	Short term
Civil society organization engagement	• Leverage networks of civil society organizations to amplify general public awareness campaigns.	Awareness	MSDF/MOPH	Long term
Advocacy	• Involve religious and community champions, role models, and advocates in related community events that promote active, healthy habits.	Awareness	MOC/MOSY/ Awqaf/MOPH	Short Term

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APPENDIX 1. DEFINITIONS OF CHILDHOOD OBESITY

Organization	Definition
World Health Organization	WHO Child Growth Standards (birth to age 5): • Obese: Body mass index (BMI) >3 standard deviations above the WHO growth standard median • Overweight: BMI >2 standard deviations above the WHO growth standard median • Underweight: BMI <2 standard deviations below the WHO growth standard median WHO Reference 2007 (ages 5 to 19): • Obese: Body mass index (BMI) >2 standard deviations above the WHO growth standard median • Overweight: BMI >1 standard deviation above the WHO growth standard median • Underweight: BMI <2 standard deviations below the WHO growth standard median
US Centers for Disease Control and Prevention	CDC Clinical Growth Charts: In children ages 2 to 19, BMI is assessed by age- and sex-specific percentiles: • Obese: 95th percentile • Overweight: 85th and <95th percentile • Normal weight: 5th and <85th percentile • Underweight: <5th percentile For children from birth to age 2, CDC uses a modified version of the WHO criteria.
International Obesity Task Force	• Provides international BMI cut points by age and sex for overweight and obesity for children ages 2 to 18 • The cut points correspond to an adult BMI of 25 (overweight) or 30 (obese)

APPENDIX 2. UPDATE OF THE SELECTED BENCHMARK COUNTRIES

Country	Details
Netherlands[178]	Program name: The Amsterdam Healthy Weight Approach (AHWA) Timeline: 2012 (ongoing) Description: Targeted at addressing childhood obesity in Amsterdam, AHWA is a long-term program (20 years) that adopts a whole-system approach (HiAP) and is led by the local government. The program adopts a life-cycle approach emphasizing the importance of early-age obesity prevention as well as maintaining a healthy lifestyle throughout. Impact to date: • Amsterdam introduced a ban on the marketing of unhealthy food products to children at sports events.[179] • Children and young people consume less sugary drinks.[180] • Babies are being breastfed for longer periods.[180] • More than 25,000 schoolchildren have participated in the Jump-in programs.[181] • Increased parent involvement in Amsterdam Healthy Weight Program (AHWP) activities (over 1,200 preschool parents), 8 health markets, 1,734 healthy eating consultations, more than 1,500 (severely) obese children identified with two-thirds of them being treated, 11 neighborhoods targeted as part of 'AHWP focus neighborhoods'.[181] • Drop in the rate of overweight and obesity among children aged 2–18 from 21% in 2012 to 18.7% in 2017.[181] • Generally, childhood obesity rates dropped significantly among families with an average socioeconomic status from 17.1% to 15.9%. Households with educated parents and/or higher incomes have witnessed lower rates of childhood obesity and overweight.[180] • However, the decline in rates of obesity and overweight has stagnated, but rates are still below the initiation year in 2012.[180] • An increase in rates of overweight and obesity among preschool children was observed in 2017, from 8.8% in 2012 to 9.6% in 2017.[180]

Country	Details
Jordan	Program name: Royal Health Awareness Society (RHAS) Timeline: 2005 (ongoing) Description: RHAS is a nonprofit organization that aims to enhance the overall wellbeing of local communities by raising health awareness and empowering Jordanians to embrace healthy lifestyles and behaviors. RHAS initiates and supports community-based health and safety interventions in partnership with public, private, and civil society institutions.[182] Impact to date: • 102 schools joined the Healthy School programs, of which 76 are on the healthy school path and 26 on the health-promoting school path. • 155+ health teachers and 102 principals were trained on health standards in the academic year 2019–2020.[183] • Under the initiative *Ajyal Salima*, which focuses on raising awareness among students aged 9–11 years on healthy habits and food choices, 50 new schools were included, targeting over 21,500 students as well as training 180 teachers. • 57,000 students benefited from the Healthy Kitchen program's healthy meals. 285 schools were able to implement healthy kitchens through partnerships with community-based kitchens. • The nutritional awareness campaigns under Healthy Kitchen have been associated with a 10% increase in eating fruits and vegetables daily, 16% increase in healthy food knowledge and identification, and 20% improvement in knowledge of the importance of water for the body in relation to juice and soda.
Finland	Program name: Schools on the Move[21] Timeline: 2010–2017 Description: Finland in 2009 recorded a 17% obesity rate across five-year-old children. In response, a program targeting one hour of physical activity in schools per day was piloted in 2010. The national program was rolled out in 2012. Impact to date: • In 2011, 14% of first grade students and 16.1% of fifth grade students were overweight or obese. • By 2015, overweight and obesity rates had dropped to 8.7% of first grade students and 8.2% of fifth grade students. • 31% of all Finnish schools had adopted the program in 2015. In 2016, the government announced that the program would be further expanded to cover colleges and other upper-secondary school institutions (for children aged 16+). • By 2017, more than 80% of Finnish children under the age of 16 were part of the Schools on the Move network.

Country	Details
Malaysia	Program name: Malaysian Childhood Obesity Treatment Trial (MASCOT) Timeline: 2012–2017 Description: A single-blind randomized control trial where children aged 7–11 years were given specific diets and monitored.[184] Impact to date: • 27% of children in the intervention group managed to maintain or lose weight in six months, compared to the control group who did not record any major changes.
Singapore	Program name: National Healthy Lifestyle Program (NHLP) Timeline: 2012–2017 Description: To promote a healthy lifestyle in Singapore.[185] The program was established to "improve the lifestyle of Singaporeans in terms of physical, social, and well-being."[185] Following its inception, several programs 'spun out' from the NHLP as a response to combating childhood obesity in Singapore, such as the Trim and Fit program (a targeted program that ran between 1992 and 2007), and the Healthier Dining Program. Impact to date: • Trim and Fit: The program led to a drop in obesity rates between the age of 11/12 and 15/16. Obesity rates for children aged 11/12 dropped to 14.6% in 2000 compared to 16.6% in 1992. In children aged 15/16 obesity rates dropped to 13.1% in 2000 compared to 15.5% in 1992. In 2006, the percentage of overweight students dropped to 9.5% in comparison to 11.7% recorded in 1993. The program also promoted physical fitness: the proportion of people passing a final physical test increased to 80.8% at the end of the program in 2006, compared to 60.1% in 1993.[186] • Healthier Dining Program: Since the program's inception, availability and accessibility of healthier food and drink options in Singapore increased by 10 times, spanning more than 300 brands and over 2,600 touchpoints.[187]

REFERENCES

1. Chong B, et al. Trends and Predictions of Malnutrition and Obesity in 204 Countries and Territories: An Analysis of the Global Burden of Disease Study 2019. *EClinicalMedicine*. March 2023; 57, 101850.

2. WHO. Child Growth Standards. Geneva: World Health Organization. n.d. Available at: www.who.int/tools/child-growth-standards/standards [Accessed 2 November 2022].

3. Obesity Prevention Source. Defining Childhood Obesity. Harvard: TH Chan School of Public Health. 8 April 2016. Available at: www.hsph.harvard.edu/obesity-prevention-source/obesity-definition/defining-childhood-obesity [Accessed 12 May 2023].

4. Childhood Obesity Foundation. What is childhood obesity? Who is at risk? 24 October 2019. Available at: https://childhoodobesityfoundation.ca/what-is-childhood-obesity [Accessed 12 May 2023].

5. WHO. Obesity and Overweight. World Health Organization; 9 June 2021. www.who.int/news-room/fact-sheets/detail/obesity-and-overweight [Accessed 12 May 2023].

6. Awad SF, O'Flaherty M, El-Nahas KG et al. Preventing type 2 diabetes mellitus in Qatar by reducing obesity, smoking, and physical inactivity: mathematical modeling analyses. *Population Health Metrics* 17, 20 (2019). https://doi.org/10.1186/s12963-019-0200-1

7. World Obesity Federation. *Addressing Weight Stigma and Misconceptions about Obesity in Europe: Considerations for Policymakers*. n.d. Available at: https://s3-eu-west-1.amazonaws.com/wof-files/Weight_Stigma_Briefing_FINAL.pdf [Accessed 3 May 2023].

8. Bacchini D, et al. Bullying and Victimization in Overweight and Obese Outpatient Children and Adolescents: An Italian Multicentric Study. *PLOS ONE*. November 2015; 10(11), e0142715.

9. Devaux M, Vuik S. The relationship between childhood obesity and educational outcomes. In: *The Heavy Burden of Obesity: The Economics of Prevention*. OECD; 2019. Available at: www.oecd-ilibrary.org/sites/641a2e79-en/index.html?itemId=/content/component/641a2e79-en [Accessed 12 May 2023].

10. WHO. The Double Burden of Malnutrition: Policy Brief. World Health Organization. 17 May 2017. Available at: www.who.int/publications/i/item/WHO-NMH-NHD-17.3 [Accessed 12 May 2023].

11. Al-Thani MH, et al. School children growth monitoring program in the state of Qatar: Observations from two survey rounds in 2016–17 and 2019–20. *Public Health Challenges*. January 2023; 2, e52.

12. Ma S. The COVID-19 pandemic: an unprecedented tragedy in the battle against childhood obesity. PG - 477-482 LID - https://doi.10.3345/cep.2020.01081.

13. Lancker WV and Parolin Z. COVID-19, school closures, and child poverty: A social crisis in the making. *Lancet Public Health*. April 2020; 5(5), 243–244.

14. Alshehri LM and Al Agha AE. Impact of Covid-19 Lockdown on the Unhealthy Dietary Habits and Physical Activity of Children and Adolescents Living in the Kingdom of Saudi Arabia. *Ann. Med. Health Sci. Res.* 0, (2021).

15. Al-Mulla NA and Mahfoud ZR. The Impact of the COVID-19 Lockdown "Home Quarantine" on the Physical Activity and Lifestyle of Children in Qatar. *Front. Public Heal.* 10, 1–11 (2022).

16. Abed Alah, M. et al. A Sociodemographic Analysis of the Impact of COVID-19-Related Schools' Closure on the Diet and Physical Activity of Children and Adolescents in Qatar. *J. Epidemiol. Glob. Health* 13, 248–265 (2023).

17. Nishtar S, et al. Ending Childhood Obesity: A Time for Action. *The Lancet*. February 2016. 387(10021), 825–27.

18. Ministry of Public Health, Qatar. *National Health Strategy 2018-2022: Our Health Our Future*. January 2018. Available at: https://andp.unescwa.org/sites/default/files/2020-10/National%20Health%20Strategy%202018-2022.pdf [Accessed 13 November 2023]..

19. Supreme Council of Health, Qatar. *National Health Strategy 2011–2016: Caring for the Future*. Available at: https://extranet.who.int/nutrition/gina/sites/default/filesstore/QAT%202013%20National%20Health%20Strategy%20%28Executive%20Summary%29%20page%2053.pdf [Accessed 13 November 2023]

20. Planning and Statistics Authority. National Development Strategy. n.d. Available at: www.psa.gov.qa/en/nds1/pages/default.aspx [Accessed 12 May 2023].

21. Ministry of Public Health. Case Studies of Successful Childhood Obesity Policies Around the World. n.d. Available at: https://hiap.moph.gov.qa/EN/Documents/Library/Policy%20Framework.pdf [Accessed 12 May 2023].

22. Qatar Ministry of Public Health. The Doha Commitment to a Healthy City, Healthy Children and Healthy Future. October 2019. https://hiap.moph.gov.qa/EN/Documents/Library/The%20Doha%20Commitment%20Multilingual.pdf

23. Gortmaker SL, et al. Changing the Future of Obesity: Science, Policy, and Action. *The Lancet*. August 2011; 378(9793), 838–47.

24. Nishtar S, et al. Ending Childhood Obesity: A Time for Action. *The Lancet*. February 2016; 387(10021), 825–27.

25. WHO. *Population-Based Approaches to Childhood Obesity Prevention*. Geneva: World Health Organization. 2012. Available at: https://apps.who.int/iris/bitstream/handle/10665/80149/9789241504782_eng.pdf [Accessed 2 April 2023].

26. Qatar News Agency. Municipality Ministry: All Qatari Municipalities Certified As Healthy Cities Culmination of Efforts to Improve Quality of Life. 8 October 2022. Available at: www.qna.org.qa/en/News-Area/News/2022-10/08/0024-municipality-ministry-all-qatari-municipalities-certified-as-healthy-cities-culmination-of-efforts-to-improve-quality-of-life [Accessed 5 April 2023].

27. Hendriks A-M, et al. Towards Health in All Policies for Childhood Obesity Prevention. *Journal of Obesity*. April 2013; 1–12.

28. UNICEF. *Applying Behavioural Insights to Tackle Childhood Obesity in Macedonia*.

29. WHO. Report of the Commission on Ending Childhood Obesity: Implementation Plan: Report by the Secretariat. Geneva: World Health Organization (WHO). 27 March 2017. Available at: https://apps.who.int/gb/ebwha/pdf_files/WHA70/A70_31-en.pdf [Accessed 30 March 2023]

30. Bauer JM and Reisch LA. Behavioural Insights and (Un)healthy Dietary Choices: A Review of Current Evidence. *J. Consum. Policy*; 42, 3–45 (2019).

31. Hallsworth M. et al. *Applying Behavioual Insights: Simple Ways to Improve Health Outcomes*. World Innovation Summit for Health. 1–44 (2016).

32. Payne CR, Niculescu M., Just DR, and Kelly MP. Shopper marketing nutrition interventions: Social norms on grocery carts increase produce spending without increasing shopper budgets. *Prev. Med. Reports* 2, 287–291 (2015).

33. World Health Organization and Ministry of Public Health Qatar. *Healthier food and healthier food environments at sports events: An action guide for sports event organizers*. (2023).

34. Chambers T, Segal A, and Sassi F. Interventions using behavioural insights to influence children's diet-related outcomes: A systematic review. *Obes. Rev.* 22, e13152 (2021).

35. Hallsworth M. et al. *Applying Behavioual Insights: Simple Ways to Improve Health Outcomes*. World Innovation Summit for Health. 1–44 (2016).

36. UNICEF. *Applying Behavioural Insights to Tackle Childhood Obesity in Macedonia*.

37. Cleveland Clinic. Benefits of Breastfeeding. Last reviewed 3 October 2022. Available at: https://my.clevelandclinic.org/health/articles/15274-benefits-of-%20breastfeeding#:~:text=Breastfeeding%20is%20also%20a%20special,in%20both%20childr%20en%20and%20adults [Accessed 12 May 2023].

38. Tandon PS, et al. The Relationship between Physical Activity and Diet and Young Children's Cognitive Development: A Systematic Review. *Preventive Medicine Reports*. April 2016; 3, 379–90.

39. Marshall SJ, et al. Relationships between media use, body fatness and physical activity in children and youth: A meta-analysis. *International Journal of Obesity and Related Metabolic Disorders*. 2004; 28(10), 1238–46.

40. Farrand C. *Front-of-Pack Food Labelling Policies in the WHO European Region*. World Health Organization European Office for the Prevention and Control of Noncommunicable Diseases. 20 January 2021. Available at: https://cdn.who.int/media/docs/default-source/thailand/ncds/ppt_clare_fopl1_final-presentation_cf.pdf?sfvrsn=388ab823_3 [Accessed 5 April 2023].

41. WHO. *Nutrient Profiling: Report of a WHO/IASO Technical Meeting, London, United Kingdom 4–6 October 2010*. Geneva: World Health Organization. 2011. Available at: https://apps.who.int/iris/handle/10665/336447 [Accessed 12 May 2023].

42. WHO. New WHO tool aim to protect children from unhealthy food marketing. World Health Organization. 14 March 2023. Available at: https://www.who.int/europe/news/item/14-03-2023-new-who-guidelines-aim-to-protect-children-from-unhealthy-food-marketing [Accessed 5 April 2023].

43. Constantin A, AlJuburi G, Cabrera O. *The potential of a front-of-package labeling system for Qatar*. Doha, Qatar: World Innovation Summit for Health 2022.

44. World Innovation Summit for Health. *Strategic Action To Combat The Obesity Epidemic*. Doha, Qatar: World Innovation Summit for Health; 2013.

45. Global Health Advocacy Incubator. Brazil Implements Front-of-Package Warning Labels. 5 December 2022. Available at: www.advocacyincubator.org/featured-stories/2022-11-08-brazil-implements-front-of-package-warning-labels [Accessed 12 May 2023].

46. Fonseca F. Brazil Approves New Regulations for Food Labeling. United States Department of Agriculture, Foreign Agricultural Service; and Global Agricultural Information Network. 21 October 21, 2020. Available at: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Brazil%20Approves%20New%20Regulations%20for%20Food%20Labeling_Sao%20Paulo%20ATO_Brazil_10-11-2020 [Accessed 3 April 2023].

47. Instituto Brasileiro de Defesa do Consumidor. Understanding The Labels. Alimentando Políticas. 2022. https://alimentandopoliticas.org.br/wp-content/uploads/2022/10/Fact_sheet_Rotulagem_Ing.pdf [Accessed 30 March 2023].

48. World Obesity Federation. *Implementing Front-of-Pack Nutrition Labelling Regulations: Considerations for European Policymakers*. n.d. Available at: https://s3-eu-west-1.amazonaws.com/wof-files/FOPL_Briefing_21Nov.pdf [Accessed 3 May 2023].

49. Al-Jawaldeh A, et al. Improving Nutrition Information in the Eastern Mediterranean Region: Implementation of Front-of-Pack Nutrition Labelling. *Nutrients*. January 2020; 12(2), 330.

50. WHO. Government Guidance of Saudi FOPL Traffic Light. World Health Organization. May 2018. Available at: https://extranet.who.int/nutrition/gina/en/node/53608 [Accessed 12 May 2023].

51. Vision 2030. Health Sector Transformation Program. n.d. Available at: www.vision2030.gov.sa/v2030/vrps/hstp [Accessed 12 May 2023].

52. Al-Jawaldeh A, et al. Improving Nutrition Information in the Eastern Mediterranean Region: Implementation of Front-of-Pack Nutrition Labelling. *Nutrients*. January 2020; 12(2), 330.

53. Valkenburg PM, Cantor J. The Development of a Child Into a Consumer. *Journal of Applied Developmental Psychology*. January 2001; 22(1), 61–72.

54. OHCHR. Convention on the Rights of the Child. Office of the High Commissioner for Human Rights; n.d. Available at: www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child [Accessed 12 May 2023].

55. OHCHR. International Covenant on Economic, Social and Cultural Rights. Office of the High Commissioner for Human Rights; n.d. Available at: www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights [Accessed 12 May 2023].

56. Council of Europe. Recommendation CM/Rec(2018)7 of the Committee of Ministers to Member States on Guidelines to Respect, Protect and Fulfil the Rights of the Child in the Digital Environment. 4 July 2018. Available at: https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016808b79f7 [Accessed 12 May 2023].

57. Brock TC, et al. Food Policy Approaches to Obesity Prevention: An International Perspective. *Current Obesity Reports*. February 2014; 3(2), 171–82.

58. FAO. Food-Based Dietary Guidelines – Qatar. Food and Agricultural Organization of the United Nations; n.d. Available at: www.fao.org/nutrition/education/food-based-dietary-guidelines/regions/countries/qatar/en/#:~:text=The%20Qatar%20food%20guide%20is,groups%20on%20a%20daily%20basis [Accessed 29 March 2023].

59. Ministry of Public Health, Qatar. *Qatar Dietary Guidelines*, 2nd edition, 2022 (first published 2015). Available at: https://www.moph.gov.qa/_layouts/15/download.aspx?SourceUrl=/Admin/Lists/PublicationsAttachments/Attachments/238/QDG2En_Digital.pdf [Accessed 13 November 2023]

60. Lin B-H, Guthrie JF. *Nutritional Quality of Food Prepared at Home and Away From Home, 1977–2008*. United States Department of Agriculture Economic Research Service. Economic Information Bulletin 105. December 2012. https://doi.org/10.22004/ag.econ.142361.

61. Burton S, et al. Attacking the Obesity Epidemic: The Potential Health Benefits of Providing Nutrition Information in Restaurants. *American Journal of Public Health*. July 2006; 96(9), 1669–75.

62. Cohn E, et al. Calorie Postings in Chain Restaurants in a Low-Income Urban Neighborhood: Measuring Practical Utility and Policy Compliance. *Journal of Urban Health-Bulletin of the New York Academy of Medicine*. February 2012; 89(4), 587–97.

63. Finkelstein EA. Performance Standards for Restaurants: A New Approach to Addressing the Obesity Epidemic. *RAND*. 1 December 2011. Available at: www.rand.org/content/dam/rand/pubs/conf_proceedings/CF300/CF313/RAND_CF313.pdf [Accessed 12 May 2023].

64. Gichuki CW. New Guidelines for Foods & Beverages at Health Facilities. *Qatar Tribune*. 1 March 2017. Available at: www.qatar-tribune.com/article/51203/FIRSTPAGE/New-guidelines-for-foods-beverages-at-health-facilities [Accessed 12 May 2023].

65. MOCI. The Ministry of Economy and Trade reaps the results of the 'Arabization' initiative launched last year to oblige suppliers to use the Arabic language in all its dealings with consumers. 20 May 2018. www.moci.gov.qa/mec_news/%D9%88%D8%B2%D8%A7%D8%B1%D8%A9-%D8%A7%D9%84%D8%A7%D9%82%D8%AA%

D8%B5%D8%A7%D8%AF-%D9%88%D8%A7%D9%84%D8%AA%D8%AC%D8%A7%D8%B1%D8%A9-%D8%AA%D8%AD%D8%B5%D8%AF-%D9%86%D8%AA%D8%A7%D8%A6%D8%AC-%D9%85%D8%A8 [Accessed 18 April 2023].

66. *The Peninsula*. Restaurants to Display More Info on Menus. *The Peninsula*. 10 June 2018. https://thepeninsulaqatar.com/article/10/06/2018/Restaurants-to-display-more-info-on-menus.

67. Ministry of Commerce and Industry. MOCI launches an initiative to regulate organize the display of data for menus of meals and drinks in restaurants and cafes. 9 June 2018. Available at: www.moci.gov.qa/mec_news/%d9%88%d8%b2%d8%a7%d8%b1%d8%a9-%d8%a7%d9%84%d8%a7%d9%82%d8%aa%d8%b5%d8%a7%d8%af-%d9%88%d8%a7%d9%84%d8%aa%d8%ac%d8%a7%d8%b1%d8%a9-%d8%aa%d8%b7%d9%84%d9%82-%d9%85%d8%a8%d8%a7%d8%af%d8%b1%d8%a9-%d8%aa-2 [Accessed 18 April 2023].

68. Itria A, et al. Taxing Sugar-Sweetened Beverages as a Policy to Reduce Overweight and Obesity in Countries of Different Income Classifications: A Systematic Review. *Public Health Nutrition*. July 2021; 24(16), 5550–60.

69. Ahmed HM. Obesity, Fast Food Manufacture, and Regulation: Revisiting Opportunities for Reform. *Food and Drug Law Journal*. January 2009; 64(3), 565–75.

70. Thow AM, et al. A Systematic Review of the Effectiveness of Food Taxes and Subsidies to Improve Diets: Understanding the Recent Evidence. *Nutrition Reviews*. September 2014; 72(9), 551–65.

71. Ruopeng A. An R. Effectiveness of Subsidies in Promoting Healthy Food Purchases and Consumption: A Review of Field Experiments. *Public Health Nutrition*. July 2013; 16(7), 1215–28.

72. Itria A, et al. Taxing Sugar-Sweetened Beverages as a Policy to Reduce Overweight and Obesity in Countries of Different Income Classifications: A Systematic Review. *Public Health Nutrition*. July 2021; 24(16), 5550–60.

73. Carbonell JG, et al. Taxation of Unhealthy Consumption of Food and Drinks: An Updated Literature Review. *Hacienda Publica Espanola*. January 2013; 207(4), 119–40. http://dx.doi.org/10.7866/HPE-RPE.13.4.5.

74. General Tax Authority. Excise Tax. FAQ. n.d. Available at: https://gta.gov.qa/en/faq-excise-tax [Accessed 12 May 2023].

75. Hampl SE, et al. Executive Summary: Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity. *Pediatrics*. 2023;151(2):e2022060641.

76. Gumbrecht J, Howard J. Updated Obesity Treatment Guidelines for Children and Teens Include Medications, Surgery for Some Young People. CNN. 11 January 2023. Available at: https://edition.cnn.com/2023/01/09/health/childhood-obesity-treatment-guidelines-wellness/index.html [Accessed 12 May 2023].

77. Reinehr T, Dieris B. New Clinical Practice Guideline for Evaluation and Treatment of Children and Adolescents with Obesity: Paradigm Shifts. *The Lancet Diabetes & Endocrinology*. February 2023; 11(4), 222–23.

78. Curley C. Criticism Emerges Over New AAP Guidelines for Childhood Obesity. Healthline. 20 January 2023. Available at: www.healthline.com/health-news/childhood-obesity-new-guidelines-recommend-surgery-nutrition-therapy#Effective-obesity-treatments-but-with-barriers [Accessed 12 May 2023].

79. World Obesity Federation. The Management and Treatment of Obesity in Children and Youth: A Briefing for European Policymakers. n.d. Available at: https://s3-eu-west-1.amazonaws.com/wof-files/CHOTreatment_Briefing.pdf [Accessed 3 May 2023].

80. Ministry of Public Health Qatar. National Clinical Guideline: The Management of Obesity in Children. 2019. Available at: https://www.moph.gov.qa/_layouts/download.aspx?SourceUrl=/Admin/Lists/ClinicalGuidelinesAttachments/Attachments/74/The%20Management%20of%20Obesity%20in%20Children.pdf [Accessed 25 May 2023].

81. Schauer GL, et al. A Qualitative Inquiry about Weight Counseling Practices in Community Health Centers. *Patient Education and Counseling*. October 2014; 97(1), 82–87.

82. Kable A, et al. Nurse Provision of Healthy Lifestyle Advice to People who are Overweight or Obese. *Nursing & Health Sciences*. December 2015; 17(4), 451–59.

83. Pearce C, et al. Obesity Prevention and the Role of Hospital and Community-Based Health Services: A Scoping Review. *BMC Health Services Research*. July 2019; 19(1).

84. Robson D, et al. Mental Health Nursing and Physical Health Care: A Cross-Sectional Study of Nurses' Attitudes, Practice, and Perceived Training Needs for the Physical Health Care of People with Severe Mental Illness. *International Journal of Mental Health Nursing*. October 2013; 22(5), 409–17.

85. Kemper KA. Stratifying Patients for Weight Loss Counseling. *The Nurse Practitioner*. August 2010; 35(8), 33–38. https://doi.org/10.1097/01.npr.0000383950.56477.a5.

86. Durant N, et al. Patient Provider Communication about the Health Effects of Obesity. *Patient Education and Counseling*. April 2009; 75(1), 53–57. https://doi.org/10.1016/j.pec.2008.09.021.

87. Lutfiyya MN, et al. Primary Prevention of Overweight and Obesity: An Analysis of National Survey Data. *Journal of General Internal Medicine*. March 2008; 23(6),821–23. https://doi.org/10.1007/s11606-008-0581-5.

88. Post RM. The Influence of Physician Acknowledgment of Patients' Weight Status on Patient Perceptions of Overweight and Obesity in the United States. Archives of Internal Medicine. February 2011; 171(4). https://doi.org/10.1001/archinternmed.2010.549.

89. Gulf Times. "MoPH Conducts Trainers Workshop on Dietary Guidelines." July 3, 2022. Accessed June 5, 2023. https://www.gulf-times.com/story/720397/moph-conducts-trainers-workshop-on-dietary-guidelines [Accessed 12 May 2023].

90. Wutzke S. Systems Approaches for Chronic Disease Prevention: Sound Logic and Empirical Evidence, but Is This View Shared Outside of Academia? *Public Health Research & Practice*. July 2016; 26(3).

91. Tackling Obesity in Qatar: A Roadmap for a Healthier Future. Open Gulf, n.d.

92. Bhatta B. Urban Sprawl Measurement from Remote Sensing Data. *Applied Geography*. December 2010; 30(4), 731–40. https://doi.org/10.1016/j.apgeog.2010.02.002.

93. Congdon P. Obesity and Urban Environments. *International Journal of Environmental Research and Public Health*. February 2019; 16(3), 464.

94. Ewing R, et al. Relationship between Urban Sprawl and Physical Activity, Obesity, and Morbidity. *American Journal of Health Promotion*. September 2003; 18(1), 47–57. https://doi.org/10.4278/0890-1171-18.1.47.

95. Pirgon O, Aslan N. The Role of Urbanization in Childhood Obesity. *Journal of Clinical Research in Pediatric Endocrinology*. September 2015; 7(3), 163–67.

96. Ellis G, et al. Connectivity and Physical Activity: Using Footpath Networks to Measure the Walkability of Built Environments. *Environment and Planning B: Planning and Design*. January 2016; 43(1), 130–51.

97. Lopez R. Urban Sprawl and Risk for Being Overweight or Obese. *American Journal of Public Health*. September 2004; 94(9), 1574–79. https://doi.org/10.2105/ajph.94.9.1574.

98. World Innovation Summit for Health. *Playing the Long Game: A framework for promoting physical activity through sports mega-events*. Doha, Qatar: World Innovation Summit for Health 2022.

99. Congdon P. Obesity and Urban Environments. *International Journal of Environmental Research and Public Health*. February 2019; 16(3), 464.

100. Wolch J, et al. Urban Green Space, Public Health, and Environmental Justice: The Challenge of Making Cities 'Just Green Enough'. *Landscape and Urban Planning*. May 2014; 125, 234–44.

101. Ministry of Municipality. *Open Space, Recreation and Sport Facilities Development Guidelines*. n.d. Available at: www.mm.gov.qa/QatarMasterplan/Downloads-qnmp/Regulation/English/Group3-Guideline/035_Open%20Space%20and%20Sport%20facilities%20%20Development%20Guidelines%20Dec%202017.pdf [Accessed 12 May 2023].

102. World Innovation Summit for Health. *Protecting Health In Dry Cities: From Evidence to Action. World Innovation Summit for Health*. Doha, Qatar: World Innovation Summit for Health 2020.

103. Gatineau M. Obesity and Disability Children and Young People. Public Health England. March 2014. Available at: www.blackpooljsna.org.uk/Documents/Developing-Well/PHE-obesity-and-disability-child-and-young-people-19-02-14.pd.pdf [Accessed 12 May 2023].

104. Liou TH, et al. Physical Disability and Obesity. *Nutrition Reviews*. October 2005; 63(10), 321–31.

105. Rimmer JH, et al. Obesity and Secondary Conditions in Adolescents with Disabilities: Addressing the Needs of an Underserved Population. *Journal of Adolescent Health*. September 2007; 41(3), 224–29. https://doi.org/10.1016/j.jadohealth.2007.05.005.

106. Akoum ME, et al. Road to Success: Lessons from the Qatar Foundation Ability Friendly Program. *BMJ Innovations*. April 2022; 9(2), 109–15.

107. Congdon P. Obesity and Urban Environments. *International Journal of Environmental Research and Public Health*. February 2019; 16(3), 464.

108. Hendrickson D, et al. Fruit and Vegetable Access in Four Low-Income Food Deserts Communities in Minnesota. *Agriculture and Human Values*. October 2006; 23(3), 371–83. https://doi.org/10.1007/s10460-006-9002-8.

109. Jiao J, et al. How to Identify Food Deserts: Measuring Physical and Economic Access to Supermarkets in King County, Washington. *American Journal of Public Health*. September 2012; 102(10), e32–39.

110. Walker R, et al. Disparities and Access to Healthy Food in the United States: A Review of Food Deserts Literature. *Health & Place*. September 2010; 16(5), 876–84. https://doi.org/10.1016/j.healthplace.2010.04.013.

111. Abarca-Gómez L, et al. Worldwide Trends in Body-Mass Index, Underweight, Overweight, and Obesity from 1975 to 2016: A Pooled Analysis of 2416 Population-Based Measurement Studies in 128·9 Million Children, Adolescents, and Adults. *The Lancet*. December 2017; 390(10113), 2627–42.

112. Timmermans J, et al. 'Obesogenic' School Food Environments? An Urban Case Study in the Netherlands. *International Journal of Environmental Research and Public Health*. March 2018; 15(4), 619.

113. Carter RT. The Impact of Public Schools on Childhood Obesity. *JAMA*. November 2002; 288(17), 2180. https://doi.org/10.1001/jama.288.17.2180-jms1106-6-1.

114. Welker EB, et al. The School Food Environment and Obesity Prevention: Progress Over the Last Decade. *Current Obesity Reports*. April 2016; 5(2), 145–55.

115. Ministry of Health. School-Based Health Awareness Program. Ministry of Health Saudi Arabia. n.d. Available at: www.moh.gov.sa/en/Ministry/Projects/School-Health-Program/Pages/default.aspx [Accessed 29 March 2023].

116. WHO. Health-Promoting Schools Initiative in Oman: A WHO Case Study in Intersectoral Action. World Health Organization (WHO). 2013. Available at: https://applications.emro.who.int/dsaf/EMROPUB_2013_EN_1587.pdf [Accessed 29 March 2023].

117. UNESCO. Bahrain National School Health Program. n.d. Available at: https://healtheducationresources.unesco.org/sites/default/files/resources/bahrain_national_school_health_programme_en.pdf [Accessed 29 March 2023].

118. Abu Dhabi Education Council, Abu Dhabi Food Control Authority and Health Authority—Abu Dhabi. Policy – School Canteen Guidelines of the Emirate of Abu Dhabi. Global database on the Implementation of Nutrition Action (GINA), World Health Organization. 2011. Available at: https://extranet.who.int/nutrition/gina/en/node/63350 [Accessed 25 May 2023].

119. Dubai Municipality. Guidelines and Requirements for Food & Nutrition in Schools in Dubai. January 2017. Available at: www.dm.gov.ae/wp-content/uploads/2020/11/Guidelines-and-Requirements-for-Food-and-Nutrition-in-Schools-in-Dubai.pdf [Accessed 29 March 2023].

120. Ministry of Health and Ministry of Education. Guidelines for School Canteens. Ministry of Health and Ministry of Education of Saudi Arabia. n.d. Available at: www.moh.gov.sa/Ministry/About/Health%20Policies/031.pdf [Accessed 29 March 2023].

121. Ministry of Education. A Guide for School Canteen Supervisors AY2018/2019. n.d. Available at: www.edu.gov.qa/ar/Deputy/sharedservicesaffairs/healthandsafety-dept/Documents/FilesLibrary/2-GuidetoSchoolCafeteriaSupervisors.pdf [Accessed 29 March 2023].

122. Quelly SB. Characteristics Associated with School Nurse Childhood Obesity Prevention Practices. *Pediatric Nursing*. 2017; 43(4), 193–99.

123. Al-Thani MH, et al. School children growth monitoring program in the state of Qatar: Observations from two survey rounds in 2016–17 and 2019–20. *Public Health Challenges*. January 2023; 2(1).

124. Schantz S, Bobo N. School Program for Screening Students at Risk for Diabetes. *NASN School Nurse*. July 2009; 24(4), 150–54. https://doi.org/10.1177/1942602x09337517.

125. Zhang J. The Bidirectional Relationship between Body Weight and Depression across Gender: A Simultaneous Equation Approach. *International Journal of Environmental Research and Public Health*. July 2021; 18(14), 7673.

126. Pan A, et al. Bidirectional Association between Depression and Obesity in Middle-Aged and Older Women. *International Journal of Obesity*. April 2012; 36(4), 595–602.

127. Bonvissuto D. Antidepressants and Weight Gain: What to Know. WebMD. 20 November 2007. Available at: www.webmd.com/depression/features/antidepressants-weight-gain [Accessed 12 May 2023].

128. Hart CN, et al. Sleep and Obesity in Children and Adolescents. *Pediatric Clinics of North America*. June 2011; 58(3), 715–33. https://doi.org/10.1016/j.pcl.2011.03.007.

129. Larrier YI, et al. College Students: Mental Health Problems and Treatment Considerations. *Journal of School Counseling*. 2011; 9(3), 1–31.

130. Murphy M, Polivka BJ. Parental Perceptions of the Schools' Role in Addressing Childhood Obesity. *Journal of School Nursing*. February 2007; 23(1), 40–46. https://doi.org/10.1177/10598405070230010701.

131. Bonde AH, et al. School Nurses' Experiences With Motivational Interviewing for Preventing Childhood Obesity. *Journal of School Nursing*. January 2014; 30(6), 448–55.

132. CDC. Physical Activity Guidelines for Americans. 2nd ed. United States Centers for Disease Control and Prevention. 2008. Available at: www.cdc.gov/healthyschools/physicalactivity/guidelines.htm [Accessed 12 May 2023].

133. Aspetar. Qatar National Physical Activity Guidelines, 2nd ed. 2021. Doha, Qatar: Aspetar Orthopaedic and Sports Medicine Hospital. 2021. Available at: www.aspetar.com/AspetarFILEUPLOAD/UploadCenter/637736948034432931_QATAR%20NATIONAL%20PHYSICAL%20ACTIVITY%20GUIDELINES_ENGLISH.pdf [Accessed 29 March 2023].

134. Piercy KL, et al. The Physical Activity Guidelines for Americans. *JAMA*. November 2018; 320(19), 2020.

135. Kühr P, et al. Three Times as Much Physical Education Reduced the Risk of Children Being Overweight or Obese after 5 Years. *Acta Paediatrica*. March 2020; 109(3), 595–601.

136. WHO. WHO Guidelines on Physical Activity and Sedentary Behaviour. Geneva: World Health Organization (WHO). 25 November 2020. Available at: www.who.int/publications/i/item/9789240015128 [Accessed 12 May 2023].

137. Active Healthy Kids Australia. REBOOT! Reimagining Physically Active Lives: 2022 Australian Report Card on Physical Activity for Children and Young People. 2022. Available at: www.activehealthykids.org/wp-content/uploads/2022/03/Australia-report-card-long-form-2022.pdf [Accessed 2 April 2023].

138. Tremblay MS, et al. Canadian 24-Hour Movement Guidelines for Children and Youth: An Integration of Physical Activity, Sedentary Behaviour, and Sleep. *Applied Physiology, Nutrition, and Metabolism*. June 2016; 41(6), sup. 3, S311–27.

139. Zimmo L, et al. School-Time Physical Activity Among Arab Elementary School Children in Qatar. *BMC Pediatrics*. March 2017; 17(76).

140. Alkhateib MA, et al. Influence of Sedentary Lifestyle on Body Weight in Qatari School Children. *Qatar Foundation Annual Research Forum Proceedings*, Qatar Foundation Annual Research Forum. October 2012; Issue 1. https://doi.org/10.5339/qfarf.2012.BMP127.

141. Zimmo L et al. School-Time Physical Activity among Arab Elementary School Children in Qatar. *BMC Pediatrics*. March 2017; 17(1).

142. Chari R, Warsh J, Ketterer T, Hossain J, and Sharif I. Association between health literacy and child and adolescent obesity. *Patient Educ. Couns.* 94, 61–66 (2014).

143. Wang D and Stewart D. The implementation and effectiveness of school-based nutrition promotion programmes using a health-promoting schools approach: a systematic review. *Public Health Nutr.* 16, 1082–1100 (2013).

144. Regan A, Parnell W, Gray A, and Wilson N. New Zealand children's dietary intakes during school hours. *Nutr. Diet.* 65, 205–210 (2008).

145. World Health Organization. *School policy framework: implementation of the WHO global strategy on diet, physical activity and health*. (2008).

146. St Leger L. Schools, health literacy and public health: possibilities and challenges. *Health Promot. Int.* 16, 197–205 (2001).

147. Brooks N and Begley A. Adolescent food literacy programmes: A review of the literature. *Nutr. Diet.* 71, 158–171 (2014).

148. Vaitkeviciute R, Ball LE, and Harris N. The relationship between food literacy and dietary intake in adolescents: a systematic review. *Public Health Nutr.* 18, 649–658 (2015).

149. Al-Thani M, et al. Obesity and Related Factors Among Children and Adolescents in Qatar. *International Journal of Basic Science in Medicine*. December 2017; 2(4), 161–65.

150. PHCC. Well Baby Clinic. Primary Health Care Corporation, n.d. Available at: www.phcc.gov.qa/en/Clinics-And-Services/Child-And-Adolescent-Health/Well-Baby-Clinic [Accessed 12 May 2023].

151. Jevitt C, et al. Lactation Complicated by Overweight and Obesity: Supporting the Mother and Newborn. *Journal of Midwifery & Women's Health*. November 2007; 52(6), 606–13. https://doi.org/10.1016/j.jmwh.2007.04.006.

152. Rivi V, et al. Mind the Mother When Considering Breastfeeding. *Frontiers in Global Women's Health*. September 2020; 1(3).

153. Hendaus MA, et al. Breastfeeding Rates and Barriers: A Report From the State of Qatar. *International Journal of Women's Health*. August 2018; 10, 467–75.

154. Supreme Council of Health. National Health Strategy 2011–2016. WHO. https://extranet.who.int/nutrition/gina/sites/default/filesstore/QAT%202011%20National%20Health%20Strategy.pdf [Accessed 30 March 2023].

155. Ministry of Public Health. Qatar Public Health Strategy 2017–2022. Ministry of Public Health, Qatar; n.d. Available at: https://extranet.who.int/ncdccs/Data/QAT_B3_QPHS%202017-2022.pdf [Accessed 30 March 2023].

156. Hamad Medical Corporation. Maternal and Child Health. Available at: www.hamad.qa/EN/your%20health/Maternal-and-Child-Health/Pages/default.aspx [Accessed 30 March 2023].

157. El Akoum M. How Can a Lactation Consultant Help in Breastfeeding Struggles? *Doha News*. 7 August 2022. Available at: https://dohanews.co/how-can-a-lactation-consultant-help-in-breastfeeding-struggles [Accessed 8 April 2023].

158. Cleveland Clinic. Lactation Consultant: When to see one & what to expect. Last updated 30 November 2021. https://my.clevelandclinic.org/health/articles/22106-lactation-consultant [Accessed 8 April 2023].

159. *The Peninsula*. MoPH Organizes Workshop on Baby-Friendly Hospital Initiative. *The Peninsula*. 13 October 2022. Available at: https://thepeninsulaqatar.com/article/13/10/2022/moph-organizes-workshop-on-baby-friendly-hospital-initiative [Accessed 2 May 2023].

160. Women's Wellness and Research Center. Lactation Clinic. Hamad Medical Corporation; n.d. Available at: www.hamad.qa/EN/Hospitals-and-services/WWRC/Maternity%20Care/Postnatal%20Support/Pages/Lactation-Clinic.aspx [Accessed 8 April 2023].

161. Riordan J. *Breastfeeding and Human Lactation*. Sudbury: Jones and Bartlett. 2004.

162. Mannel R, Mannel RS. Staffing for Hospital Lactation Programs: Recommendations From a Tertiary Care Teaching Hospital. *Journal of Human Lactation*. November 2006; 22(4), 409–17. https://doi.org/10.1177/0890334406294166.

163. Endevelt R, et al. An Intensive Family Intervention Clinic for Reducing Childhood Obesity. *Journal of the American Board of Family Medicine*. May 2014; 27(3), 321–28. https://doi.org/10.3122/jabfm.2014.03.130243.

164. Berge JM, Everts J. Family-Based Interventions Targeting Childhood Obesity: A Meta-Analysis. *Childhood Obesity*. April 2011; 7(2), 110–21. https://doi.org/10.1089/chi.2011.07.02.1004.berge.

165. Wang X, et al. Family-based Interventions for Preventing Overweight or Obesity among Preschoolers from Racial/Ethnic Minority Groups: A Scoping Review. *Obesity Science & Practice*. November 2021; 8(3), 371–86.

166. Robertson W, et al. Two-Year Follow-up of the 'Families for Health' Programme for the Treatment of Childhood Obesity. *Child Care Health and Development*. March 2012; 38(2), 229–36. https://doi.org/10.1111/j.1365-2214.2011.01237.x.

167. Robertson W, et al. Pilot of 'Families for Health': Community-Based Family Intervention for Obesity. *Archives of Disease in Childhood*. May 2008; 93(11), 921–28. https://doi.org/10.1136/adc.2008.139162.

168. Busse H, et al. What Is the Role of Civil Society in Multisectoral Nutrition Governance Systems? A Multicountry Review. *Food and Nutrition Bulletin*. March 2020; 41(2), 244–60.

169. WHO. Report of the Commission on Ending Childhood Obesity: Implementation Plan: Report by the Secretariat. Geneva: World Health Organization (WHO). 27 March 2017. Available at: https://apps.who.int/gb/ebwha/pdf_files/WHA70/A70_31-en.pdf [Accessed 30 March 2023].

170. CIVICUS. The State of Qatar: Submission to the UN Universal Periodic Review. 19th Session of the UPR Working Group. CIVICUS: World Alliance for Citizen Participation. 16 September 2013. Available at: www.civicus.org/images/CIVICUS_GCHR_Joint_Qatar_UPR_Submission.pdf [Accessed 6 April 2023].

171. Qatar Diabetic Association. Prevention by Nutrition. n.d. Available at: https://qda.org.qa/prevention-by-nutrition [Accessed 6 April 2023].

172. Qatar News Agency. Qatar Diabetes Association Launches 23rd Annual Al Bawasil Camp. 21 December 2022. Available at: www.qna.org.qa/en/News-Area/News/2022-12/21/0028-qatar-diabetes-association-launches-23rd-annual-al-bawasil-camp [Accessed 6 April 2023].

173. Selmi SM, et al. A Program for Obese Youth At-Risk for Diabetes in Qatar. *Avicenna*. March 2015; 2015(1).

174. Jabbaripour P, et al. The Role of Islamic Lifestyle and Healthy Nutrition in Accordance with the Recommendations of Islam and the Holy Quran by Focusing on the Risk of Cancer Incident. *Journal of Community Medicine and Health Solutions*. November 2020; 1(1), 018–022.

175. Dogra SA, et al. Delivering a Childhood Obesity Prevention Intervention Using Islamic Religious Settings in the UK: What Is Most Important to the Stakeholders? *Preventive Medicine Reports*. April 2021; 22, 101387.

176. Dogra SA. Living a Piety-Led Life beyond Muharram: Becoming or Being a South Asian Shia Muslim in the UK. *Contemporary Islam*. October 2019; 13(3), 307–24.

177. Rai K, et al. A Scoping Review and Systematic Mapping of Health Promotion Interventions Associated with Obesity in Islamic Religious Settings in the UK. *Obesity Reviews*. June 2019; 20(9), 1231–61.

178. UNICEF, City of Amsterdam, EAT. The Amsterdam Healthy Weight Approach: Investing in Healthy Urban Childhoods: A Case Study on Healthy Diets for Children. United Nations Children's Fund (UNICEF). November 2020. www.unicef.org/media/89401/file/Amsterdam-Healthy-Weight-Approach-Investing-healthy-urban-childhoods.pdf [Accessed 30 March 2023].

179. Amsterdam Healthy Weight Programme. Amsterdam Will Become the Healthiest City for Children! Time to get tough! Part 1. Amsterdam Healthy Weight Programme 2018–2021 Multiannual Programme. City of Amsterdam. December 2017. Available at: https://assets.amsterdam.nl/publish/pages/967207/summary_amsterdam_healthy_weight_programme_2018-2021-wcag.pdf [Accessed 30 March 2023].

180. Amsterdam Healthy Weight Programme. Weight and Lifestyle of Children in Amsterdam. City of Amsterdam. July 2019. Available at: https://assets.amsterdam.nl/publish/pages/967207/eng-factsheet_amsterdam_weight_and_lifestyle_-_july-2019.pdf [Accessed 12 May 2023].

181. Amsterdam Healthy Weight Programme. Amsterdam Will Become the Healthiest City for Children! Time to get tough! Part 1. Amsterdam Healthy Weight Programme 2018-2021 Multiannual Programme. City of Amsterdam. December 2017. Available at: https://assets.amsterdam.nl/publish/pages/967207/summary_amsterdam_healthy_weight_programme_2018-2021-wcag.pdf [Accessed 30 March 2023].

182. Royal Health Awareness Society. About Us. n.d. Available at: https://rhas.org.jo/Contents/About_RHAS.aspx#.ZCU8McJByUl [Accessed 30 March 2023].

183. Royal Health Awareness Society. Annual Report 2020: A Year of Resilience. n.d. Available at: https://rhas.org.jo/documents/EN-2020.pdf [Accessed 12 May 2023].

184. Wafa SW, et al. The Malaysian Childhood Obesity Treatment Trial (MASCOT). *Malaysian Journal of Nutrition*. August 2011; 17(2), 229–36. www.researchgate.net/publication/221804243_The_Malaysian_childhood_obesity_treatment_trial_MASCOT.

185. Thulaja NR. National Healthy Lifestyle Programme. Singapore Infopedia. 2017. Available at: https://eresources.nlb.gov.sg/infopedia/articles/SIP_339_2005-01-06.html [Accessed 12 May 2023].

186. Soon G, et al. Obesity Prevention and Control Efforts in Singapore: 2008 Case Study. 2008. Seattle: The National Bureau of Asian Research, Center for Health and Aging. 2008. Available at: www.nbr.org/wp-content/uploads/pdfs/publications/obesity-prevention-and-control-efforts-in-singapore-2008-case-study.pdf [Accessed 7 April 2023].

187. Health Promotion Board. Healthier Dining Programme. Singapore Government. n.d. Available at: https://hpb.gov.sg/healthy-living/food-beverage/healthier-dining-programme/about-the-healthier-dining-grant [Accessed 30 March 2023].

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