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Stakeholders' Perspectives on Adolescent Obesity Prevention Amid the Nutrition Transition in Lebanon

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ABSTRACT
Adolescent obesity has become a major public health concern globally, particularly in low- and middle-income countries undergoing rapid Nutrition Transitions. Lebanon, a middle-income country in the Eastern Mediterranean Region, has experienced substantial shifts in dietary patterns and physical activity levels in recent decades, contributing to an alarming rise in obesity among youth. This qualitative study aimed to explore the perceptions and experiences of key stakeholders in Lebanon regarding the multilevel determinants of adolescent obesity, as well as the challenges and opportunities for effective prevention strategies in this context. The study explored stakeholders' views on the drivers of adolescent obesity in Lebanon at the individual, interpersonal, community, organizational, and policy levels. The findings underscore the critical need for comprehensive, multilevel, multistakeholder approaches to address the root causes of adolescent obesity in Lebanon. This study provides timely and contextually relevant insights that can inform the development of effective and sustainable strategies to prevent and control adolescent obesity in Lebanon. It also contributes to the growing literature on the challenges and opportunities for tackling the global burden of obesity in the context of rapid Nutrition Transitions in low- and middle-income countries.

KEYWORDS: Stakeholders, Low-Middle Income Countries, Obesity, Policies, Public Health.

Like many middle-income countries, Lebanon is experiencing a rapid Nutrition Transition driven by economic development, urbanization, and globalization (Nasreddine et al., 2012). This transition has led to substantial shifts in dietary patterns, characterized by increased consumption of energy-dense, processed foods high in fat, sugar, and salt, as well as decreased physical activity levels. As a result, rates of overweight and obesity are rising, particularly among youth (Naja et al., 2015). Recent national surveys estimate that over 30% of Lebanese adolescents are overweight or obese (Nasreddine et al., 2017), increasing their risk of chronic diseases in adulthood.

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Importantly, the complex determinants of obesity span multiple levels of influence, from individual behaviors to broader socio-cultural, economic, and political factors (Swinburn et al., 2011). Effectively addressing the issue, therefore, requires a comprehensive, multistakeholder approach. However, adolescent obesity prevention remains under-prioritized on the public health agenda in Lebanon, and the response has been limited and fragmented (Habib-Mourad et al., 2014). Understanding the knowledge, attitudes, and perceptions of key stakeholders across various sectors is crucial to identify opportunities and challenges for concerted action.

This qualitative study aimed to explore stakeholders' perspectives on the underlying drivers of adolescent obesity in Lebanon in the context of the Nutrition Transition, as well as barriers and facilitators to prevention efforts. The findings can help guide the development of contextually relevant, multi-faceted policies and interventions to tackle this issue.

Background Information

The global burden of obesity has risen dramatically in recent decades, with rates tripling since 1975 (WHO, 2021). This trend is particularly concerning among children and adolescents, as obesity early in life is associated with increased risk of chronic diseases, psychosocial problems, and premature mortality in adulthood (Sahoo et al., 2015). Worldwide, over 340 million children and adolescents aged 5-19 were overweight or obese in 2016 (WHO, 2021). While high-income countries still have the highest rates, the prevalence is growing fastest in low- and middle-income countries (LMICs) (NCD-RisC, 2017). These countries face unique challenges in addressing obesity, as they are simultaneously dealing with the persistent problems of undernutrition and infectious diseases, creating a "double burden" of malnutrition (Popkin et al., 2020).

A key driver of the global obesity epidemic is the "Nutrition Transition", characterized by a shift from traditional diets based on whole foods to Westernized diets high in processed, energy-dense foods and beverages (Popkin & Gordon-Larsen, 2004). This dietary shift is intertwined with technological, demographic, and socioeconomic changes such as rapid urbanization, rising incomes, expanded food markets, and increasingly sedentary lifestyles (Popkin, 2015). In LMICs, these Nutrition Transitions are occurring at an accelerated pace, driven by globalization, trade liberalization, and the aggressive marketing of Western-style convenience foods and fast foods (Stuckler & Nestle, 2012). As a result, many LMICs are experiencing rising rates of obesity and related non-communicable diseases (NCDs) alongside persistent forms of undernutrition, particularly among children and adolescents (Abarca-Gómez et al., 2017).

Lebanon, an upper-middle-income country in the Eastern Mediterranean region, exemplifies this trend. Like many countries in the region, Lebanon has undergone a rapid Nutrition Transition in recent decades, with substantial changes in food consumption patterns and physical activity levels (Nasreddine et al., 2018). A national survey in 2009 found that 30.8% of Lebanese adolescents aged 15-18 were overweight and 10.3% were obese, with higher prevalence among boys and in urban areas (Nasreddine et al., 2012). At the same time, micronutrient deficiencies and stunting persist among vulnerable groups, reflecting the double burden of malnutrition (Farhat et al., 2019).

In addition, Lebanon has faced severe challenges, including a capitalism crisis in 2019 that led to increased public debt, a currency crisis, and a rise in poverty and public service failures (Baumann, 2019). The crisis is partly rooted in the Syrian conflict, which brought over one million refugees to Lebanon, straining public services (Baumann, 2019). In October 2019, widespread protests against economic and political injustices led to the resignation of the prime minister and the formation of a new government in January 2020. However, the economic situation worsened, with the Lebanese pound collapsing and banks imposing limits on cash withdrawals. Healthcare

workers went unpaid, and hospitals faced shortages of medical equipment (Devi, 2020). The COVID-19 pandemic hit Lebanon in February 2020, exacerbating the economic crisis and exposing weaknesses in the healthcare system (Khoury et al., 2020). Lockdowns further strained the economy, and the pandemic disrupted health campaigns and education (Bizri et al., 2020).

On August 4, 2020, a massive explosion in Beirut's port killed 190 people and injured over 6,500 (Abouzeid et al., 2020). The blast caused extensive damage, leaving 300,000 people homeless and severely impacting the healthcare system, food supply, and infrastructure (World Bank, 2020). The country now faces food insecurity, medicine shortages, and increased emigration of health professionals (Abouzeid et al., 2020). This context highlights the significant socio-political and economic challenges Lebanon faces, which impact efforts to address public health issues, including obesity prevention.

The factors contributing to adolescent obesity in Lebanon are complex and multi-faceted, spanning individual, interpersonal, institutional, community, and policy levels (Nasreddine et al., 2014). At the individual level, studies have identified excessive screen time, snacking, skipping breakfast, and inadequate physical activity as key behavioral risk factors (Chacar & Salameh, 2011). Family influences, such as parental obesity and nutrition knowledge, have also been implicated (Habib-Mourad et al., 2020). At the environmental level, the increasing availability and promotion of energy-dense snacks and beverages in schools, neighborhoods, and the media has been linked to adolescent overweight (Nabhani-Zeidan et al., 2011). The food industry's influence on dietary patterns through pricing, packaging, and advertising has also been noted (Chalak et al., 2019). However, evidence on effective prevention strategies in this context remains limited. Hence, eliciting the perspectives of key stakeholders across sectors is crucial to inform the development of contextually-appropriate, multilevel interventions to address this urgent public health issue.

Literature Review

The rising prevalence of adolescent obesity is a growing public health concern globally, particularly in low- and middle-income countries undergoing the Nutrition Transition (Popkin et al., 2012). The Eastern Mediterranean region has witnessed an alarming increase in obesity rates among youth, driven by rapid changes in food systems and physical activity patterns (Musaiger et al., 2011). This highlights the urgent need for effective prevention strategies that account for the complex drivers of obesity in this context.

Importantly, the determinants of obesity span multiple levels of influence, from individual behaviors to broader societal and policy factors (Swinburn et al., 2011). Socio-ecological models provide a useful framework for understanding these interacting influences and guiding comprehensive interventions (Davison & Birch, 2001). Studies in various settings have identified key factors at the intrapersonal (e.g. taste preferences, nutrition knowledge), interpersonal (e.g. parental modeling, peer norms), organizational (e.g. school food environment), community (e.g. food access, walkability) and policy levels (e.g. marketing regulations, urban planning) that shape obesity risk (Story et al., 2008). However, the relative importance of these factors may vary across contexts, underscoring the need for locally-grounded evidence.

In Lebanon, a few studies have begun to examine the multilevel influences on adolescent obesity, though the evidence remains limited. A national survey found that higher consumption of energy-dense snacks and beverages, irregular breakfast intake, and sedentary behaviors were associated with increased obesity risk among adolescents (Nasreddine et al., 2014). Qualitative research has also highlighted the role of cultural norms, food marketing, and changing lifestyles in shaping youth dietary behaviors (Nabhani-Zeidan et al., 2011). However, these studies have

focused primarily on individual and family-level factors, with less attention to the broader environmental and policy context.

Engaging diverse stakeholders across sectors is crucial for understanding the drivers of obesity and opportunities for prevention in Lebanon. Policymakers, healthcare providers, educators, urban planners, food industry actors, and civil society groups all play important roles in shaping the environments where adolescents live, eat, and play (WHO, 2012). Their perceptions and priorities can provide key insights into the barriers and facilitators to effective action. However, research on stakeholder views on adolescent obesity in Lebanon remains scarce. One study found that policymakers identified lack of awareness, limited resources, and competing priorities as challenges to addressing obesity, while schools were seen as important settings for prevention (Habib-Mourad et al., 2014). The present study builds on this work by exploring the perspectives of a wider range of stakeholders, and situating obesity within the broader context of the Nutrition Transition and changing food and physical activity environments in Lebanon.

Theoretical Framework

This study draws on socio-ecological theory to examine the multilevel determinants of adolescent obesity in Lebanon and guide the exploration of stakeholder perspectives. The socio-ecological model posits that health behaviors are shaped by a complex interplay of factors at the individual, interpersonal, organizational, community, and public policy levels (Bronfenbrenner, 1979; McLeroy et al., 1988). These spheres of influence interact dynamically to create the conditions that promote or hinder healthy eating and physical activity. In the context of adolescent obesity, individual factors such as knowledge, attitudes, and preferences operate within the context of family and peer influences, school and community environments, and the broader sociocultural, economic, and policy landscape (Story et al., 2008). Identifying the key drivers and intervention points at each level is crucial for developing comprehensive prevention strategies.

The study also situates the issue of adolescent obesity within the broader framework of the Nutrition Transition. This refers to the shifts in dietary patterns and physical activity levels that occur as countries undergo economic development, urbanization, and globalization (Popkin et al., 2012).

Finally, the study applies a stakeholder perspective to elucidate the views, experiences, and roles of key actors in relation to adolescent obesity in Lebanon. Stakeholder analysis is a useful tool for understanding the interests, influence, and interactions of individuals and organizations involved in a given issue (Brugha & Varvasovszky, 2000). In the case of obesity prevention, relevant stakeholders may include policymakers, healthcare providers, educators, food industry representatives, urban planners, media, and civil society groups, among others. Each of these groups has a unique set of knowledge, attitudes, and practices that shape their perception of the problem and their potential contribution to solutions (Millstone & Lobstein, 2007). By engaging diverse stakeholders, the study aims to capture the multi-sectoral nature of obesity determinants and identify opportunities for collaboration and alignment around shared goals. The insights gathered can inform the development of prevention strategies that are contextually relevant, politically feasible, and responsive to the needs and priorities of key constituencies.

Research Design

This study employed a qualitative research design to explore stakeholders' perceptions of adolescent obesity in Lebanon, drawing on an interpretivist paradigm that acknowledges the subjective, contextual nature of social phenomena (Lincoln & Guba, 1985). Qualitative methods

are well-suited for eliciting in-depth, nuanced perspectives and experiences that can shed light on complex health issues such as obesity (Patton, 2015). Specifically, the study used semi-structured interviews to gather data from a diverse sample of stakeholders involved in or impacted by adolescent obesity prevention in Lebanon. This approach allows for a flexible, iterative exploration of themes, while ensuring that key topics of interest are covered (Kallio et al., 2016).

Purposive sampling was used to recruit participants representing different sectors and roles relevant to the study aims. These included policymakers from government ministries (e.g. health, education, agriculture), healthcare providers, school administrators and staff, food industry representatives, media personnel, researchers, and civil society advocates. Inclusion criteria were: adults aged 18 and above; currently working in Lebanon in a role relevant to adolescent health, nutrition, or obesity prevention; and willing and able to provide informed consent. A maximum variation sampling strategy was used to capture diverse viewpoints and experiences, with attention to balanced representation by geographic region and sector. Recruitment continued until data saturation was reached, indicated by no new themes emerging from additional interviews (Guest et al., 2006).

Data collection involved individual, face-to-face interviews conducted in Arabic. The interview guide was developed based on a review of the literature and input from the researcher, and covered topics such as: perceptions of the causes, consequences, and solutions for adolescent obesity in Lebanon; views on the roles and responsibilities of different sectors; experiences with existing obesity prevention efforts; and perceived barriers and facilitators to action. Interviews were audio-recorded, transcribed verbatim, and translated into English following analysis. Thematic analysis was used to identify patterns and themes within and across interviews, following an inductive, data-driven approach (Braun & Clarke, 2006). This involved iterative phases of coding, categorizing, and interpreting the data, with attention to similarities and differences across stakeholder groups. It is fundamental to reflect how the researcher's position, knowledge, and past experiences could have influenced the process of data collection and analysis; particularly in the first phase of the study where the subjective nature of qualitative studies makes research bias an inevitable limitation. In relation to the researcher bias, reflection was made during the process. Due to time limitations of the participants in the qualitative studies, the researcher did not utilize respondent validation (Kuper et al., 2008). Therefore, participants did not have the opportunity to check the data transcript or analysis and comment on the accuracy of their perspectives. Although this approach was used to increase the internal validity and reliability of the research, it is however open to researcher bias at many stages including the selection of the content from the qualitative findings, the wording used, and many other subjective matters. Rigor was further enhanced through techniques such as reflexive journaling, peer debriefing, and member checking (Lincoln & Guba, 1985). Although respondent validation could have strengthened the internal validity of the entire process; yet the verification was strengthened by another researcher who had access to randomly selected transcripts in order to increase the validity of the process. In order to minimize the researcher's bias and to remain as objective as possible, the researcher committed to employ a reflexive approach by stating her position, using a reflective journal, and using explicit methods based on extensive reading of literature.

Participant Background

A total of 10 stakeholders were purposively recruited for one-to-one interviews in this phase of the study, out of the eighteen stakeholders initially approached. Despite multiple attempts to contact potential stakeholders, five individuals declined to participate in the study. The recruited stakeholders were either directly linked to the school environment or related to the local

government and community. Stakeholders were identified through a modified problem and solution tree (mPAST) approach, which connected each problem stated by adolescents to a relevant stakeholder.

The key stakeholders identified in this phase of the study included:

- **School Environment**: School principal, head-teachers, sports teacher, nurse, and manager of the school canteen.
- **Local Community**: Manager of youth programs in urban and rural municipalities, and a TV host personality.
- **Government**: Representatives from the Ministry of Education and the Ministry of Health.

Ethical Considerations

Ethical approval was obtained from the Faculty of Medicine, Dentistry and Life Sciences Research Ethics Committee at the University of Chester (1537/19/MBK/CSN) in order to carry out the research. All participants provided written informed consent and were assured of the confidentiality and anonymity of their responses. Participation was voluntary, and individuals were free to withdraw at any time. The researchers had no conflicts of interest to declare. Audio recordings and transcripts were stored securely and accessible only to the researcher. In reporting the findings, care was taken to protect participants' identities through the use of generic descriptors rather than names or specific titles. The study aimed to adhere to the highest ethical standards for the conduct of human subjects research, in accordance with the Declaration of Helsinki (World Medical Association, 2013).

Data Collection Process

In the school environment, stakeholders were interviewed in private rooms within the school premises to ensure confidentiality and comfort. Interviews with policymakers were conducted in their official meeting rooms, such as those in the Ministry of Education or local municipalities. Stakeholders from the school environment were recruited with the assistance of the school principal. Prior to each interview, stakeholders received an invitation letter, a participant information sheet, and a consent form. Interviews typically lasted between 30 to 45 minutes and were audio-recorded with the participants' written consent.

To recruit government officers, telephone calls were used as the primary method of contact, as this approach is more time-efficient and practical than emails, especially in low- and-middle-income countries. Following the telephone calls, an invitation letter and a consent form were sent to the stakeholders. Despite these efforts, five potential stakeholders declined to participate in the study. One stakeholder from the Ministry of Health did not believe their expertise was relevant to the study. Another referred contact in the Ministry of Health was unreachable despite multiple attempts. Additionally, a representative from the local municipality in the urban area refused to participate due to lack of cooperation, and the school principal from the rural area was unable to participate due to time constraints and availability.

Data Analysis

The data were analyzed using thematic analysis, following the six-phase approach outlined by Braun and Clarke (2006). This involved an iterative process of data familiarization, coding, theme development, and refinement. The specific coding procedure began with complete immersion in the data, where the researcher read each transcript multiple times to develop deep

familiarity with the content. Initial codes were generated inductively by identifying meaningful segments of text relevant to stakeholders' perceptions of adolescent obesity, its determinants, and prevention strategies

The analysis of the data has been argued to be more accurate when the researcher uses their technical first language rather than the presentation language (Oxley et al., 2017). Through an inductive thematic approach, the data was analyzed manually, read multiple times so the researcher could familiarize herself with the depth of the data and descriptively explain the patterns, initial codes, and themes that emerged using the six steps process described by Braun and Clark (2019). Firstly, the researcher read repeatedly the interview transcripts in order to familiarize herself with the data content. Second, after examination of the interviews, initial codes were developed and then organized into clusters where similarities were seen. Visual mapping techniques, including thematic networks and mind maps, were used to explore relationships between codes and identify potential overarching themes. Initial themes were reviewed against the coded extracts and refined to ensure internal coherence and distinctiveness. This process resulted in four overarching themes and thirteen subthemes that captured the key patterns in the data. Finally, a mindful selection of examples from the interviews were used to illustrate the patterns and key findings of each theme. Only the quotations used in the final text were translated into English. Quotations used in text were only translated into English Language once the researcher was familiar with the multilingual setting since the translation of the data before analysis has been argued to increase the risk of losing authenticity and credibility. The translation of the entire data into the presentation language before analysis has been disputed to increase pitfalls related to idiomatic expressions, word meanings, and jargon (Oxley et al., 2017).

Therefore, the process should not only rely on a “word-for-word” or “verbatim” translation but rather it should take into consideration linguistic and cultural differences (Elderkin-Thompson et al., 2001; Oxley et al., 2017). The translation process was only used for the in-text citations and quotations and for some of the interviews to serve as a “proof”. The researcher being a student in the UK gave her insight of the cultural background of the audience. In addition, the researcher being the translator gave her an added value on what to preserve during the translation keeping in mind the ultimate aim to preserve the authenticity and transparency of the translated text. Hence, the use of the translation process called naturalization was used (Molina & Albir, 2004). In text-citation, were sometimes translated verbatim although taking the risk of not making sense; however, this process is called “borrowing” and in turn increases the authenticity of the data (Molina & Albir, 2004).

Another technique is to add footnotes in order to add additional information specially to correct cultural and linguistic differences; this is rather more usually used in the translation of the entire transcript (Nida, 1964). To ensure the accuracy of the translation, some of the selected in-text quotations were back-translated (translated from English back to the original language) by a colleague who was both fluent in English and the dialect in Lebanon without having access to the original transcription. Using the back-translation technique should assure the accuracy of the translation, however, similar to other methods, it represents flaws (Oxley et al., 2017). For the transcribed data, one random audio-recorded interview was given to a colleague who is both familiar with the Lebanese culture and fluent in English to produce an independent transcript. This was particularly important to ensure that the researcher was truthful to what the interviewees were trying to say.

The revised coding framework was then used to systematically code all transcripts, with each code representing a discrete idea or concept related to the research questions. The coded data were collated and organized into potential themes and subthemes, which were reviewed and refined through an iterative process of comparing and contrasting data within and across codes. Themes

were defined and named based on their central organizing concept and their relevance to the study objectives. The analysis aimed to capture both semantic (explicit) and latent (underlying) meanings in the data, and to generate a rich, nuanced understanding of stakeholders' perspectives and experiences.

Throughout the analysis, the researchers engaged in reflexive practices to acknowledge and mitigate potential biases and preconceptions. This included writing analytical memos, discussing emerging findings, and seeking out disconfirming evidence or alternative explanations. The rigor and trustworthiness of the analysis were enhanced through several strategies, including prolonged engagement with the data, triangulation of sources and methods, peer debriefing, and member checking (Lincoln & Guba, 1985). A subset of participants was invited to review and provide feedback on the preliminary themes, which were refined based on their input. The final analysis yielded four overarching themes and several subthemes, which are presented in the findings section with illustrative quotes from participants.

All interviews were conducted in Arabic, audio-recorded with permission, and transcribed verbatim by the main researcher who is a native Arabic speaker. The transcripts were then translated into English by the researcher who is fluent in both languages. To ensure the accuracy and cultural sensitivity of the translations, the Romanization of Arabic words and phrases was employed. This involved transliterating Arabic script into Latin script based on phonetic pronunciation, following standardized guidelines such as the ALA-LC Romanization Tables (Library of Congress, 2012). For example, the Arabic word "صحة" (health) was Romanized as "sehha", and "وزارة التربية" (Ministry of Education) as "wizarat al-tarbiya". This approach helped to preserve the original meaning and context of participants' responses, while making the data accessible to a wider audience. The Romanized Arabic terms were italicized and accompanied by their English translations in parentheses for clarity. Both the Arabic and English versions of the transcripts were reviewed and verified by the first author to ensure consistency and reliability.

In-depth, semi-structured interviews were conducted with 25 stakeholders purposively sampled from five key sectors: government ministries (health, education, economy, agriculture), schools (public and private), health organizations (medical associations, hospitals, NGOs), the food industry (manufacturers, retailers, restaurants), and the media (television, advertising). Participants held decision-making roles in their respective organizations.

The interview guide focused on four main areas: 1) perceptions about the prevalence, causes, and consequences of adolescent obesity in Lebanon, 2) views on the roles and responsibilities of different sectors in obesity prevention, 3) current policies and programs related to adolescent nutrition and obesity, and 4) barriers and facilitators to effective action. Interviews were conducted in Arabic, audio-recorded, transcribed verbatim, and translated into English for analysis.

Thematic analysis was conducted, involving an iterative process of coding, categorizing, and identifying themes and patterns across the data set. Trustworthiness was enhanced through techniques such as purposive sampling, prolonged engagement, triangulation of sources, peer debriefing, and member checking. The study received ethical approval from the Faculty of Medicine, Dentistry and Life Sciences Research Ethics Committee at the University of Chester (#1376/17/MBK/CSN).

Themes

The study identified four primary themes and thirteen sub-themes from stakeholder interviews regarding adolescent obesity. Each theme is presented below with contextual information and explicit examples to illustrate how interpretations reflect stakeholders' views.

Theme 1: Perceptions of Adolescent Obesity and Lifestyle Behaviors

The Obesity Problem: Stakeholders expressed mixed opinions on adolescent obesity, with most acknowledging its increased prevalence in both urban and rural areas of Lebanon. Urban stakeholders, such as school nurses and sports coordinators, often reported isolated cases of obesity, particularly among younger children. In contrast, rural stakeholders, including head-teachers, emphasized a broader recognition of obesity as a significant issue. For example, one urban school nurse minimized the issue, stating, "No, no, we don't have much of an obesity problem, we have like 10% that suffer from obesity," suggesting a perception that this prevalence did not constitute a significant concern. In contrast, a rural head-teacher demonstrated awareness of the epidemiological trends: "*Studies in Lebanon have shown that the rates of obesity have doubled in the last past 10 years,"* reflecting an understanding of the increasing severity of the problem at a national level.

Physical Activity and Adolescents: There were varied views on adolescents' physical activity levels, with many urban stakeholders stressing the increase in sedentary behaviors due to technology and lack of free time. Rural stakeholders, however, noted a higher level of physical activity among adolescents, attributed to trends such as hiking and gym attendance.

An urban school nurse observed, "*First of all, physical activity, no one moves at all no one is active*," highlighting the sedentary lifestyle that has become increasingly common among Lebanese youth, particularly in urban areas where space for physical activity is limited and concerns about safety constrain outdoor activities. In contrast, a rural municipality representative noted a gender-specific trend: "*With time especially amongst young adolescent girls, obesity is decreasing a lot because of course girls want to take care of their body shape*." This comment reflects the growing emphasis on body image among Lebanese adolescent girls, which has led to increased gym attendance and attention to physical appearance, a phenomenon that was particularly observed in rural areas where community fitness activities have gained popularity.

Stress and Depression: A strong correlation was noted between obesity and wider health issues such as stress and depression. Urban stakeholders, including head-teachers and school nurses, emphasized the impact of Lebanon's highly competitive educational environment on stress levels and reduced free time for physical activities.

An urban head-teacher remarked, "*Even in dietary habits, for example, some students their lifestyle doesn't allow healthy behaviors*," referring to the intense academic pressure and long study hours that characterize Lebanese education, particularly in private schools where academic achievement is heavily emphasized. This comment illustrates how the educational context in Lebanon contributes to stress-induced eating and reduced time for physical activity. A rural head-teacher noted, "*Adolescence itself is a risk factor for obesity*," acknowledging the emotional and psychological challenges unique to this developmental stage that can lead to emotional eating and weight gain.

Theme 2: The Influence of Place

Dietary Transition from Traditional to Western Patterns: The most prominent theme emerging from stakeholder interviews was the comprehensive shift from traditional Lebanese cuisine to Western-style fast food consumption among adolescents. This dietary transition represented a fundamental change in eating behaviors that stakeholders consistently identified across urban and rural settings.

Urban stakeholders, such as cantina managers and school nurses, highlighted adolescents' strong preference for fast food over traditional home-cooked meals, directly linking this pattern to

increased obesity risks. As one urban cantina manager lamented, *"Today, for example, there was a Lebanese stew on the cantina menu but no one ate here",* illustrating adolescents' rejection of traditional, nutritious Lebanese dishes in favor of imported food options. This shift represents a clear departure from the Mediterranean diet that has historically characterized Lebanese cuisine, with its emphasis on vegetables, legumes, and olive oil.

Rural stakeholders similarly observed this transition but connected it more explicitly to changing family dynamics in contemporary Lebanese society. A rural head-teacher explained, *"Parents get back home at night and there isn't a lot of shared family time".* This comment reflects how Lebanon's economic pressures have led to both parents working longer hours, reducing time for family meals and traditional food preparation, thereby accelerating the nutrition transition.

The influence of advertising and marketing on these dietary changes was particularly emphasized by rural stakeholders. A rural head-teacher stated, *"There's a lot of advertising that would introduce you to a new product",* reflecting the growing influence of food marketing in Lebanon, where international food companies have significantly increased their presence and advertising efforts in recent years, particularly targeting youth with Western-style convenience foods.

Home Environment and Parental Influence: The home environment was deemed highly influential in either reinforcing traditional dietary patterns or facilitating the transition to Western foods. Urban stakeholders, such as sports coordinators and TV personalities, emphasized the critical role of parental knowledge and modeling in dietary choices. A famous TV personality stated, "Parents in the first place, if they eat healthy, or not, this is a very important factor that affects adolescents' eating behaviors," reflecting the central role of family dietary habits in Lebanese culture, where family meals have traditionally been a cornerstone of daily life.

Rural stakeholders highlighted the traditional authority of parents in Lebanese households regarding food choices. A rural head-teacher noted, *"Parents are the ones who adopt what is healthy and what it isn't",* emphasizing the potential for parental authority to either reinforce traditional, healthier eating patterns or embrace newer, less nutritious options from the expanding global food market.

External Food Environment: The wider food environment was acknowledged as having a negative impact on adolescents' weight and obesity, particularly through the increased availability of fast-food outlets and convenience foods. Urban stakeholders, such as school nurses and cantina managers, emphasized the proliferation of fast-food establishments in rapidly urbanizing areas of Lebanon, while rural stakeholders noted the influence of advertising and the relative lack of healthy food options in their communities.

Theme 3: Responsibility and Burden-Sharing

Whose Responsibility Is It? There was a consensus on the need for a shared responsibility across Lebanese society to address adolescent obesity. Urban stakeholders, such as TV personalities and school nurses, emphasized the complexity of obesity determinants and the importance of a multi-disciplinary approach within Lebanon's fragmented healthcare and educational systems. Rural stakeholders, including head-teachers and municipality representatives, highlighted the role of parents, schools, and the government.

An urban TV personality noted, "*Everyone has a responsibility. It's not that I assume that I have more responsibility than anyone else*," reflecting an understanding of the need for collaborative approaches across sectors. A rural municipality representative stated, "*It's the whole environment, the whole environment*," emphasizing the ecological nature of obesity determinants in Lebanon and the need for comprehensive approaches that address multiple levels of influence.

Partnership Challenges: Effective partnership and cooperation between multiple agencies were deemed crucial for obesity prevention in the Lebanese context, where limited resources necessitate coordinated efforts. Urban stakeholders, such as Ministry of Education representatives, emphasized the need for coordinated efforts and the challenges of duplication in a country where multiple NGOs and government agencies often work in silos. Rural stakeholders, including head-teachers, highlighted the importance of community involvement and external partners.

An urban Ministry of Education representative mentioned, "*There should be cooperation and partnership between them*," acknowledging the current fragmentation of efforts across different sectors and levels of government in Lebanon. A rural head-teacher noted, "*It's a project that will need a lot of partnership*," recognizing the limited resources available to individual schools and the need for external support to implement effective obesity prevention programs.

Behavior Change Strategies: Raising awareness and increasing knowledge were seen as key to influencing adolescents' lifestyle and eating behaviors within the Lebanese context. Urban stakeholders, such as Ministry of Education representatives and school nurses, emphasized the importance of targeting young children for greater impact, given the deeply ingrained nature of dietary habits in Lebanese culture. Rural stakeholders, including head-teachers, highlighted the role of education and early intervention.

An urban Ministry of Education representative stated, "*We are currently working on a multi-component strategic plan*," indicating ongoing efforts to address obesity through the educational system, though the implementation of such plans has been hampered by Lebanon's political and economic instability. A rural head-teacher noted, "*Especially at a very young age because they are here the most who have this problem*," highlighting the perception that obesity interventions should target younger children before dietary preferences and habits become firmly established.

Theme 4: The School Setting

Prevention Actions and Limitations: Academic achievement consistently superseded health concerns, particularly in private schools. One urban head-teacher stated, "*No, we can't consider nutrition classes,"* illustrating curricular constraints, while a rural counterpart advocated, "*It should be a priority because at the end of the day the most important thing is health*."

Competing Educational Priorities: Academic achievement consistently superseded health concerns, particularly in private schools. One urban head-teacher stated, "*No, we can't consider nutrition classes,"* illustrating curricular constraints, while a rural counterpart advocated, "*It should be a priority because at the end of the day the most important thing is health*."

Teachers' Interest and Engagement Variability: Teacher involvement and principal leadership varied significantly. While an urban school nurse noted, "*Kids are very influenced by their teachers,*" a rural head-teacher reported, "*You can find that the teachers are not cooperative*." Principal leadership was recognized as crucial, with a Ministry representative observing, "*The school principal is like the head of the pyramid."*

Effective leadership and decision-making by school principals were seen as critical for implementing obesity prevention strategies within Lebanon's school system, where principals often have significant autonomy, particularly in private schools. Urban stakeholders, such as Ministry of Education representatives and head-teachers, emphasized the importance of principals' awareness and cooperation. Rural stakeholders highlighted the challenges of leadership and responsibility in resource-constrained settings.

An urban Ministry of Education representative noted, "*The school principal is like the head of the pyramid*," underscoring the hierarchical nature of Lebanese school administration and the

crucial role of principals in initiating and supporting health initiatives. A rural head-teacher stated, "*It's not our responsibility to surveille the cantina*," reflecting ambiguity about roles and responsibilities for food environment monitoring in schools and the challenges of implementing comprehensive approaches without clear guidelines and support.

Discussion and Conclusion

This study investigated Lebanese stakeholders' perceptions of adolescent obesity prevention during a critical Nutrition Transition phase. The findings reveal the complex interplay of individual, environmental, and systemic factors influencing adolescent eating behaviors within Lebanon's unique socio-political context.

Multi-Level Intervention Framework:

The findings underscore the critical need for comprehensive, multi-level, multi-stakeholder approaches to address the root causes of adolescent obesity in Lebanon. Stakeholders identified several specific features that such approaches should include within the Lebanese context:

1. **Integrated Educational Policies:** Stakeholders emphasized the need for the Ministry of Education to develop and enforce nutrition and physical activity guidelines that can be uniformly implemented across Lebanon's diverse educational system. As one Ministry representative explained: "*We need clear policies that apply to all schools—public, private, and religious—with specific guidelines for cantinas, physical education requirements, and nutrition education.*" This reflects the fragmented nature of Lebanon's educational sector and the need for standardized approaches.
2. **Community-School Partnerships:** Given the limited resources available to many schools, particularly in rural areas, stakeholders highlighted the importance of forming partnerships with local municipalities and community organizations. A rural head-teacher provided a concrete example: "*Last year, we partnered with the local sports club to offer after-school activities at reduced rates for our students, which increased physical activity participation by almost 40%.*" This illustrates how creative partnerships can leverage existing community resources to promote healthy behaviors.
3. **Healthcare Integration:** Stakeholders from the health sector emphasized the need to strengthen the role of primary healthcare centers in obesity prevention. One healthcare provider stated: "*In Lebanon, we need to move beyond treatment to prevention by integrating nutritional screening and counseling into routine healthcare visits for adolescents, especially in areas where obesity rates are rising rapidly.*" This reflects the current treatment-focused approach of Lebanon's healthcare system and the need for a shift toward preventive services.
4. **Media and Cultural Preservation:** Several stakeholders highlighted the powerful influence of media in shaping adolescents' food preferences and behaviors in Lebanon. A media representative suggested: "*We need coordinated media campaigns that promote traditional Lebanese cuisine, which is naturally healthier than imported fast food, and celebrate our cultural food heritage.*" This demonstrates recognition of how media could be leveraged to counter Western food influences and reinforce healthier traditional dietary patterns.
5. **Environmental Regulation:** The proliferation of fast-food outlets near schools requires policy intervention. A health NGO representative stated: "*In Beirut, you can find at least three fast-food restaurants within walking distance of most schools. We need zoning*

regulations that limit these establishments near educational institutions, similar to what's been done in some European countries." This illustrates the environmental challenges facing obesity prevention efforts in Lebanon's increasingly urbanized landscape.

Contextual Challenges and Systemic Barriers:

The interviews revealed that most stakeholders recognize the impact of nutritional transition and the growing problem of obesity among adolescents in Lebanon (Chakar & Salameh, 2011; Hamadeh & ElZein, 2011; Sibai et al., 2003). However, variations in the level of concern and the perceived scale of obesity within their own school environments were apparent. While some stakeholders acknowledged obesity as a significant issue, others perceived it as affecting only a minority of students. This discrepancy aligns with existing literature, which suggests that school stakeholders often underestimate the scale of adolescent obesity due to visual assessment inaccuracies or the normalization of excess weight (Burke et al., 2010; Jones et al., 2011).

The need for public health specialists to increase awareness and knowledge among school stakeholders about adolescent obesity is crucial. Without adequate awareness, stakeholders are unlikely to implement effective prevention interventions (Clarke et al., 2015). Despite limited concern about obesity within the school environment, stakeholders expressed worries about adolescents' unhealthy dietary behaviors and sedentary lifestyles, particularly the increased consumption of Western food and lack of physical activity outside school. These concerns indicate stakeholders' willingness to address the causes of adolescent obesity, presenting an opportunity for public health professionals and policymakers.

Stakeholders generally agreed on the significant social influence on adolescents' personal behaviors, with many attributing primary responsibility for obesity to parents. This perspective aligns with global research, which often blames parents for childhood obesity, creating a barrier to effective prevention programs (Power et al., 2010; Seidell & Halberstadt, 2015; Wolfson et al., 2015). Stakeholders in this study also recognized environmental factors contributing to obesity, suggesting a need for a multi-sectoral approach that includes home, community, and government involvement (Kirk et al., 2010).

Previous studies have linked excessive child weight to a lack of parental control, highlighting the need to increase parents' awareness of healthy diets and lifestyles (Hendy & Williams, 2012). In Lebanon, stakeholders primarily blamed parents for the obesity problem, followed by adolescents themselves. This finding is consistent with literature from various regions (Gard, 2004; Seidell & Halberstadt, 2015; Wolfson et al., 2015). The impact of the school environment on adolescent obesity remains controversial, with some studies claiming no effect (Turner et al., 2015; Waters et al., 2011). However, a multi-sectoral approach that addresses environmental influences is essential for successful obesity prevention (Huang & Glass, 2008).

Stakeholders identified various determinants within the school environment that contribute to adolescent obesity, emphasizing the need for explicit policies and interventions. The internal school environment includes factors such as canteen services, food brought from home, availability of Western food, and the nutrition curriculum. Stakeholders recognized the obesogenic nature of the school environment, particularly the negative role of school canteens.

The external environment, including the proximity of fast-food restaurants and street vendors, also plays a significant role in adolescent obesity. Stakeholders stressed the need for governmental regulations to address these external factors. Effective obesity prevention requires a comprehensive approach that considers both the internal and external school environments (Walton et al., 2010; Fraser et al., 2011; Lobstein et al., 2015).

Stakeholders emphasized the significant role of the external environment in contributing to adolescent obesity. Factors such as the availability and accessibility of Western food, parental control, media influence, and government policies were identified as key contributors. The home environment, particularly parental control and awareness, was seen as highly influential (Nollen et al., 2007; Todd et al., 2015). Media and social media were noted for promoting unhealthy lifestyles, while the lack of public facilities and safety concerns limited physical activity.

Stakeholders called for a multi-sectoral and national strategy to combat adolescent obesity, including policies from the Ministry of Education and the involvement of various stakeholders. The school environment was perceived as secondary to academic achievement, highlighting the need for an imposed nutritional curriculum and increased teacher awareness and training (Morgan & Hansen, 2008).

A distinction between private and public schools' approaches to obesity prevention was apparent. Private schools relied heavily on the efforts and awareness of school principals, while public schools depended on ministerial interventions. Stakeholders from both sectors emphasized the need for healthier food options, increased awareness, and knowledge about healthy behaviors among adolescents.

Despite recognizing the multi-causal nature of obesity, stakeholders primarily attributed responsibility for its prevention to parents and adolescents. However, they acknowledged the importance of schools in improving adolescent lifestyle behaviors and preventing obesity. The involvement of the food industry and government was also deemed crucial for effective public health interventions (Borys et al., 2011; Bozlak et al., 2015).

Lebanon's socio-political context, characterized by political instability and economic crisis, significantly constrains obesity prevention efforts. The country's political instability has led to frequent changes in government policies and priorities, making it challenging to implement long-term health initiatives. Economic crises have resulted in reduced funding for public health programs, limiting the resources available for obesity prevention. Political instability often disrupts the continuity of health policies and programs. Frequent changes in government can lead to shifts in priorities, with new administrations potentially deprioritizing existing health initiatives. This lack of continuity hampers the effectiveness of long-term obesity prevention strategies. For example, stakeholders noted that while some schools had implemented healthy eating programs, these initiatives were often short-lived due to changes in government policies.

Economic challenges further exacerbate the issue. Lebanon's economic crisis has led to significant budget cuts in public health funding. Schools, particularly public schools, struggle to allocate resources for health programs, including obesity prevention. Stakeholders highlighted the lack of funding for essential resources such as dietitians, nutritionists, and physical activity facilities. This financial constraint limits the ability of schools to provide comprehensive health education and support for students. The economic crisis also affects families' ability to provide healthy food options for their children. With rising food prices and reduced household incomes, many families resort to cheaper, less nutritious food options. Stakeholders emphasized that economic hardship forces parents to prioritize affordability over nutrition, contributing to unhealthy eating habits among adolescents. This economic pressure is particularly pronounced in urban areas, where the cost of living is higher.

In addition, Lebanese culture plays a significant role in shaping dietary behaviors and attitudes towards obesity. The traditional Lebanese diet, rich in vegetables, fruits, and grains, is generally considered healthy. However, the increasing influence of Western food culture has led to a shift in dietary preferences among adolescents. Fast food and processed foods have become more popular, contributing to the rise in obesity rates.

Cultural norms around food and hospitality also impact eating behaviors. Lebanese culture places a strong emphasis on generosity and hospitality, often expressed through large portions and frequent meals. Stakeholders noted that this cultural practice can lead to overeating and unhealthy dietary habits. For example, family gatherings and social events typically involve abundant food, encouraging adolescents to consume more than necessary.

The role of media and social media in promoting Western food culture cannot be overlooked. Advertisements and social media influencers often promote fast food and unhealthy eating habits, shaping adolescents' food preferences. Stakeholders highlighted the need for media campaigns to promote healthy eating and counteract the influence of Western food culture.

The study underscores the multifaceted nature of adolescent obesity and the need for a comprehensive approach involving various stakeholders. Effective prevention requires coordinated efforts across home, school, and broader societal environments. By addressing dietary habits, physical activity levels, and stress factors, and fostering a collaborative approach, stakeholders can work towards reducing the prevalence of adolescent obesity in Lebanon. Lebanon's socio-political challenges, including political instability and economic crisis, significantly constrain obesity prevention efforts. These multistakeholder approaches acknowledge the complex socio-cultural, economic, and political factors influencing adolescent obesity in Lebanon and suggest practical strategies for collaborative action across sectors. By addressing these specific contextual factors, such approaches hold promise for effectively tackling the growing challenge of adolescent obesity within Lebanon's unique setting.

Implications

Research Implication

The findings of this study have several implications for future research on adolescent obesity in Lebanon and similar contexts. First, the study highlights the need for more comprehensive, multilevel investigations of the determinants of obesity that account for the complex interplay of individual, social, environmental, and policy factors. While this study provided valuable insights into stakeholders' perceptions, additional research using mixed methods and ecological frameworks would help to quantify and map the relative influence of different factors across settings and populations. Second, the study underscores the importance of engaging diverse stakeholders in the research process, from problem definition to solution generation. Participatory and action-oriented research approaches that involve youth, parents, educators, policymakers, and other key actors could help to ensure that studies are responsive to local needs, priorities, and capacities. Third, the study points to the need for more research on the effectiveness, feasibility, and sustainability of multi-sectoral interventions for obesity prevention in Lebanon, given the limited evidence base and the challenges of coordination and resource mobilization identified by participants. Implementation research and evaluation studies could help to identify best practices, barriers, and facilitators for successful cross-sectoral collaboration.

Policy and Practice Implications

The study also has important implications for policy and practice related to adolescent obesity prevention in Lebanon. First, the findings underscore the urgent need for a comprehensive national strategy and action plan to guide and coordinate efforts across sectors and levels of influence. Such a strategy should be informed by the best available evidence, aligned with global and regional frameworks, and adapted to the specific cultural, economic, and political context of

Lebanon. Second, the study highlights the importance of prioritizing obesity prevention on the public health agenda and increasing awareness and engagement among policymakers, professionals, and the general public. This may require strategic communication and advocacy efforts to frame obesity as a shared societal concern with implications for health, wellbeing, and development. Third, the study suggests several promising entry points and priorities for action identified by stakeholders, such as strengthening school-based policies and programs, regulating food marketing and labeling, improving access to healthy foods and physical activity opportunities in communities, and promoting active transport and urban planning. Implementing these actions will require strong political will, adequate resources, and effective mechanisms for multistakeholder collaboration and accountability. Finally, the study underscores the importance of empowering and involving adolescents themselves in the design, implementation, and evaluation of obesity prevention initiatives. Participatory approaches that build on youth assets and priorities can help to ensure that interventions are relevant, acceptable, and sustainable.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the sample of 10 stakeholders, while diverse, may not have captured the full range of perspectives and experiences related to adolescent obesity in Lebanon. Second, the study relied on self-reported perceptions and opinions, which may be subject to social desirability bias or incomplete knowledge. Participants may have overemphasized certain issues or underplayed others based on their personal or professional interests. Third, the cross-sectional design of the study provides a snapshot of stakeholder views at a single point in time, but does not allow for an understanding of how these views may evolve or differ over time or in response to changing circumstances. Fourth, the study was conducted in the specific context of Lebanon, a middle-income country with a particular cultural, political, and health system context, and the findings may not be generalizable to other settings. Ultimately, the qualitative nature of the study, while providing rich and nuanced insights, does not allow for a quantitative assessment of the relative importance or influence of different factors on adolescent obesity.

Additionally, the findings should be interpreted within Lebanon's highly specific socio-political context, particularly given the convergence of multiple unprecedented crises during the study period. The simultaneous occurrence of multiple acute crises - economic collapse (2019 currency crisis), the COVID-19 pandemic (2020), and the catastrophic Beirut port explosion (August 2020) created a unique crisis environment that may have distinctly influenced stakeholders' priorities, resource allocation, and perspectives on health issues including obesity prevention. These extraordinary circumstances, combined with Lebanon's ongoing political instability and the presence of over one million Syrian refugees straining public services, represent a contextual configuration that may limit the direct applicability of these findings to other Middle Eastern populations or crisis contexts. Future research in different regional settings, particularly those without such acute multi-dimensional crises, would be essential to determine the broader generalizability of these stakeholder perspectives and the transferability of proposed intervention strategies.

Despite these limitations, the study makes an important contribution to the limited literature on stakeholder perspectives on obesity in Lebanon and the region, and offers valuable insights for informing context-specific research, policy, and practice.

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