

SOCIOECONOMIC CHALLENGES OF ADOLESCENT OBESITY

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Abstract: *Obesity is the epidemic of the century, due to its prevalence, impact on national budgets, loss in a gross domestic product, productivity loss, and impact on mortality, morbidity and quality of life. National behaviour change campaigns have not yet shown acceptable long-term results, and there is a need for higher taxation on unhealthy food. Besides, adolescents are vulnerable and easily targeted by "ultra-funded" sophisticated marketing campaigns. Modest evidence on first and second-line treatments makes bariatric surgery the main treatment of choice. Bariatric surgery could be the standard of care provided to those adolescents who failed weight loss attempts for more than six months and present pre-specified high body mass index and obesity-related comorbidities. To confirm whether the findings extracted from the initial narrative search were still valid, an additional, more profound narrative search, including systematic literature review features, was performed, extracting information before the COVID-19 pandemic from three databases: PubMed from 2018 to 2019; Google Scholar from 2018 to 2019; and The Centre for Reviews and Dissemination from the University of York (from 2010 to 2019). Policymakers need to commit with community health campaigns to change societal behaviour on the real impact of obesity. There is a need for earmarked taxation on unhealthy food to prevent obesity publicly and provide enough funds to increase the provision and reimbursement of bariatric surgery. Bariatric surgery at early ages can reduce the progression of morbid obesity-related comorbidities. However, evaluations of morbidly obese adolescents are not performed in time, due to barriers, which avoid upcoming bariatric surgery procedures. Stakeholders should develop strategies to reduce attrition rate and improve patient retention through juvenile-oriented care. There are still ethical aspects pending since we do not fully know the long-term effects and complications. Given the low impact of public preventive campaigns targeting voluntary behavioural change in the long run, and the lax taxation and regulation on the food industry, decision makers should change their mind on bariatric surgery, from an indulgent waste of money to an effective fund-saver.*

Keywords: bariatric, behaviour, burden, campaign, community, decision maker, epidemic, obese, preventive, regulation.

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Introduction. More than 1.9 billion adults in 2016 were overweight, and from those, over 650 million were obese. The World Health Organization (WHO, 2019), together with the International Obesity Taskforce (IOTF) classified obesity as the epidemic of the century, due to its prevalence, impact on national budgets, loss in the gross domestic product (GDP), productivity loss, and impact on mortality, morbidity and quality of life. Obesity is related to non-communicable diseases (NCD) such as type II diabetes (T2DM), cardiovascular disease (CVD), hypertension, cancer, obstructive sleep apnoea (OSA), osteoarticular abnormalities and depression, and they are increasing worldwide. In the USA, due to the obesity epidemic, lost of quality-adjusted life years (QALYS), from 1993 to 2008, got doubled (Jia and Lubetkin, 2010). T2DM was the main cause of non-traumatic lower limb amputations, kidney failure and blindness (Pantalone et al., 2015). NCD account for more than half of the total global burden of disease, and only CVDs encompass one-third of the combined worldwide mortality rate (Global Health Data Exchange, 2019). Current rates of obesity and T2DM in children, influence the future burden of obesity since obese children will grow up becoming prone to be sick obese adults (WHO, 2018). The unique solution to prevent 90% of children from becoming overweight by 2050 is efficient prevention, since there are not enough resources to treat the epidemic (Change4Life, 2008). In 2016, 340 million people, aged 5 to 19, were overweight and of those, 41 million were children under 5 (WHO, 2019).

Literature Review. The unacceptable burden of obesity urgently needs standardised global responses, before all national health systems collapse. There is no implemented standardisation in the way countries deal with prevention. The variation includes whether and how public health organisations are involved. Most European countries do not have relevant national health policies in place. Policymakers, providers, payers and health care practitioners, poorly recognise obesity as a disease, treating it instead, as an individual way of life. Hence, it cannot be managed as a proper illness affecting whole populations that suffer a well-defined health problem. Moreover, funding is constrained while the food industry is both, well-funded and well-connected.

There are some examples of national/regional institutions managing weight loss programs. Germany promoted physical activity and healthy eating, through the In Form Program, 2019. France encouraged the prevention of childhood obesity with Ensemble Prévenons l'Obésité Des Enfants (EPODE) initiative, which was exported to Spain, Greece, and Belgium (Borys et al., 2014). The United Kingdom (UK) promoted healthy diets and active lifestyles to maintain a healthy weight by implementing 5-A-Day 65 and Change4Life programs (NHS, 2013; Change4Life, 2008). In addition, the Healthy Eating and Lifestyle Program (HELP), evaluated how obesity at early ages was managed within the primary care domain. However, HELP was incapable of effectively reducing BMI (Christie et al., 2011, 2017). The United States Preventive Services Task Force in 2017 reported modest improvement of healthy weight and common weight to regain after intensive lifestyle intervention (Grossman et al., 2017; O'Connor et al., 2017; Kelly et al., 2013). Australia conducted the HopSCOTCH test from 2008 to 2011. Twenty-two general practitioner services and one tertiary referral centre reported neither significant changes in BMI nor other obesity-related outcomes of interest (Wake et al., 2013). The epidemic is even more insidious with children living in the most deprived areas. It also applies to affluent countries such as Sweden, England, France and Germany, where obesity can reach twice the prevalence described in wealthier areas (OECD, 2017). Even the 5-A-Day campaign was less successful in reaching poorer households (BBC, 2013). Spain is an exception in reaching stabilization in obesity prevalence at the municipal level thanks to the THAO-Child program (Santos et al., 2015). The limitation of this community-based intervention initiative is that the prevalence of childhood obesity worldwide is so high, that a simple brake on the increase in prevalence, is considered a success nowadays. Even though the outcomes of national/regional behaviour change campaigns have not shown acceptable long-term results, they need to be more persistent, common, aggressive and better funded with the money levied on unhealthy foods or sugar-sweetened beverages (SSB). Besides, community-based interventions require larger long-term studies to assess properly their efficacy. Governments have started to further regulate ultra-processed and SSB in order to increase the effects of preventive campaigns. Some administrations reached agreements with the food industry to limit amounts of salt, sugar and saturated fat (Department of Health UK, 2013). A strong headwind coming from the powerful food industry may counteract the overall potential effects that regulatory policies may achieve. It influences ministries of agriculture and food, and the economy. It happened for instance in Denmark in 2011. National taxes on saturated fat lasted just fifteen months. Authorities declared that results on consumed saturated fat were not reduced enough and, taxes made food prices inflate, putting jobs consequently at risk (The Economist, 2012). This headwind has recently been seen in Moldova, Poland, Spain and to some extent through the EU and the US. The UK is the leading country in regulating obesity. In 2018, came into force legal taxes on manufacturers of SSB. Additionally, it became the first country in the world that: First, restricted unhealthy food advertising to children. Second, banned on

children's television programming all potential promotion of foods high in sugar, salt and/or fat. Nevertheless, a remaining overall emphasis on voluntary actions that should be taken by the industry may reduce potential impact on outcomes. The results of this national initiative will be key to start planning new strategies in the medium/long run (EuroHealth, 2019).

Children and adolescents keep spending greater portions of their time playing with game consoles, watching television, and surfing the internet through computers, mobile phones and tablets. It makes them vulnerable and easily targeted by "ultra-funded" sophisticated marketing campaigns, coming from the powerful food industry. The war is being won by "poor nutritional ultra-processed foods and SSB" spurred on "their high availability, low cost, and aggressive marketing, which result in excessive consumption" (Monteiro et al., 2010; Swinburn et al., 2011) and "lead to obesity" (da Costa Louzada et al., 2015; Monteiro et al., 2018) and "other chronic diet-related NCD" (Rauber et al., 2015). Besides, there are no long-term national or global success stories to disseminate and as a result, obesity keeps increasing. An urgent well-funded global action should be put in place to help countries fight against the obesity epidemic (Ng et al., 2014).

Meanwhile, waiting for national and/or global success stories on dietary and lifestyle changes, actions should be taken on the already obese population. Increasing worldwide rates of obesity in children have been linked with further deterioration of psychological and physical health outcomes that will last for years worsening, and therefore symptoms in adulthood (Llewellyn et al., 2016). Osteoarticular anomalies were found in 50% of obese children and adolescents due to axial compressive forces on joints, spine and growing bones. It potentially leads to spine deformities (kyphosis) and increases the risk of osteoarthritis in adulthood (Gibson et al., 2017). In obese youngsters, the stigmatisation of society provokes them, lower self-competence and self-esteem than non-obese children and adolescents (Omar, 2009). Children becoming obese have been related to higher risk of depression later in adulthood (Sánchez-Villegas et al., 2010). Obesity among children and adolescents progresses in 50-75% of cases, carrying it into adulthood. Those entering early into obesity will drastically reduce their life expectancy by nine years for women, and twelve years for men (Calle et al., 1999; Finkelstein et al., 2010). Since the risk of mortality is related to years of suffering from obesity, all excess weight not having been treated, will potentially increase the risk of premature death (Abdullah et al., 2011).

Lifestyle intervention is the first-line of treatment given to adolescents. It is the cheapest and showed no serious adverse effects. Although lifestyle intervention is relatively effective, benefits are not usually sustained in the long run and a high relapse rate is common. For most of the published randomised control trials (RCT) on weight loss medication and/or bariatric surgery (BS), the treatment of choice for the control group has been lifestyle intervention, which usually has shown worse outcomes.

Pharmacologic therapy is the second-line of treatment after lifestyle interventions failed. Weight loss medication should always be indicated as an adjunct to lifestyle modifications and be prescribed under strict controls by specialised health care professionals. Furthermore, medication is not appropriate for all obese, paediatric patients (Chao et al., 2018). In the US, Orlistat is the only approved weight loss medication by the FDA for patients aged twelve years or older. However, the European Medicines Agency (EMA) has not approved its use for patients aged eighteen years or younger. Orlistat inhibits gastric and pancreatic lipases from the diet, leading to a 30% reduction in the overall ingested calories. The largest (539 patients) Orlistat paediatric (ages ranging from twelve to sixteen) randomised study showed a reduction of 0.55 kg/m² in BMI, versus BMI increment of 0.31 kg/m² for the placebo cohort. It is a modest result for cohorts receiving for one-year, hypocaloric diets (30% fat) plus either, a placebo or Orlistat (Chanoine et al., 2005). Further studies are needed to find potential connections between hepatic or renal adverse events and Orlistat. It is mandatory to take these potential risks into account before prescribing it to paediatric patients (Alli, 2019). Besides, fat-soluble vitamins K, E, D, and A and beta-carotene are not properly absorbed, since the Orlistat mechanism is based on the inhibition of fat absorption. Hence, daily addition of multivitamin complements should be prescribed (Chanoine et al., 2005). Metformin is not a weight loss medication but a T2DM treatment for overweight "children from 10 years of age and adolescents" to improve glycaemic control. Metformin "reduces liver gluconeogenesis and improves glucose transport in cell membranes" and "heightening insulin uptake" (Metformin, 2019). Obese paediatric studies resulted in mild weight loss. However, more long-term studies are needed (Greydanus et al., 2018; Mead et al., 2016). Pharmacotherapy added to lifestyle changes may improve and maintain weight loss, while reducing obesity-related comorbidities. Still, studies, in the long run, are needed to better describe and even dismiss potential serious adverse effects on adolescents. Studies should still assess how the medication affects the development of organs, bones, the central nervous system and sexual maturation. Besides, several weight loss medications such as sibutramine, fenfluramine,

benfluorex, dexfenfluramine, and rimonabant have been withdrawn because of serious adverse events, especially on cardiovascular and psychiatric parameters (Chao et al., 2018). Orlistat and Metformin are relatively safe and added to lifestyle changes to result in mild weight loss. Attention should be paid to liver and kidney problems and to the degree of tolerability of gastrointestinal side effects. Longer-term benefits still need to be presented together with adherence issues and barriers to access to weight loss medicaments.

Modest long-term evidence on the first and second-line of treatments (lifestyle changes and pharmacotherapy) in adolescents makes BS at the present time, the main treatment of choice (Capella and Capella, 2003). Compared to the standard or intensified medical treatments, BS presented superior long-lasting results on weight loss and diabetes remission (Jensen et al., 2014; Colquitt et al., 2014; Rubino et al., 2016). Studies performed in Germany, the UK and France (Ackroyd et al., 2006); in Austria, Italy, and Spain (Anselmino et al., 2009); in Italy (Terranova et al., 2012) and in the United States (US) (Wang et al., 2014), presented BS as cost-effective and even cost-saving when accounting the savings on obesity-related comorbidities. In Spain, cost savings after BS were as high as 13.994 euros (Castilla et al., 2014). In Scotland, those savings were as high as 30.404 pounds per year (16.420 pounds corresponded to hospital admissions, 2.532 pounds to outpatient clinic visits and 11.452 pounds to medications) (Karim et al., 2013). For national health systems, it is one of the procedures with the highest cost-benefit ratio. It breaks even in thirty-nine months, considering just direct costs (Martín-Ramiro et al., 2015). It achieves relevant remissions on BMI and T2DM (AQuAS, 2018). In Korea and the US, day-to-day living with obesity, depression and quality of life improved after BS, compared with non-surgical alternatives (Oh et al., 2013; Strain et al., 2014). Besides, a survey conducted among operated patients revealed extreme satisfaction with also a willingness to choose BS again (Capella and Capella, 2003). Despite the existing evidence, most of the potential candidates are unaware of, or cannot get access, to BS because is considered a last resort (Dixon et al., 2011). The dominant principle is that obesity needs to be controlled before severe physical and psychological consequences progress. The burden of obesity increases if the time being ill (obese) prolongs; hence, savings are accomplished when BS is performed earlier in life. BS in adult cohorts presented excellent outcomes in: First, lowering long-term mortality when compared with non-surgical cohorts (Sjostrom et al., 2007). Second, decreasing the relative risk of death by 89% (Christou et al., 2004). Third, achieving a similar mortality rate (0.1% - 0.5%) to hysterectomy or cholecystectomy (Rubino et al., 2016), which is lower, for example, than the risk of dying from cardiac surgery (3.1%) (Hickey et al., 2012). Evidence showed in adults is convincing but BS in adolescents has the same or even better outcomes (Nguyen and Scott-Conner, 2012). BS in teenagers is linked to an improvement in quality of life (Pratt et al., 2009), and compared to adults, "comorbidities are less advanced and more likely to be reversible in younger patients" (Treadwell et al., 2008). Therefore, care should be provided to those adolescents who failed weight loss attempts for more than six months and present pre-specified high BMI and obesity-related comorbidities.

The American Society for Metabolic and Bariatric Surgery (ASMBS) executed an extensive literature search from 2009 to 2017. It concluded that BS is effective and safe in adolescents, considering the higher risk of progression of associated comorbidities in adulthood. BS at early ages can reduce the progression of morbid obesity-related comorbidities (Pratt et al., 2018). ASMBS guidelines consider it essential to count on family involvement and support; reach skeletal maturity (13-year-old girls and 15-year-old boys) and achieve physiological stability. Furthermore, to include paediatricians in MDTs, as well as "primary care physician, cardiologist, pulmonologist, psychiatrist, nutritionist and adolescent obesity specialist". These MDTs should demonstrate first, enough BS expertise in adults (Greydanus et al., 2018). However, no worldwide consensus has been yet reached. In the meantime, the current recommendation is to pursue higher safety thresholds than those used in adults: "First, failure of ≥ 6 months of organised weight loss attempts. Second, BMI ≥ 40 kg/m² with serious obesity-related comorbidities. Third, BMI ≥ 50 kg/m² with less serious obesity-related comorbidities" (Inge et al., 2004). Many authors argue that BS should be universally available to all classes of obese people as it is cost-saving for super obese and even cost-effective for mildly obese patients (Chang et al., 2011). BS is cost-effective after 5 years, in severely obese teenagers, even though costs and morbidity are initially high (Klebanoff et al., 2017). Early BS offered to bigger portions of morbidly obese adolescents reduces psychological and physical related comorbidities and increases the quality of life (Narwaria and Bariatric, 2018). Still, evaluations of morbidly obese adolescents are not performed in time, due to barriers, which avoid upcoming BS procedures (Chernoguz and Chwals, 2018). Solid systematic reviews showed that access was associated to sociodemographic, economic and racial factors (Jackson et al., 2014). BS patients were significantly more likely to be female, white, and have private insurance (Bhogal et al., 2015). BS encompasses as well high patient pre-operative attrition rates (Taylor et al., 2018). The belief that obesity is a choice of life rather than a serious illness is deeply rooted into society. Providers and, doctors not related to

obesity, lack the needed knowledge to put value on BS, acting as tough gatekeepers by putting BS into the background. Hence, they delay assessments, referrals and start with lifestyle interventions and pharmacologic treatment. 80% of obese people do not perceive themselves as obese. Hence, patients do not ask for help, postponing both, the initial visit to a general practitioner (GP), and the posterior referral to endocrinologist (Uribe-Carvajal et al., 2018). More evidence on safety profile and long-term utility of BS at early ages is essential. Even though BS at early ages is just now producing long-term outcomes confirming better clinical results and durable bodyweight reduction, the micronutrient deficiencies reported (Olbers et al., 2017; Inge et al., 2017) require longer follow-up (FU) and strict further FU on adherence to dietary supplements and new healthy habits. Severe redundancy of skin becomes a major aesthetic issue making adolescents feel uncomfortable exposing their bodies. This issue "makes our early surgical intervention, ironically, somewhat late" (Capella and Capella, 2003). Informed consent and assent are sensitive in adolescent population, especially in cases of discordance with parents (van Geelen et al., 2013). Besides, an agreement between parents and hospital's ethical committee must be reached. Despite the improvements in the United States, racial and ethnic disparities in treatment access remain, affecting mostly those races and ethnicities already highly impacted by the obesity epidemic (Bruff et al., 2018). Without a systematic coverage, only the most-affluent/low-obesity states, will benefit from the increase in BS procedures. Besides, Essential Health Benefit (EHB) coverage is also better developed there (DeMaria et al., 2018). Teen-LABS Research Consortium reported extremely high coverage denial. Paradoxically, being under 18 years was the most common reason to care denial. Only 47% of eligible BS candidates received initial insurance coverage (Inge et al., 2004). Despite the increase in the number of public BS performed, the Brazilian national health service (SUS) cannot absorb the demand for public BS (Cazzo et al., 2019). The Spanish Society of Obesity Surgery (SECO) described BS, which is universally covered, as one of the surgeries with longest waiting list in the country (Arteaga-González et al., 2018). The lack of resources and its increased prevalence influenced officials not to include morbid obesity on the official list of illnesses (Coduras Martínez et al., 2019).

Methodology and research methods. The body of the present research was based on an extensive search of studies through MeSH terms and Google Scholar (before COVID-19 pandemic) from 1999 to 2019, with no language restrictions. Terms used were related to bariatric procedures, and to a spectrum of additional terms related to weight loss management outcomes, obesity and adolescence. Additionally, from the articles retrieved in the first search, supplementary studies were identified by hand searching, among the cited references. Relevant web sites were also targeted using Google. To confirm whether the findings extracted from the initial narrative search were still valid, an additional, more profound narrative search including systematic literature review (SLR) features, was performed. The electronic search extracted data from three data bases: PubMed from 2018 to 2019; Google Scholar from 2018 to 2019; and The Centre for Reviews and Dissemination from the University of York (from 2010 to 2019). Articles that were not in English were excluded as well as patents and citations. We identified documents related to bariatric surgery performed on adolescents, that are available in peer review clinical and economic journals, together with data from national health systems and health technology assessment (HTA) agencies. It facilitated the link between discussion, final recommendation statement, and conclusion. Initially, 23999 articles were found among the three selected data bases. Pubmed alone accounted for 23961 items, and after the application of additional filters (search "Bariatric Surgery" [Majr] NOT (lipectomy OR balloon OR band) Filters: Publication date from 2018/01/01 to 2020/12/31; Humans; English; Core clinical journals; Child: birth-18 years), the items found came down to 25 articles. From these, 6 studies were also excluded, after further screenings of titles and abstracts. Finally, 19 articles were considered. Therefore, after adding 29 studies from Google Scholar and 9 from the Centre for Reviews and Dissemination from the University of York, a total of 59 articles were analysed. Adjustable gastric band (AGB) and gastric balloon were considered excluded in both searches, owing the following reasons: First, the two procedures most commonly performed on adolescents are gastric bypass (GB) and sleeve gastrectomy (SG). Second, GB is not yet approved for patients under the age of 18, by the United States Food and Drug Administration (FDA). Third, studies showed greater body mass index (BMI) reductions via GB and SG than AGB in teenagers (Inge et al., 2018).

Results. Policymakers need to commit with social education campaigns to educate society on the real impact of obesity. They should as well encourage scientific societies, medical device industry and universities, to educate providers and payers to increase access to BS and disseminate the results on its effectiveness. Providers need to improve the referral management of obese adolescents to sooner reach endocrinologists and bariatric surgeons. A well-funded professional education program should train doctors, not related to obesity, to increase the provider efficiency. Providers should create well-coordinated MDTs teams in recognised centres of excellence adapted to patient necessities. All stakeholders should empower and educate adolescents

by the implementation of juvenile oriented care. They will better understand the risk of potential complications or reinterventions, and the mandatory commitment needed to fully adhere to lifelong supplementation, healthy diet and lifestyle changes (Khattab and Sperling, 2019). Educating bariatric patients is really challenging as they are highly complicated. Their morbid obesity is not just the result of excessive food intake (ultra-processed foods and SSB), lifestyle (sedentarism) and inherited genetic disorders. Psychological instability is also a concern, and it is a determinant in diagnostic and treatment before BS and after BS. Bariatric patients tend to be socially discriminated and this causes emotional and psychological distress. Their self-esteem is low, increasing therefore their isolation while forgetting about performing daily tasks and practicing personal interactions. Their academic performance is lower than the average. Their work performance is characterised by lower productivity at work (presenteeism) (Gates et al., 2008) and higher rates of absenteeism (defined as time away from work) than the average (Gottler et al., 2017). In this context, obese patients are disposed to look for emotional console in the excessive intake of unhealthy food. It is common that specialised scales measure among other parameters emotional eating, external eating and restrained eating behaviours. Other examinations assess the grade of binge eating disorder, depression and anxiety. Disordered eating behaviours are linked to depression and anxiety (Güneş et al., 2019). Obese adolescents should be screened for these anomalies. They should be well-defined, in order to work on the cause provoking it, or at least estimate if it could cause a reduced adherence to the healthy new life principles. Once this is assessed by the psychiatrist, the MDT should finally approve BS. Families are key to help adolescents to control those factors provoking discern. Patients need to be psychologically fit in order to comply with the required adherence to dietary supplements and new healthy habits. Therefore, without an adolescent oriented care, it is impossible to address these emotional and psychological disorders, potentially making BS fail, causing an unjustifiable waste in health care resource utilization. Patient workshops and the figure of an "expert patient" is key to increase adherence. Besides, it helps them to understand patient information and informed consent, while better engaging patient's family to the adolescent morbidly obese pathway. Those initiatives will enable them to begin and maintain lifestyle changes that will last forever, since BS success heavily depends on physical, emotional, and psychological fitness inpatients (Chernoguz and Chwals, 2018). Institutions should fight against those who spread prejudices against obesity, that act as a barrier and that also exist within the healthcare system (Dixon et al., 2011). Institutions should also create new regulations on public and private insurers. Implement novel standardised guiding principles to providers and scientific societies, to encourage more flexible standards that will allow more obese adolescents to be operated on early. They will clearly detail the time patients will remain on-hold (on medicaments or monitoring) but should never position BS as a last resort. As the outcomes are non-inferior to adults, BS should be funded and supported by national health systems. Besides, national health systems should promote national registries to continue assessing outcomes in the long run. In countries with universal coverage, more resources should be allocated into BS, and the creation of updated waiting list registries should be mandatory to better monitor and manage timing. Stakeholders should develop strategies to reduce attrition rate and improve patient retention, such as online access to workshops and lectures to attract adolescents while saving resources and costs (Monfared et al., 2019). In countries such as Canada and Spain where coverage is universal, the lead-up process before BS is paramount to increase rates of success after surgery. Although this step adds useful actions to improve outcomes after surgery and helps MDT measure future commitment towards adherence to BS principles, it is also important to educate adolescents before the lead-up process. The pressure on patients could be high leading to attrition before BS (Doumouras et al., 2020). Other countries only cover BS when starting at the age of 18 or even at the age of 21 (for instance in Argentina). Hence, changes on mandatory medical plans should be implemented to avoid coverage denials for BS at early ages (Rodríguez et al., 2017). Public and private insurers should work for better access regardless race or socioeconomic status, restructure inadequate payment models, and reduce the excessive delay in final approvals. BS denial based on under aged principles cannot be sustained (Armstrong et al., 2019). Flabby skin after BS is a serious issue affecting patients' self-esteem and quality of life. Access to plastic surgery is nowadays limited, and it should be included in the BS package.

Conclusions. Obesity is preventable (WHO, 2019) and prevention should be a worldwide priority. A unique goal! However, submitting these currently obese youngsters to ineffective non-surgical treatments while early BS is held back, cannot longer be clinically or economically supported (Capella and Capella, 2003). Thus, there is a need for earmarked taxation on unhealthy foods and SSB to publicly prevent obesity, and provide enough funds to increase the provision and reimbursement of effective treatments such as BS. BS for adolescents is an effective surgical treatment that improves quality of life, manages weight significantly well and reduces related comorbidities. However, a clear limitation is that postoperative complications,

compliance with adherence to dietary supplements and new healthy habits, and effective FU, could remain a problem more related to adolescents than grown-ups (Aikenhead et al., 2011). They should be sustained in a longer period than in adults, since adolescents will live longer. Especially challenging is the commitment in the long run as adolescents are more exposed to aggressive advertising campaigns. They spend greater portions of their time playing with game consoles, watching television, and surfing internet through computers, mobile phones and tablets. It makes them vulnerable and easily targeted by sophisticated marketing campaigns, coming from the powerful food industry. More countries should follow the well-meaning initiatives coming from the UK. Despite the opposition of the food industry, the country is always looking for creative ways to tackle the epidemic. The UK also tried to prevent shops and supermarkets from displaying sweets and snacks at till checkouts. Some even implemented free fruit instead (Independent, 2018). Regional activity-based HTA (Region Vastra Gotaland, HTA – centrum - Sweden) made an interesting appraisal of BS in adolescents. This HTA reinforced the idea that prejudices in society make a life for obese adolescents not favourable. Obesity not effectively treated will hinder normal socioeconomic life for morbidly obese adolescents. BS is an option that improves health-related quality of life and metabolic outcomes with a good safety profile (deaths are rare). However important limitations must be considered: First, short-term complications and long-term consequences of BS in adolescents are not sufficiently studied. Second, there are still ethical aspects pending when deciding BS as the treatment of choice, since we do not fully know the long-term effects and complications. Moreover, the average adolescent obese patient does not usually take full responsibility for long-term compliance with adherence to dietary supplements and new healthy habits. Third, flabby skin after BS is a serious issue affecting patients' self-esteem and quality of life and further plastic surgeries will be performed (Gothberg et al., 2014). There is a need for official accreditation on "BS on adolescents" to lower in-hospital comorbidities. Stakeholders should be aware that the "lower mortality rate associated with accredited centres may be attributed to their ability to recognise and rescue complications" (Nguyen et al., 2012). The lack of clear consensus, even on the BMI cut-off point, and the prioritisation of resource allocation between adults and adolescents, make my recommendations not generalisable. The final purpose of the present dissertation was to change the view on BS, from an indulgent waste of money to an effective fund-saver.

Conflicts of Interest: Jorge Navarrete-Dualde was an employee of Johnson & Johnson MedTech during the time this research was conducted.

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Соціально-економічні проблеми ожиріння у підлітковому віці

Ожиріння є епідемією століття через його поширення, вплив на національні бюджети, скорочення об'єму валового внутрішнього продукту, зниження продуктивності та вплив на рівень смертності, захворюваності та якості життя. Національні кампанії зі зміни поведінки ще не показали прийнятних довгострокових результатів, і існує потреба у підвищенні податків на нездорову їжу. Крім того, підлітки є вразливою групою і легко піддаються впливу «надфінансованих» складних маркетингових кампаній. Скрамні дані щодо першої та другої лінії лікування роблять бариатричну хірургію основним методом лікування. Бариатрична хірургія може стати стандартом лікування тих підлітків, які не змогли схуднути упродовж більше шести місяців і мають попередньо визначений високий індекс маси тіла та супутні захворювання, пов'язані з ожирінням. Для підтвердження того, що висновки, отримані в результаті первинного описового огляду літератури, залишаються актуальними, був проведений додатковий більш глибокий описовий огляд літератури, що включає функції систематичного огляду літератури, з вилученням інформації з трьох баз даних до початку пандемії COVID-19: PubMed з 2018 по 2019 рік; Google Scholar з 2018 по 2019 рік; та Центру оглядів та розповсюдження інформації Йоркського університету (з 2010 по 2019 рік). Політики повинні взяти на себе зобов'язання змінити поведінку суспільства щодо реального впливу ожиріння за допомогою проведення громадських кампаній з охорони здоров'я. Існує потреба в цільовому оподаткуванні нездорової їжі аби публічно запобігти ожирінню та забезпечити достатнє фінансування для збільшення обсягів надання та відшкодування витрат на проведення бариатричної хірургії. Бариатрична хірургія в ранньому віці може зменшити прогресування патологічних супутніх захворювань, пов'язаних з ожирінням. Однак обстеження підлітків з патологічним ожирінням не проводиться вчасно через бар'єри, які перешкоджають проведенню майбутніх бариатричних хірургічних операцій. Зацікавлені сторони повинні розробити стратегії для зменшення рівня відтоку пацієнтів та покращення умов перебування пацієнтів шляхом надання медичної допомоги, орієнтованої на неповнолітніх. Досі залишаються невирішеними етичні аспекти, оскільки не до кінця відомі довгострокові наслідки та ускладнення. Враховуючи низьку ефективність громадських кампаній, спрямованих на профілактику та добровільну зміну поведінки в довгостроковій перспективі, а також слабе оподаткування та регулювання харчової промисловості, особи, які приймають рішення, повинні змінити своє ставлення до бариатричної хірургії з необгрунтованого розтрачання бюджетних коштів на ефективне цільове фінансування.

Ключові слова: бариатрія, поведінка, тягар, кампанія, громада, особа, яка приймає рішення, епідемія, ожиріння, профілактика, регулювання.