European Journal of Biology and Medical Science Research
Vol.9, No.4, pp.35-47, 2021
Print ISSN: ISSN 2053-406X
Online ISSN: ISSN 2053-4078

THE ECONOMIC BURDEN OF THE OBESITY IN BRAZIL

Karina Contis Costa[1]
Murillo de Oliveira Dias[2]
Raphael de Oliveira Albergarias Lopes[3]
Jorge Cardoso[4]

[1,3,4]Université de Bordeaux | IIE
[2]Fundaçao Getulio Vargas

[2]corresponding author: murillo.dias@fgv.br

ABSTRACT: *Almost one in two people in Brazil is currently obese. Obesity in adults reduces life expectancy, increases health care costs, decreases work performance, and consequently, decreases the GDP. Therefore, we addressed the economic significance of obesity in Brazil. The Brazilian Government has made some policies to promote healthy lifestyles to challenge this international public health dilemma. The article evaluated policies that could significantly improve public health outcomes. Discussion and future research compile the present study.*
KEYWORDS: public health care, overweight, obesity, economic burden.

INTRODUCTION

The burden of obesity in adults in Brazil has been growing significantly in the past years. It is becoming sooner than expected a significant health and economic problem. Obesity was considered in the past a problem of high-income nations. To date, low and middle-income countries are facing the same challenges. According to the World Health Organization (WHO), overweight and obesity are defined as "abnormal or excessive fat accumulation that may impair health." (WHO, 2021, p.1). In 2016, 1.9 billion people worldwide were overweight, 650 million obese, and 13 percent of adults were obese (WHO, 2021). Furthermore, obesity has also increased health costs during the pandemic and indirectly aggravated coronavirus disease symptoms (WHO, 2021).

As it is known, the fundamental cause of obesity is "an energy imbalance between calories consumed and calories expended" (WHO, 2021, p.1). The most significant reasons for obesity have been a combination of (i) food consumption energy-dense, and micronutrient-poor that is rich in sugars, salt, and fat; (ii) decrease in physical activity; (iii) sedentary lifestyle; (iv) changing transportation modals; (v) urban lifestyle. Conversely, the consequences for obesity (BMI>30) include: (vi) cardiovascular diseases; (vii) diabetes; (viii) musculoskeletal disorders; (ix) several types of cancers;

https://doi.org/10.37745/ejbmsr.2013

(x) depression. Finally, to prevent obesity (and overweight), the WHO recommend to (xi) limit the ingestion of fat, salt, and sugars; (xii) increase the consumption of vegetables, legumes, grains, nuts, and fruits; and finally (xiii) engage in physical activity - at least 150 minutes per week for adults.

This article focus on the economic impact of obesity (BMI >30, see Table 1) in the Brazilian economy on adults of both genders.

Table 1
Body Mass Index (BMI) Categories

Category	BMI
Underweight	<18.5
Normal weight	18.5 to 24.9
Overweight	25 to 29.9
Obesity	30 or greater

Source: WHO (2021)

Obesity is also a non-communicable disease (NCD). NCDs are diseases not directly transmissible. Furthermore, they include (i) cancers, (ii) strokes, (iii) diabetes, (iv) autoimmune diseases, among others. Therefore, obesity is considered an epidemic by the WHO (2021). So, for instance, the other BMI categories, such as children and youngsters, are not part of the present study and should be investigated separately. On the other hand, the significant increase in obesity in Brazil has recently attracted scholarly attention. As a result, some critical and well-structured studies have been conducted during recent years.

Furthermore, this article has the merit of condensing, in a single research, sparse research on the costs of obesity in the public health system overseas, Brazil, and government measures (Anvisa - National Sanitary Surveillance Agency and the Ministry of Health). Finally, this work is organized in the following sections: (i) Research design and Limitations; (ii) Literature review; (iii) Discussion; (iv) Future research. In the next section, the research design is disclosed.

RESEARCH DESIGN AND LIMITATIONS

This study combined an inductive rationale with an interpretive logic through a multiple-methods approach, combining an extensive literature review with a descriptive, multiple case study. The attributable fraction of each disease was calculated based on its prevalence in the adult Brazilian population and the relative risks established for these primary diseases and their outcomes in the scientific literature.

The study expands and updates estimates of the cost attributable to the main NCDs associated with food, such as obesity and diabetes, and presents unprecedented costs attributable to arterial hypertension in the SUS.

This research is limited to (i) the WHO standard recommendations on obesity; (ii) Brazilian Federal normative on Public Health and, for this reason, limited to Brazil. In the next section, we present the literature review.

THE EVOLUTION OF OBESITY: BACKGROUND

The worldwide prevalence of obesity tripled between 1975 and 2016. As a result, obesity is a critical global issue, requiring a comprehensive intervention strategy rolled out at scale (McKinsey, 2014). Still, according to the WHO, nearly two billion adults were overweight in 2016 (current data available while this article is written). From these, almost one-third were obese (WHO, 2021).

Figure 1 depicts the global rates of obesity from 1970 to date, and projected to 2030, according to the Organization for Economic Cooperation and Development (OECD) Obesity Update 2017, as follows:

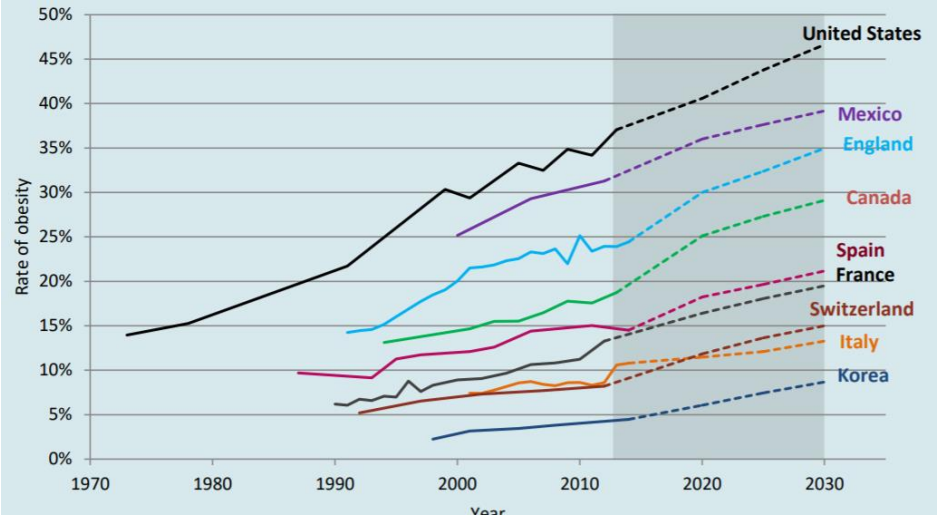

Fig. 1: Project rates of obesity. Source: OECD, 2017, p.6

Notice in Figure 1 that the obesity levels are expected to be higher in all the OECD countries in 2030, highlighting the United States, Mexico, and England.

In 2014, the WHO issued the European Food and Nutrition Action Plan 2015–2020, designed to reduce the burden of preventable diet-related non-communicable diseases, including obesity (WHO, 2014), including (i) school and workplace educational

campaigns; (ii) primary care interventions (regarding the prescription of physical activity, for instance); (iii) pricing and fiscal measures; (iv) reformulation of products, changes in portion sizes; (v) food labeling; (vi) nutritional facts labeling (OECD, 2021). Examples of food labeling are illustrated in Figure 2, as follows:

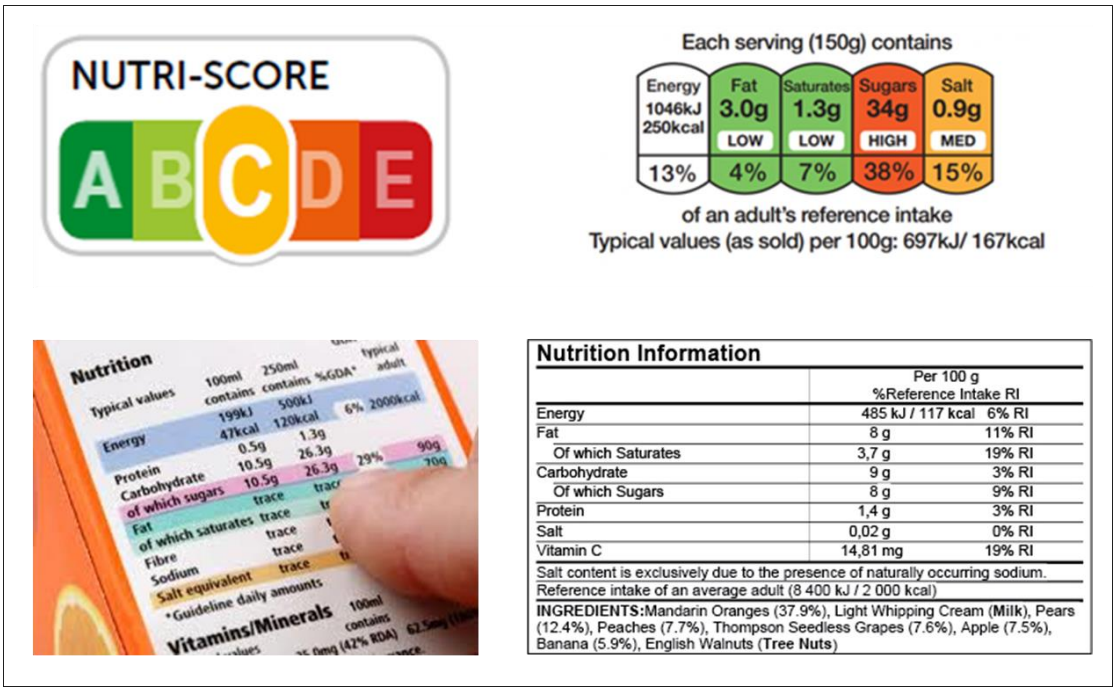

Fig. 2: Food labeling examples. Source: WHO, 2021.

In March 2017, the French Government was the first European to adopt the front-of-pack Nutri-Score labeling system, or the 5-Colour Nutrition Label (5-CNL), as depicted in Figure 2 (upper side). Later, the labeling system was endorsed by health authorities in Switzerland, Luxembourg, Netherlands, Belgium, Spain, and Germany (Chantal, Fabrice, and Hercber, 2018). In 2020, the governments of Portugal, Slovenia, and Austria embraced the 5-CNL front-of-pack system.

In the next three decades, overweight and obesity-related conditions will reduce the life expectancy of OECD countries by approximately three years on average. In addition, they are expected to spend nearly 8.4 percent of their total budget on health treatments for obese-related diseases, as illustrated in the following Figure 3 (Brazil highlighted in red):

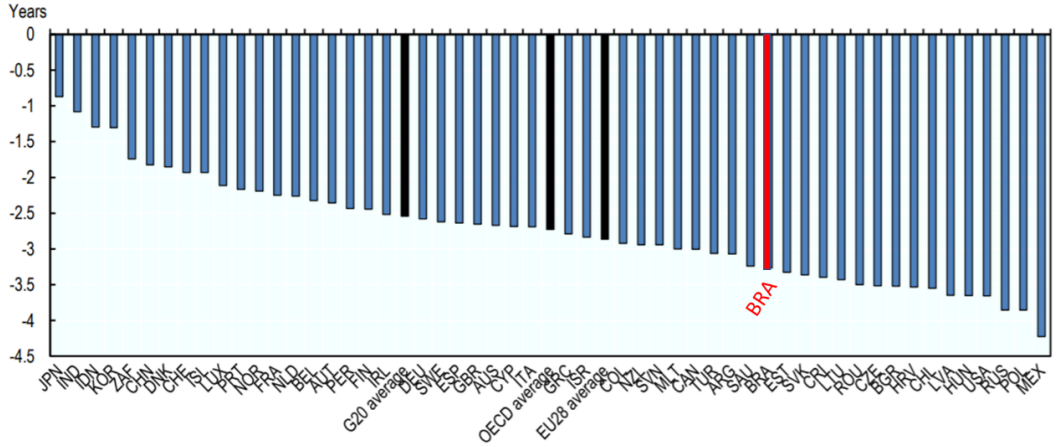

Fig. 3: The impact on life expectancy in years, average 2020-2050.
Source: OECD, 2019, p.22

Obesity is related to higher health care costs. For example, obese receive approximately 2.4 more medical prescriptions than normal weight (OECD, 2019). The estimates of health expenditure regarding obesity are illustrated in Figure 4, as follows:

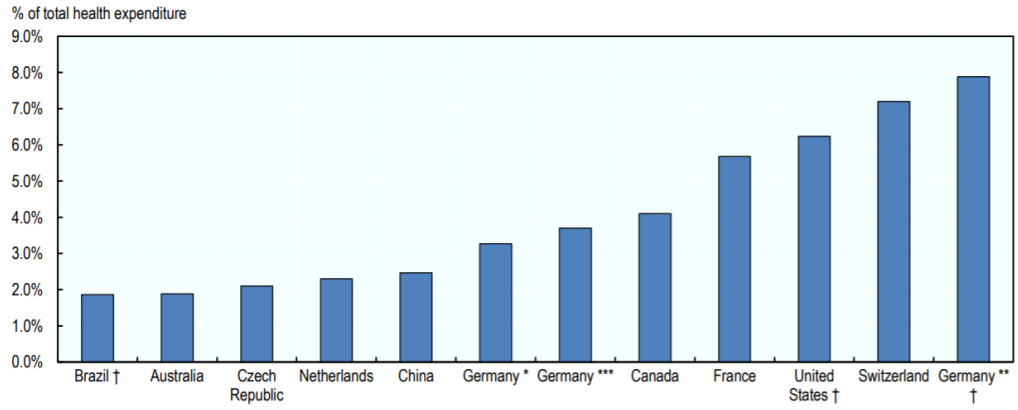

Fig. 4 Health expenditure associated with obesity estimates.
Source: OECD, 2019, p.78

Obesity and related conditions tend to reduce the GDP in the OECD countries by 3.3 percent, including one percent of total tax revenue spent on obesity (OECD, 2019). The percentage difference in GDP due to overweight and obesity for the OECD countries in the next three decades (Brazil highlighted in red) is displayed in Figure 5, as follows:

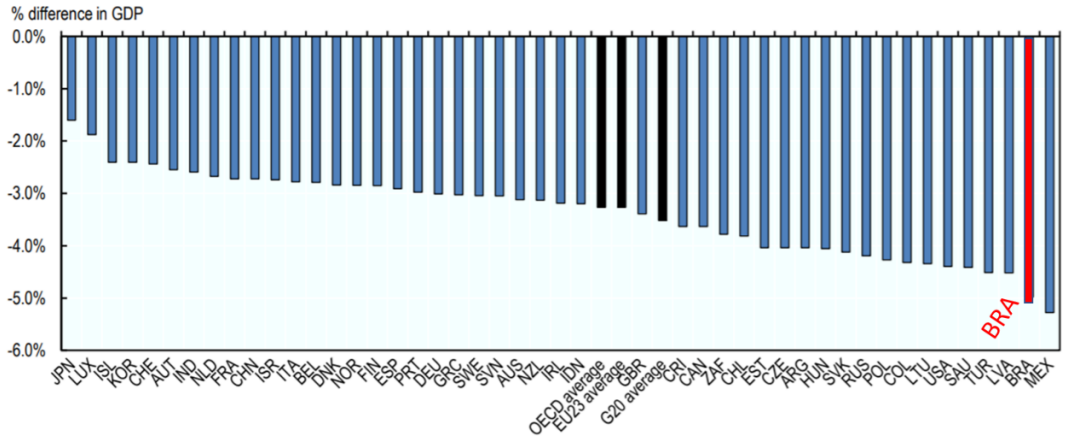

Fig. 5 Percentage difference in GDP due to overweight, average 2020-2050.
Source: OECD, 2019, p.27

In the next section, we present the economic burden of obesity in Brazil and the Brazilian government initiatives to control the obesity levels in the population.

THE ECONOMIC BURDEN OF OBESITY IN BRAZIL

According to the Health Ministry Report 2020, 55.7 percent of Brazilian adults are overweight, and 19,8 percent are obese, approximately 40 million people (Ministério da Saúde, 2020).

In October 2020, the Brazilian Government issued a crucial initiative to combat obesity, establishing the Clinical Protocol and Therapeutic Guidelines for Overweight and Obesity in Adults through Report 567. In addition, it condenses critical information on tracking and diagnosis of overweight and obesity and reporting the recent changes in eating habits, physical activity, and other prescriptions for tackling obesity.

In Brazil, NCDs are equally relevant, having been responsible, in 2016, for 74 percent of all deaths, including (i) heart diseases; (28 percent); (ii) cancer (18 percent); (iii) respiratory diseases (6 percent), and diabetes (5 percent). According to Report 567 (Vigitel, 2019), the frequency distribution of obesity (BMI>30 kg/m^2 in the Brazilian adults per State is illustrated in Figure 6 (adult men) and Figure 7 (adult women), as follows:

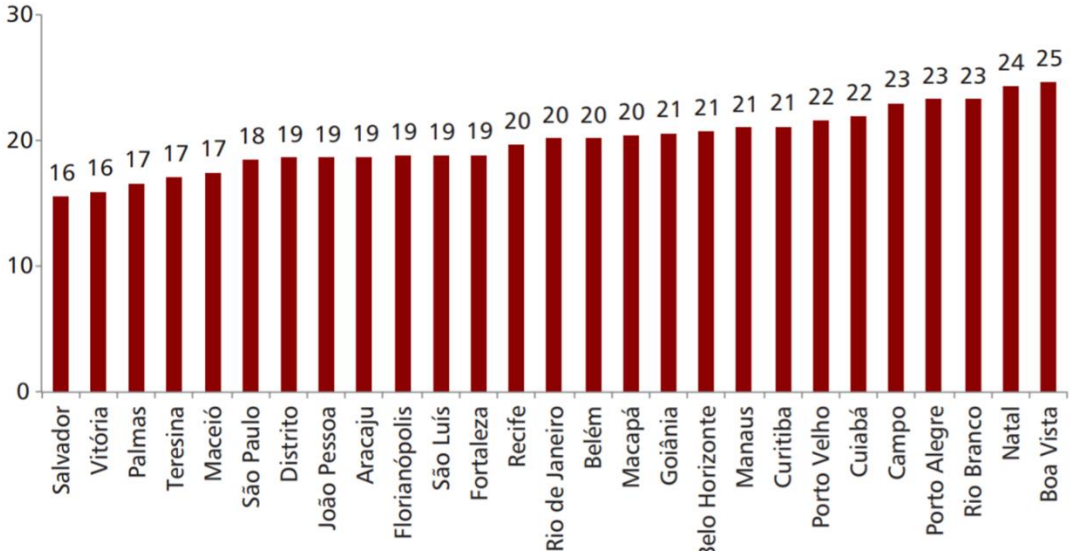

Fig. 6: Percentage of adult men (≥ 18 years) with obesity (BMI ≥ 30 kg/m^2).
Source: Vigitel, 2019, p.41. Reprinted under permission

Figure 6 shows that the highest obesity frequency among adult men is found in the city of Boa Vista in the Amazon region. Conversely, the lowest obesity frequency is in Salvador, the capital of the Brazilian state of Bahia (14 percent).

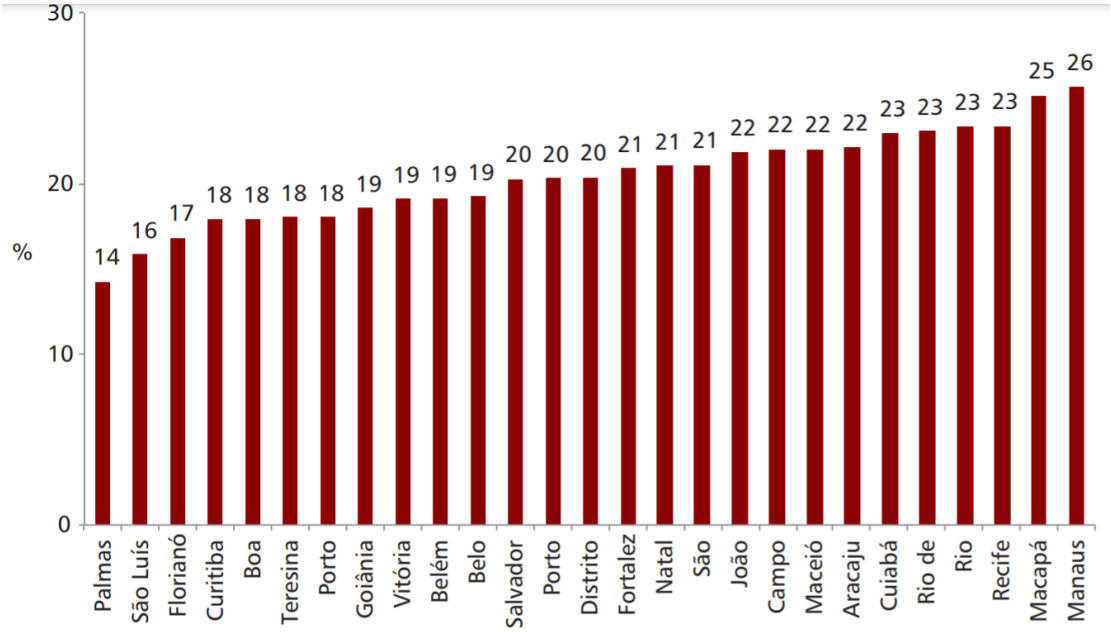

Fig. 7: Percentage of adult women (≥ 18 years) with obesity (BMI ≥ 30 kg/m^2).
Source: Vigitel, 2019, p.41. Reprinted under permission

Note in Figure 7 the highest obesity frequency among adult women in Manaus, Amazonas state. Conversely, the lowest obesity frequency was found in Palmas, the Tocantins State. (14 percent).

CHALLENGES AND INITIATIVES

Definitions of goals for sugar reduction are highly complex because the impacts of an unsuccessful public policy can be disastrous. In addition to not bringing the expected results in the population's health, they can make products more expensive, a susceptible point, especially the current economic situation that our country is in.

The total costs of hypertension, diabetes and obesity on the Brazilian Health Unic System (SUS) reached **$ 890 million in 2018**. Out of these, 11 percent were spent on obesity, totaling **$ 98 million**. Regarding gender and age, 56 percent of the total costs were spent with women (44 percent with men), and 70 percent with people between 20 to 69 years old. In addition, obesity is a risk factor for diabetes and hypertension. In 2013, for instance, more than one-third of the diabetics and hypertensive were obese, increasing the total costs of obesity (Nilson et al., 2020).

The data suggests that the economic cost of obesity for the Brazilian Government is less than $ 0,50c per inhabitant per year or $ 2,00 per year the obese person. Indeed, the lowest price among particular countries.

In France, the cost related to obesity is estimated at $ 2.750 per year per obese person. The costs alone for the French state are at least $ 2,5 billion per year (Emery, 2007). Such amount is still "slim" if compared to UK's National Health Budget, which is over £6 billion per year (NHS, 2015),

In 2007, the Ministry of Health created a technical group formed by Portaria no. 3.092/2007 to discuss the reduction of sugars in processed foods. In November 2018, a voluntary agreement was signed by the Ministry of Health and the presidents of associations in the food production sector.

In 2017, the Health Ministry reported the results of the removal of more than 17.2 thousand tons of salt from food since 2011. The highest percentage of reduction was observed in (i) soups (65.15 percent of sodium per 100g of product); (ii) instant soups (49.14 percent per 100g); (iii) mozzarella cheese (23.15 percent); (iv) cream cheese (20.47 percent); (iv) breaded (5.7 percent), the most negligible reduction (Ministério da Saúde, 2017).

In 2018, the Brazilian Government established a goal to reduce 144,000 tons of sugar by 2022 from processed foods. The goal is to remove sugar from (i) biscuits (62.4 percent); (ii) dairy products (53.9 percent); (iii) cakes (32.4 percent); (iv) cake mixes (46.1percent); (v) chocolate (10.5 percent); (vi) sugary drinks (33.8 percent) (Ministério da Saúde, 2018).

The reduction is monitored every two years by the National Health Surveillance Agency (Anvisa). The Brazilian Association of Food Industries (ABIA), the Brazilian Association of Soft Drinks and Non-Alcoholic Beverages (ABIR), the Brazilian Association of Biscuits, Pasta and Industrialized Breads, and Cakes (ABIMAPI), and the Brazilian Dairy Association (Viva Lácteos) are part of the agreement.

In 2018, according to the Health Ministry Strategic Action Plan to face the chronic diseases and NCDs in Brazil (2021-2030), 54.7 percent of deaths are caused by NCDs (Ministério da Saúde, 2020). In Brazil, cardiovascular diseases, several types of cancers, diabetes, and respiratory infections are caused by people's lifestyles, determined in majority by the following factors: (i) access to public goods and services, (ii) a guarantee of rights, (iii) access to information, (iv) employment and income; (v) healthy lifestyles. On the other hand, the main risk factors detected by the Health Ministry to the NCDs are (vi) smoking, (vii) alcohol consumption, (viii) unhealthy food, and (ix) physical inactivity. Therefore, the Plan compiled three action directives for the decade (2021-2030), as follows: (a) surveillance, assessment, and monitoring; (b) health promotion; and (c) comprehensive care (Ministério da Saúde, 2020). Furthermore, the Health Ministry has the objective of stopping the growth of obesity in adults until 2030, illustrated in Figure 8, as follows:

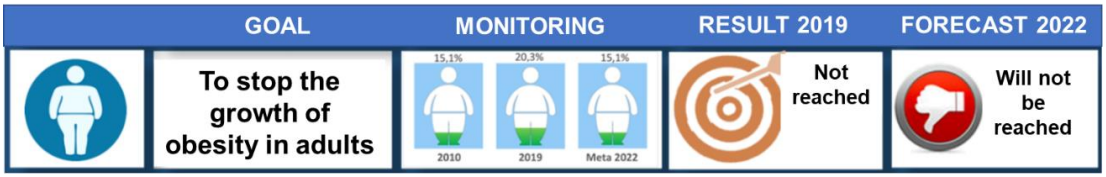

Figure 8 Objective to stop the growth of obesity in adults.
Source: Ministry of Health, 2020, p.16.

Observe in Figure 8 the negative forecast on the objective fulfillment to 2022: from 20.3 percent in 2019 to 15.1 percent in 2022. To tackle obesity, the Health Ministry established the following objectives for 2030: (i) stop the growth of obesity in adults; (ii) increase the recommended consumption of fruits and vegetables by 30 percent; (iii) reduce the consumption of artificially sweetened beverages by 30 percent; (iv) stop the consumption of ultra-processed foods; (v) increase the prevalence the practice of physical activity by 30 percent; (vi) reduce the prevalence of smoking by 40 percent, and (vii) reduce the abusive consumption of alcoholic beverages by 10 percent

(Ministério da Saúde, 2020). Furthermore, in October 2020, the National Sanitary Surveillance Agency (ANVISA) issued the RDC nº 429/2020, which establishes criteria about nutritional labeling of packaged foods. As a result, the Brazilian front-of-pack labeling system is displayed in Figure 9, as follows:

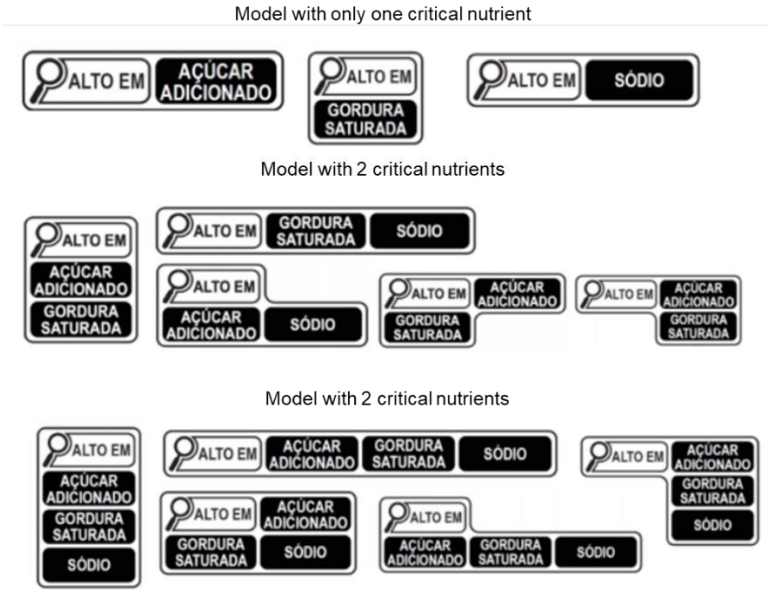

Fig. 9: the Brazilian front-of-pack labeling system.
Source: ANVISA, 2020

Observe in Figure 9 the Brazilian front-of-pack labeling system versions containing (i) one, (ii) two, or (iii) more than two critical nutrients. In the next section, the discussion, implications, and future research are presented.

DISCUSSION

In this section, the implications of the present study are discussed. In addition, this article investigated the costs of obesity in Brazil and Government measures to tackle it. As a result, the Health Ministry devised a strategic Action Plan to face the chronic diseases and NCDs in Brazil (2021-2030), as presented in the previous section.

First, this article has the merit of compiling sparse studies on obesity in a single research, providing scholars, policy, and decision-makers an updated perspective on the subject under review. Moreover, the study has implications in the following fields of research: (i) healthy lifestyle practices to prevent burnout syndrome (Simoni, M, Dias, M.; 2021, 2020); (ii) Trust, Psychological Well-Being, and Leadership Applied to the Workplace Commitment (Vieira, P., Dias, M., Lopes, R., Cardoso, J., 2021); (iii) transformative or evolutionary trust (Dias, M., and Lopes, R., 2021); (iv) lifestyle and the coronavirus pandemic (Dias, M., and Lopes, 2020) among others.

Despite the Brazilian Health Ministry's efforts to tackle obesity, most of the ministry's current resources have been allocated to combat the Covid-19 pandemic. There were 21.5 million cases registered until this article edition, with nearly 600,000 deaths in Brazil (Ministério da Saúde 2021). Therefore, the National Plan to face the chronic diseases and NCDs in Brazil (2021-2030) should be resumed after controlling or stopping the pandemic. To date, most efforts are to vaccine the entire Brazilian population (near 215 million people) with the two-shot or one-shot version of the COVID-19 vaccine.

OECD bets on the NCDs prevention package to return even higher benefits. For example, an additional 205 000 life-years could be saved annually. In addition, this package would prevent health costs of approximately $ 26 billion by 2050 (OECD, 2019).

Finally, studying different approaches for tackling obesity in foreign countries is encouraging because the lessons learned in one country can serve as an example for other countries. On the other hand, the population of each country has its ethnic traits, which vary many times from region to region. Therefore, an action that works in one country may not work in a neighboring country. Consequently, it is essential to study the commonalities between the different approaches to combating obesity and then adapt them to each country. For instance, eating habits are constantly changing. During the pandemic, more cases of weight gain in the population are registered every day, among other reasons, due to the increase in anxiety caused by the social mobility restrictions, lockdowns, and social isolation, for instance.

FUTURE RESEARCH

The objective of the current paper is to develop a concise literature review on the economic dimension of the adoption and implementation of the formulae developed in the present article on obesity. Furthermore, we encourage future research on improving the (i) Brazilian front-of-pack labeling system; (ii) statistical analysis on obesity performance models; (iii) further studies on the new lifestyle habits and the impact on obesity due to the coronavirus pandemic.

REFERENCES

ANVISA (2020) Resolução da diretoria colegiada - RDC nº 429, de 8 de outubro de 2020. Retrieved on 7 October 2021 from http://antigo.anvisa.gov.br/documents/10181/3882585/RDC_429_2020_.pdf/9dc15f3a-db4c-4d3f-90d8-ef4b80537380

C. Emery, A. Lafuma, B. Khoshnood, F. Fagnani, J. Dinet, C. Sermet (2007) Évaluation du coût associé à l'obésité en France. *Médecine des Maladies Métaboliques, (1)* 2, 28-34, doi: 10.1016/S1957-2557(07)88624-X.

Campbell, N., Browne, S., Claudy, M., Mialon, M., Hercberg, S., Goiana-da-Silva, F., & Finucane, F. (2021). The Gift of Data: Industry-Led Food Reformulation and the Obesity Crisis in Europe. Journal of Public Policy & Marketing, 0743915620983842.

Chantal, J.; Fabrice, E.; Hercberg, S. (2018). Front-of-pack Nutri-Score labeling in France: an evidence-based policy. *The Lancet Public Health. 3* (4): e164. doi:10.1016/s2468-2667(18)30009-4.

Dias, M., Lopes, R. (2020) The Age of Protocols: How the COVID-19 Pandemic Reshaped our Society. *EAS Journal of Psychology and Behavioural Sciences*, *2*(5).

Ludwig, D. S., & Pollack, H. A. (2009). Obesity and the economy: from crisis to opportunity. *Jama*, *301*(5), 533-535.

Mathieu-Bolh, N. (2021). The elusive link between income and obesity. Journal of Economic Surveys, 1-34. doi: https://doi.org/10.1111/joes.12458

Ministério da Saúde (2007). *Acordo de Cooperação.* Retrieved on 5 October 2021 from Ministério da Saúde (2007). *Acordo de Cooperação.* Retrieved on 5 October 2021 from dehttp://189.28.128.100/dab/docs/portaldab/documentos/acordodecooperacaoabia_ms.pdf

Ministério da Saúde (2007). Portaria nº 3.092/2007. *Portaria 3092.* Retrieved on 5 October 2021 from de http://189.28.128.100/dab/docs/portaldab/documentos/portaria3092_04_12_07.pdf

Ministério da Saúde (2016) *Promoção da Saúde.* Retrieved on 5 October 2021 from de http://dab.saude.gov.br/portaldab/ape_promocao_da_saude.php?conteudo=reducao

Ministério da Saúde (2018) *Brasil assume meta para reduzir 144 mil toneladas de* Ministério da Saúde (2018) *Brasil assume meta para reduzir 144 mil toneladas de açúcar até 2022*. Retrieved on 4 October 2021 from http://portalms.saude.gov.br/noticias/agencia-saude/44777-brasil-assume-meta-para-reduzir-144-mil-toneladas-de-acucar-ate-2022

Ministério da Saúde (2018) *Documentos.* Retrieved on 5 October 2021 from http://189.28.128.100/dab/docs/portaldab/documentos/promocao/extrato_da_publicacao.pdf

Ministério da Saúde (2020) Plano de ações estratégicas para o enfrentamento das doenças crônicas e agravos não transmissíveis no Brasil • 2021-2030 • Retrieved

on 7 October 2021 from https://antigo.saude.gov.br/images/pdf/2020/October/01/Plano-DANT-vers--o-Consulta-p--blica.pdf

Ministério da Saúde.(2018). *Compromisso: redução de açúcar*. Retrieved on 5 October 2021 from http://portalarquivos2.saude.gov.br/images/pdf/2018/novembro/26/termo-de-compromisso-reducao-acucar.pdf

Nilson E., Andrade R., Brito D., Oliveira M. (2020) Custos atribuíveis a obesidade, hipertensão e diabetes no Sistema Único de Saúde, Brasil, 2018. *Rev Panam Salud Publica, 44*:e32. https://doi.org/10.26633/RPSP.2020.32

OECD (2019), The Heavy Burden of Obesity: The Economics of Prevention, OECD Health Policy Studies, OECD Publishing, Paris, https://doi.org/10.1787/67450d67-en

OECD (2021) Organization for Economic Co-operation and Development (OECD). *Obesity Update 2017*. Retrieved on 6 October 2021 from https://www.oecd.org/health/health-systems/Obesity-Update-2017.pdf

Simoni, M, Dias, M. (2020) Literature Review on Cognitive Behavioral Therapy. *British Journal of Psychology Research, 8*(4), doi: 39-47. doi: 10.6084/m9.figshare.13072643

Simoni, M, Dias, M. (2021) Literature Review on Factors that Impact Burnout Syndrome. *International Journal of Health and Psychology Research, 9*(1), 1-17. doi: 10.6084/m9.figshare.14182517

Vieira, P., Dias, M., Lopes, R., Cardoso, J. (2021) Literature Review on Trust, Psychological Well-Being, and Leadership Applied to the Workplace Commitment. *British Journal of Psychology Research,* 9(2), 20-37, doi: 10.37745/bjpr.2013

Vigitel (2019). Vigilância de fatores de risco e proteção para doenças *Vigitel Brasil 2019*. Retrieved on 6 October 2021 from https://portalarquivos.saude.gov.br/images/pdf/2020/April/27/vigitel-brasil-2019-vigilancia-fatores-risco.pdf

WHO (2021) *Obesity and overweight*. Retrieved on 5 October 2021 from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight