https://repository.uaeh.edu.mx/revistas/index.php./MJMR/issue/archive

Mexican Journal of Medical Research ICSa

Biannual Publication, Vol. 8, No. 16 (2020) 65-71

ISSN: 2007-5235

Overview of the overweight and obesity epidemic in Mexico

Panorama de la epidemia de sobrepeso y obesidad en México

Miriam S. Hernández-Medina [a]

Abstract:

The nutritional transition and the population dynamics are closely related. According to the World Health Organization (WHO), since 1997, overweight and obesity have been recognized as public health problems, both in developed and developing countries, reaching pandemic proportions. Each year around 2.8 million people die because of them. Overweight and obesity are the cause of pathologies such as metabolic syndrome, arterial hypertension, dyslipidemia and coronary heart disease. Mexico is part of the countries that present this pandemic, with the information obtained by the National Nutrition and Health Surveys since 1988 it has been possible to document the permanent tendency to increase Overweight and Obesity. The literature states that the increase in obesity worldwide is closely linked to food policies, understood as one of the structural social determinants of health. Healthy public policies should be formulated to promote the prevention and control of Chronic Noncommunicable Diseases and reorient health systems so that they meet the needs of people suffering from excess body weight. The objective of this paper is to know the situation in the country the regarding the pandemic of overweight and obesity, including the generation of programs, strategies and, public policies which aim to ensure their control and prevention in the Mexican population.

Keywords:

Overweight, Obesity, Epidemic, Prevention Strategies, Public Policies

Resumen:

La transición nutricional y la dinámica poblacional están estrechamente relacionadas. De acuerdo con la Organización Mundial de la Salud (OMS), desde 1997, se ha reconocido al sobrepeso y la obesidad como problemas de salud pública, tanto en países desarrollados como en aquellos en vías de desarrollo, alcanzando proporciones pandémicas, pues cada año mueren alrededor de 2,8 millones de personas a causa de ellas. El sobrepeso y la obesidad son causantes de patologías tales como el síndrome metabólico, la hipertensión arterial, la dislipemia y enfermedades coronarias. México forma parte de los países que presentan esta pandemia, con la información obtenida por las Encuestas Nacionales de Nutrición y Salud desde el año 1988 se ha podido documentar la tendencia permanente al aumento del Sobrepeso y la Obesidad. La literatura plantea que el aumento de la Obesidad en todo el mundo está estrechamente ligado a las políticas alimentarias, entendidas estas como uno de los determinantes sociales estructurales de la salud. Se deben formular políticas públicas saludables que promuevan la prevención y el control de las Enfermedades Crónico no Transmisibles y reorientar los sistemas de salud para que cubran las necesidades de las personas que sufren exceso de peso corporal. El objetivo del presente es conocer la situación existente en el país en torno a la pandemia de sobrepeso y obesidad, incluyendo la generación de programas, estrategias y políticas públicas los cuales tienen el fin de asegurar su control y prevención en la población mexicana.

Palabras Clave:

Sobrepeso, Obesidad, Epidemia, Estrategias de Prevención, Políticas Publicas

[a] *Corresponding author, Fressenius Medical Care of Mexico, Nutrition department, https://orcid.org/0000-0002-2147-426X, Email: miriamsel.ba8@gmail.com*

Received: 01/03/2019, Accepted: 13/08/2019, Published: 05/07/2020

INTRODUCTION

During the second half of the 20th century, the world population experienced demographic changes at an unprecedented rate. Changes in nutrition and population are intimately related in several ways.[1] According to the World Health Organization (WHO), since 1997, overweight (OW) and obesity (OB) have been recognized as public health problems, both in developed and developing countries. These diseases, which are of chronic duration and are defined as complex and heterogeneous clinical entities with a strong genetic component, whose expression isinfluenced by environmental, social, cultural and economic factors, starting at an early age.[2]

At the Bellagio meeting it was mentioned that modern societies seem to be converging on a diet pattern high in saturated fat, refined sugar and low fiber foods, often referred to as the "Western diet." The human diet, activity patterns and nutritional status have undergone a sequence of important changes, defined as general patterns of food use and their corresponding nutrition-associated diseases.[3] OB has reached pandemic proportions since about 2.8 million people die each year because of it. The combination of OW and OB as pathologies has placed them as the fifth risk factor for death in the world.[4]

OB is the cause of pathologies such as metabolic syndrome, arterial hypertension, dyslipidemia and coronary diseases; it is associated with high levels of cellular oxidative damage, due to alterations in the mitochondria. Governments, international partners, civil society, non-governmental organizations, the private sector and the business sector concerning food products have a crucial role in the prevention of both diseases, however, they are also determinants in the promotion of these, therefore, special attention should be paid to the programs and public policies generated by these agencies for the population and health systems to evaluate the preventive effect of these strategies/programs.[5]

Mexico, like other countries, faces the problem of poor nutrition. During the last quarter of a century, the country has been immersed in a dynamic process of epidemiological transition that is characterized by a decrease in mortality rates, an increase in life expectancy, a decrease in the fertility rate and an increase in chronic diseases.[6] Poor nutrition due to excess (OW and OB) increases the risk of chronic diseases and decreases the years of healthy life and productivity, which implies, as well as malnutrition, a high economic cost for the country due to the Direct and indirect costs that cause both diseases.[7]

The objective of the present review is to know the situation in the country regarding the pandemic of overweight and obesity, including the generation of programs, strategies and public policies which aim to ensure their control and prevention in the Mexican population.

OVERWEIGHT AND OBESITY

The WHO defines OW and OB as an abnormal or excessive accumulation of fat, the most common indicator used to identify excess weight is the body mass index (BMI). It is OW when the BMI is equal to or higher than 25, and OB when it is equal to or higher than 30.[8]

The OW is due to the imbalance between the food consumed and physical activity. OB is a complex problem linked to the lifestyle, the environment and the genetic background, as shown in Figure 1.[9] In recent years, different phenotypic forms of obesity have been defined according to the distribution of fat deposition in the body, the age of onset and the associated metabolic complications. It is a chronic disorder, which can sometimes significantly limit the life of the sufferer. Different studies have shown the benefits of moderate but sustained weight loss on associated metabolic complications.[10]

Over the years, numerous hypotheses have been proposed to explain why some people have OW while others remain thin, and why it is so complicated to maintain weight in obese individuals who have lost weight. No theory can explain all manifestations of OB and apply uniformly to all individuals.[11]

Poor nutrition, characterized by unhealthy lifestyles such as high intake of added sugars and excess saturated fats, as well as by the low consumption of fruits and vegetables, coupled with the long time spent in front of television screens, tablets, computers and low physical activity, make people more prone to suffer from OW and OB, while predisposing them to cardiovascular diseases, hypertension and diabetes, among others.[12] When it happens during childhood tends to extend to adulthood, which increases the risk of chronic diseases.[13]

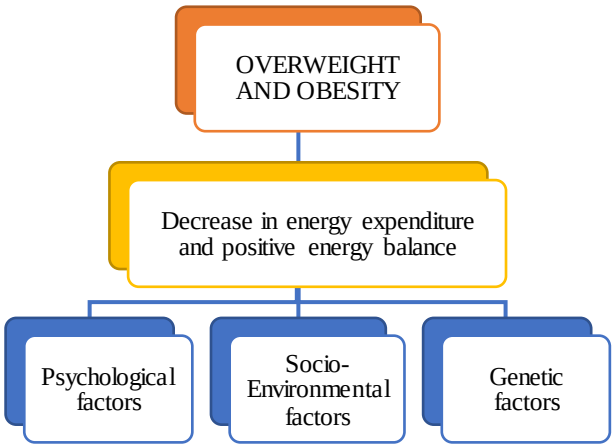

Figure 1. *Main factors that intervene in the development of Overweight and Obesity.*[9]

DIMENSION OF THE PROBLEM OF OVERWEIGHT AND OBESITY

OB is the most frequent metabolic disease in the 21st century, there is no disease that has aroused greater interest in scientists in recent years like this. Forty years ago in the world, the number of people with low weight was much higher than obese people. This situation has been reversed and currently the number of people who suffer from OB, double the people with low weight.[14] If the trend continues, by 2030 more than 40% of the population of the planet will have OW and more than a fifth will suffer from OB.[15]

According to the Food and Agriculture Organization of the United Nations (FAO), in the Americas region, 58% of the population lives with OW and OB (360 million people), being Chile (63 %), Mexico (64%) and Bahamas (69%) those with the highest rates. It should be noted that the increase in OB in Latin America and the Caribbean has a disproportionate impact on women: in more than 20 countries, the female OB rate is 10 percentage points higher than that of men.[16] As for OB in children, the prevalence has increased at an alarming rate, it is estimated that in 2016, more than 41 million children under the age of five worldwide were OW or obese.[17] Observing these figures, it is easy to deduce that this pathology is a serious public health problem since it is an important risk factor for Noncommunicable Chronic Diseases (NCD), which are the ones with the highest burden of morbidity and mortality, not only in Mexico but also in the world.[18]

Since 1980, OW and OB have doubled worldwide, reaching in 2014 more than 1 900 million adults over 18 years with OW, of which, more than 600 million had OB, which implies a prevalence in adults over 18 years of 39% OW and 13% OB. With regard to the child population, there are more than 41 million children under 5 years of age with OW or OB worldwide, which means an increase of close to 11 million in the last 15 years.[19] In most countries of the Americas, a change in eating habits is taking place, which increases the consumption of foods with a dense energy content, rich in saturated fats, sugars and salt. This model, together with the fact that between 30 and 60% of the population do not reach the minimum recommended level of physical activity, contributes to large extent to the high rates of OW and OB in the region.[20]

Mexico has been immersed in this epidemic that affects millions of people. With the information provided by the National Nutrition and Health Surveys since 1988 it has been possible to document the permanent tendency to increase OW and OB,[21] the prevalence of these in all age groups has increased in recent decades, and childhood obesity represents a challenge. In Mexico, the burden of OW and OB is shifting towards groups with a lower socioeconomic level,[22] due to the fact that Mexico is undergoing an epidemiological transition. The prevalence of OB presents differences by socioeconomic level, region, and locality. It is higher in the high socioeconomic level than in the low one, in urban areas compared to the rural ones, and in the northern region of the country in comparison with the south and the center.[6]

According to the National Mid-term Health and Nutrition Survey (ENSANUTMC) 2016, in adults 20 years of age and older the combined prevalence of OW and OB was 72.5%, which shows an increase of 1.3 percentage points compared to the National Survey of Health and Nutrition (ENSANUT) 2012, which is referred to as a non-significant increase, however, these increases have been sustained, showing higher prevalences reported in the first surveys, changes in the last reported surveys they are less evident since the percentage increase is less, this data demonstrates in a tangible way the epidemiological and food transition that the country is going through.[23]

In the State of Hidalgo ENSANUT 2012, reports a prevalence OB of 8.2% in children under five years of age compared to 9.7% registered nationally, 30.4% is in the school-age population, 0.4% above what was reported in 2010.[6] According to the Nutritional Profile in schoolchildren where prevalences of 30% were shown, this fact shows a trend towards stabilization in prevalence in the last two years.[24] In adolescents according to the ENSANUT, in 2012 there was a 31.8% with OB, an insignificant increase in relation to the year 2006 of 31.2%, which in turn is 3 percentage points below the national average of 35%, these results show a slowdown in the speed of increase of OW OB in the state.[6] In the adult population of twenty years old and over, 70.1% of the population has excess weight, below the national average of 71.2%, which places Hidalgo in the 19th place with respect to other entities.[25]

Figure 2 shows the evolution of the prevalence of OW and OB in Mexico, with respect to the evaluations and reports of the national health surveys from 2000 to 2016.

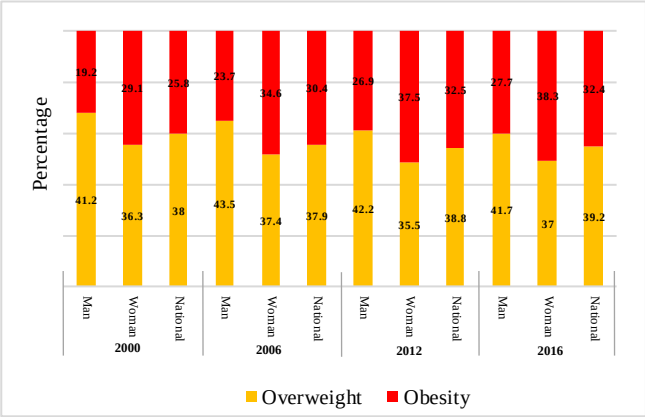

***Figure 2**. Prevalence of Overweight and Obesity in adults by sex of the years 2000, 2006, 2012 and 2016, Mexico.*[6,22,26,27]

SOCIAL DETERMINANTS OF OVERWEIGHT AND OBESITY

Social justice is a matter of life or death. It affects the way people live, the likelihood of getting sick and the risk of dying prematurely,[28] in such a way that the social determinants of health (SDH), that is, the conditions in which the population is born, grows, lives, works and ages, as well as the type of systems used to fight the disease are those that determine inequality and social inequality. These conditions are in turn influenced by political and economic forces in each region.[29]

It has been widely documented that the increase in OB throughout the world is closely linked to food policies, understood as one of the structural social determinants of health. This relationship can be explained by the changes of the neoliberal model and the economic and social policies related to it, spread throughout Latin America in the eighties and put into practice in Mexico since 1983 promoting economic globalization. This model was born with the purpose of achieving continuous economic growth and stability in prices, and to promote the highest levels of welfare for the world population. However, it has not given the conjectured results; from 1982 to the present, in Mexico not only has equity not been promoted, but inequality has been regressed and increased.[30]

In this context, the so-called "food transition" has been favored by this macroeconomic model since it has negatively affected the national and local production and marketing of food and beverages. This, together with the scarce subsidy to local agriculture, the inequality in the distribution of income and the absence of regulation of the food market together with the uncontrolled and unethical media in the advertising and marketing of their products, have shaped the food culture and modified the eating patterns of the Mexican population.[31]

Impact of the Epidemiological and Nutritional Transition with respect to Obesity in the Mexican population

Mexico and many other low and middle-income countries are currently facing a "double burden" of morbidity, the combined existence of malnutrition and OB. The term "obesity in poverty" has been coined to refer to this phenomenon.[6] The nutritional transition experienced by the country has a westernization of the diet, specifically: 1) increase in the availability of low cost processed foods added with high amounts of fat, sugar, and salt; 2) increase in the consumption of fast food; 3) decreased time available for preparing food at home; 4) significantly increased exposure to advertising and industrialized food supply, and 5) a significant decrease in physical activity of the population.[32]

In a recent analysis of the epidemiological transition in Mexico, it was found that NCD caused 75% of the total deaths and 68% of the years of life potentially lost. In Latin American countries, the general prevalence of the metabolic syndrome is 24.9% (range 18.8-43.3%), and is slightly more frequent in women (25.3%) than in men (23.2%), being the age group with the highest prevalence of those over 50 years. The parallel increase in the frequency of obesity and the metabolic syndrome is a worldwide phenomenon and Mexico is not the exception. This epidemiological scenario allows us to measure the severity of OB in Mexico and justifies the management of profitable health programs and projects to successfully resolve this problem.[33]

Estimation of the economic costs of Overweight and Obesity in the Mexican Society

It is estimated that OB accounts for 1 to 3% of total health care expenditures in most countries and that costs will increase rapidly in the coming years due to diseases associated to OB. The economic costs of OB have raised considerable attention in recent years. The cost, or burden of an illness can be measured by the financial impact of related diseases on the health system (direct costs) and by the loss of productivity and quality of life (indirect costs) to society and individuals.[34]

In Mexico, it is estimated that the care of diseases caused by OW and OB has an annual cost of approximately 3500 million dollars. The estimated direct cost of medical care for diseases attributable to OW and OB (cardiovascular, cerebrovascular diseases, hypertension, some cancers, diabetes mellitus type 2). These pathologies cause impoverishment because they reduce labor productivity and cause catastrophic health expenses related to chronic diseases.[32] Based on estimates from the Organization for Economic Cooperation and Development (OECD), an effective prevention strategy would prevent 155,000 deaths per year from chronic diseases in Japan, 75 000 in Italy, 70 000 in England, 55 000 in Mexico and 40 000 in Canada. The annual cost of such strategy would be $12 USD per capita in Mexico, $19 USD in Japan and England, $22 USD in Italy and $32 USD in Canada.[35]

It is from the signing of the North American Free Trade Agreement (NAFTA), that OW and OB in Mexico show a rapid increase, as a result of the change of economic model, of the changes in the conditions of production and demand food, due to migrations from the countryside to urban centers, population growth concentrated to a greater extent in cities, and the so-called food transition. The increase in these pathologies will gradually affect the country's competitiveness, the possibilities of economic development and further weaken the finances of the health sector, of not implementing corrective public policies aimed at regulating the offer and its contents, together with a greater dissemination of information about risks of poor food choices.[36]

STRATEGIES FOR THE PREVENTION AND CONTROL OF OVERWEIGHT AND OBESITY

Comprehensive care of OB requires high-impact interventions that can be applied through a primary care approach that reinforces early detection and timely treatment. To achieve the maximum effect, healthy public policies must be formulated to promote the prevention and control of NCD and reorient health systems so that they meet the needs of people who suffer from excess body weight. The current situation of OW and OB in Mexico requires implementing a comprehensive policy, multisectoral and with effective coordination, to achieve changes in eating patterns and physical activity that allow the prevention of chronic diseases and reducing the prevalence of OW and OB.[33]

In response to the growth of this epidemic, WHO promoted the Global Strategy on Healthy Eating, Physical Activity and Health for the prevention of chronic diseases, to which Mexico joined in 2004. In 2010, it was updated in our Official Mexican Standard (NOM-008- SSA3-2010), in which sanitary criteria are established to regulate the comprehensive treatment of OW and OB, particularly the provisions for medical, surgical and nutritional treatment.[37]

The 2008-2013 Action Plan of the WHO Global Strategy for the Prevention and Control of Non-communicable Diseases establishes as one of its objectives the promotion of interventions to reduce the main modifiable risk factors of noncommunicable diseases, including tobacco use, unhealthy diets, physical inactivity and the harmful use of alcohol.[38] The National Strategy for the Prevention and Control of Overweight, Obesity and Diabetes, which promotes the construction of a national public policy that generates habits of healthy food consumption and the realization of physical activity in the population, involving the public and private sectors, as well as civil society.[25]

Mexico, despite being considered one of the pioneer countries in the establishment of taxes on sugary drinks in 2016 declared an epidemiological alert after realizing its critical situation, with more than 72% of its adult population with OW22, paradoxically, the national health budget has progressively received cuts since 2013, constituting 3.1% of the total budget in 2013 and only 2.3% in 2018, a decrease of US $5.1 billion.[39]

The funding allocated to prevent and control OB has been even grimmer, never reaching 1% of the health budget. This annual reduction in funds illustrates Mexico's unwillingness to critically address obesity. Protecting the design and implementation of public health nutrition policies in the face of conflicts of interest and industry interference is of utmost importance to generate an improvement in the prevention and treatment of OB.[40]

Public policies for the care and prevention of overweight and obesity

Mexican food policies and programs have been evolving since 1922; they began to generate various assistance programs according to the social context that was lived in the country, which is why they tended to solve problems of nutritional deficiencies, however, due to the epidemiological and nutritional transition that has been experimented, in the last decades, to implement actions that solve problems not only of deficiencies but also of excesses.[41]

There is a consensus among public health experts interested in the design and application of obesity prevention policies that to achieve this purpose, it is essential to act on the environment and on the individual. The adoption of healthy eating and physical activity behaviors for the prevention and control of obesity requires environments in which healthy options are the norm; that is, they are available, accessible and easy to adopt.[42]

Two of the most frequently used public health policies to fight against obesity are the implementation of educational campaigns (food orientation) and medical and nutritional counseling programs based on behavioral change, which usually includes recommendations for lifestyle changes, nutritional therapy with various degrees of caloric restriction and increased physical activity. One of the limitations of strategies focused on the individual level is that, by not considering the environment to which people are exposed, they tend to underestimate the challenge of carrying them out in real life.[33] The promotion of healthy environments is an important tool that can address different areas associated with the dynamics of OW and OB and that offers a vast list of opportunities that would help mitigate the problem.[42]

The established public policies include strategies and national agreements for the prevention, treatment and control of overweight and obesity, focused on the business sector. The government has promoted laws such as the application of taxes on sugary drinks, regulation regarding the time and manner of advertising food and beverages, in addition to official rules on labeling these products. To assess the impact of the tax on sugary beverages, household expenditure and sales figures for these beverages have been used as indicators: although it is debatable to relate economic data with epidemics. In addition, although the consumption of sugar-sweetened beverages has been reduced, spending on households has not declined accordingly.[43]

It is necessary, in addition to what is implemented by the business and government sector, to carry out pedagogical actions in the educational stages of training since in accordance with whas was mentioned by FAO, promoting nutrition through schools can create benefits that extend more beyond the classrooms and the playground, to improve the health and nutritional well-being of homes and communities.[44]

CONCLUSION

In accordance with the aforementioned, it can be concluded that at a global level, public policies have been established regarding the care, control and prevention of OB, such as the strategies and

governmental laws regulating food and beverages, however, today, the situation is still alarming as shown by the statistical data of the population who suffers from OW or OB.

By changing the traditional pedagogical method to a constructivist one, we could generate positive results in terms of improving habits, practices and behaviors related to food, and physical activity, from a stage of development in which it is essential to promote health care, in addition to the modification of the school, social and family contexts, by increasing the supply of healthy products. These are factors that could generate an important impact in the acquisition of healthy behaviors related to food and physical activity, not only in pediatric stages but in all stages of human development.

REFERENCES

1. Figueroa R, Rodriguez-Garcia R. Nutrition and Population. Nutrition: A Foundation for Development. 1st. ed. Ginebra, Suiza: ACC/SCN; 2002: 1 - 4.

2. Programa Sectorial de Salud. Programa de Acción Específico. Prevención y Control de la Obesidad y Riesgo Cardiovascular 2013 – 2018 [Document on the de internet]. 2013. [Updated March 12, 2018; cited 10 Feb 19]. Available from: http://www.cenaprece.salud.gob.mx/descargas/pdf/PAE_PrevencionControlObesidadRiesgoCardiovascular2013_2018.pdf

3. Popkin BM. An overview on the nutrition transition and its health implications: The Bellagio meeting. Public Health Nutr. 2002; 5(1A): 93 – 103.

4. Organización Mundial de Salud. 10 datos sobre la obesidad. [Document on the internet]. 2017. [Updated February 10, 2019; cited 8 Feb 19]. Available from: https://www.who.int/features/factfiles/obesity/es/

5. Cáscales Angosto M. Obesidad: Pandemia del siglo XXI. [Document on the internet] [Updated September 12, 2018; cited 2 Feb 19]. Available from: http://www.analesranf.com/index.php/mono/article/view/1566/1650

6. Gutiérrez JP, Rivera-Dommarco J, Shamah-Levy T, Villalpando-Hernández S, Franco A, Cuevas-Nasu L, et al. Encuesta Nacional de Salud y Nutrición 2012. Resultados Nacionales. Cuernavaca, Mexico: Inst. Nac. Salud Publ. 2012; 180 – 186.

7. Shamah Levy T. El sobrepeso y la obesidad: ¿son una situación irremediable? Bol. Med. Hosp. Infant. Mex. 2016; 73(2): 1- 20.

8. Organización Mundial de la Salud. Estrategia mundial sobre régimen alimentario, actividad física y salud. Sobrepeso y Obesidad Infantiles. [Document on the internet]. 2018. [Updated November 21, 2018; cited 31 Jan 19]. Available from: http://www.who.int/dietphysicalactivity/childhood/es/

9. Kathleen Mahan L, Scott-Stump S, Raymond L. Nutrición en el Control de Peso. In Raymond L, Couch S, editors. Krause Dietoterapia. 13th ed. Barcelona, España: Elsevier; 2012: 462 – 484.

10. Mataix J. Obesidad. In Salvado J. Tratado de Nutrición y Alimentación. Barcelona, España: MMX Editorial Oceano; 1433 – 1467.

11. Organización Mundial de la Salud. Obesidad y sobrepeso. Nota descriptiva N°311. [Document on the internet]. 2015. [Updated January 9, 2019; cited 12 Feb 19]. Available from: http://www.who.int/mediacentre/factsheets/fs311/es/

12. Secretaria de Integración y Desarrollo del Sector Salud. Informe sobre la salud de los mexicanos 2015. Diagnostico general de la salud poblacional. [Document on the internet]. 2015. [Updated January 30, 2019; cited 3 Feb 19]. Available from: www.dged.salud.gob.mx/contenidos/dedss/issm2015.html

13. Alvear-Galindo MG, Yamamoto-Kimura LT, Morán-Álvarez C, Solís-Días MG, Torres-Durán PV, Juárez-Oropeza MA, *et al*. Consumo alimentario dentro y fuera de la escuela. Rev. Med. Inst. Mex. Seguro Social. 2013; 51(4): 1 – 34.

14. NCD Risk Factor Collaboration. Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 populationbased measurement studies with 19.2 million participants. Lancet. 2015; 100(25): 1366-1396.

15. Organización Mundial de la Salud. Proyecciones en base al incremento de las prevalencias de obesidad anuales (1975-2014) otorgados por la OMS. Global Health Observatory data. Country statistics. [Document on the internet]. 2015. [Updated December 11, 2018; cited 31 Jan 19]. Available from: http://www.who.int/gho/en/

16. Organización de las Naciones Unidas para la Alimentación y la Agricultura. Panorama de la Seguridad Alimentaria y Nutricional en América Latina y el Caribe 2016. FAO. [Document on the internet]. 2016. [Updated December 2, 2018; cited 4 Feb 19]. Available from: http://www.fao.org/americas/publicaciones-audiovideo/panorama/2016/es/

17. Organización Mundial de la Salud. Comisión para acabar con la obesidad infantil. Datos y cifras sobre obesidad infantil. [Document on the internet]. 2018. [Updated January 18, 2019; cited 10 Feb 19]. Available from: http://www.who.int/end-childhood-obesity/facts/es/

18. Organización Mundial de la Salud. Comparative quantification of health risks. [Document on the internet]. 2004. [Updated January 11, 2019; cited 29 Jan 19]. Available from: http://apps.who.int/iris/bitstream/handle/10665/42792/9241580348_eng_Volume1.pdf;jsessionid=12E197E07A4155BA3B36772A755CD084?sequence=1

19. Malo-Serrano M, Castillo MN, Pajita DD. La obesidad en el mundo. An. Fac. Med. 2017; 78(2): 173 – 178.

20. Organización Panamericana de la Salud. Métodos Poblacionales e individuales para la prevención y el tratamiento de la diabetes y la obesidad. [Document on the internet] [Cited 12 Feb 19]. Available from: http://bvs.minsa.gob.pe/local/minsa/1784.pdf

21. Hernández-Cordero S, Cuevas-Nasu L, Morán-Ruán MC, Méndez-Gómez HI, Ávila-Arcos MA, Rivera-Dommarco JA. Overweight and obesity in Mexican children and adolescents during the last 25 years. Nutr. Diabetes. 2017; 7(3): 46 – 60.

22. Shamah Levy T, Cuevas Nasu L, Rivera Dommarco J, Hernández Ávila M. Encuesta Nacional de Salud y Nutrición de Medio Camino 2016. Salud Publica Mex. 2018; 60(3): 244 – 253.

23. Secretaría de Salud. Estrategia Nacional para la prevención y control del sobrepeso, obesidad y la diabetes. Gobierno Federal. [Document on the internet]. 2013. [Updated January 10, 2019; cited 15 Feb 19]. Available from: https://www.gob.mx/cms/uploads/attachment/file/200355/Estrategia_nacional_para_prevencion_y_control_de_sobrepeso_obesidad_y_diabetes.pdf

24. Galván M, Amezcua-González A, López-Rodríguez G. Perfil Nutricional de Escolares de Hidalgo 2010: Estado de Nutrición y Variables del Contexto Familiar, Escolar e Individual. Pachuca, Hidalgo: Universidad Autónoma del Estado de Hidalgo; 2011: 39 – 58.

25. Secretaria de Salud del Estado de Hidalgo. Estrategia Estatal para la Prevención y el Control del Sobrepeso, la Obesidad y la Diabetes. [Document on the internet]. 2014. [Updated January 20, 2019; citado 12 Feb 19]. Available from: http://www.cenaprece.salud.gob.mx/programas/interior/adulto/descargas/pdf/EstrategiaSODHidalgo.pdf

26. Olaiz G, Rojas R, Barquera S, Shamah T, Aguilar C, Cravioto P, *et al*. Encuesta Nacional de Salud 2000. La salud de los adultos. Cuernavaca, Morelos, México: Inst. Nac. Salud Publ. 2003; 2: 37 – 46.

27. Olaiz-Fernández G, Rivera-Dommarco J, Shamah-Levy T, Rojas R, Villalpando-Hernández S, Hernández-Avila M, *et al*. Encuesta Nacional de Salud y Nutrición 2006. Cuernavaca, México. Inst. Nac. Salud Publ. 2006; 85 – 103.

28. Secretaria de Salud. Acuerdo Nacional para la Salud Alimentaria Estrategia contra el sobrepeso y la obesidad. [Document on the internet]. 2010. [Updated January 14, 2019; citado 18 Feb 19]. Available from: http://activate.gob.mx/Documentos/ACUERDO%20NACIONAL%20POR%20LA%20SALUD%20ALIMENTARIA.pdf

29. Dávila-Torres J, González-Izquierdo JJ, Barrera-Cruz A. Panorama de la obesidad en México. Rev. Medica Inst. Mex. Seguro Soc. 2015; 53(2): 240 – 249.

30. Organización Mundial de la Salud. Subsanar las desigualdades en una generación. Comisión sobre los Determinantes Sociales de la Salud. [Document on the internet]. 2009. [Updated January 21, 2019; cited 20 Feb 19]. Available from: http://www.who.int/social_determinants/thecommission/finalreport/es/

31. Díaz-Perera FC, Bacallao GC, Alemany PC. Relación entre la dimensión socioeconómica y la dimensión salud en familias cubanas. Rev. Cub. Salud Publ. 2012; 38: 56 – 71.

32. Tello C. Sobre la desigualdad en México. 2nd ed. México: Universidad Nacional Autónoma de México. 2012: 227- 254.

33. Campos Nonato I, Cuevas Nasu L, González Castell L, Hernández Bafrrera L, Shama Levy T, de Cosío Martínez T, *et al*. Epidemiología de la obesidad y sus principales comorbilidades en México. In: Rivera Dommarco J, Colchero MA, Fuentes ML, González de Cosío Martínez T, Aguilar Salinas CA, Hernández Licona G, *et al*. editors. La obesidad en México. Estado de la política pública y recomendaciones para su prevención y control. 1st ed. Cuernavaca: Inst. Nac. Salud Publ.; 2018.

34. Bahia L, Coutinho ES, Barufaldi LA, Abreu GA, Malhão TA, de Souza CP. The costs of overweight and obesity-related diseases in the Brazilian public health system: cross-sectional study. BMC Public Health. 2012; 12: 440.

35. Franco S. Obesity and the Economics of Prevention: Fit not Fat. USA: Organization for the Economic Cooperation and Development; 2010; 108 – 124.

36. Torres F, Rojas A. Obesidad y salud pública en México: transformación del patrón hegemónico de oferta-demanda de alimentos. Rev. Probl. Desarrollo. 2018; 193(49): 46 – 52.

37. Secretaría de Salud [México] Norma Oficial Mexicana NOM-008-SSA3-2010, Para el tratamiento integral del sobrepeso y la obesidad. México: Diario Oficial de la Federación; 2010.

38. World Health Organization. 2008-2013 action plan for the global strategy for the prevention and control of noncommunicable diseases: prevent and control cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. Geneva: World Health Organization; 2008.

39. Secretaría de Hacienda y Crédito Público. Análisis Administrativo Económico del Gasto Programable, Presupuesto de Egresos de la Federación, 2013-2018. [Document on the internet]. 2013. [Updated January 15, 2019; cited 21 Feb 19]. Available from: https://ppef.hacienda.gob.mx/

40. Barquera S, White M. Treating Obesity Seriously in Mexico: Realizing, Much Too Late, Action Must Be Immediate. Obesity. 2018; 26(10): 34 – 50.

41. Barquera S, Rivera J, Gasca A. Políticas y programas de alimentación y nutrición en México. Salud Publica Mex. 2001; 43(5): 130 – 142.

42. Rivera J, Hernández M, Aguilar C, Vadillo F, Murayama C. Obesidad en México. Recomendaciones para una política de estado. 1st ed. México: Universidad Nacional Autónoma de México; 2012.

43. Food and Agriculture Organization of the United Nations. Foro Global sobre Seguridad Alimentaria y Nutrición. [Document on the internet] [Updated January 15, 2019; cited 22 Feb 19]. Available from: www.fao.org/fsnforum/es

44. Food and Agriculture Organization of the United Nations. Grupo de Educación Nutricional y de Sensibilización del Consumidor. La importancia de la Educación Nutricional. [Document on the internet]. 2011. [Updated January 21, 2019; cited 24 Feb 19]. Available from: http://www.fao.org/ag/humannutrition/3177902a54ce633a9507824a8e1165d4ae1d92.pdf