

The social and economic costs of obesity in Latin America: a call to action



This report is inspired by the Sodexo Institute for Quality of Life round-table 'Dialogue' that took place near Santiago de Chile on 24 November 2016 and whose participants were:

Colegio de Nutricionistas Universitarios de Chile

Dr. Samuel Durán, Chair

Ministry of Health, Mexico

Zaira Valderrama, Under-Secretary of Cross-sector Policy in the Health Promotion Department

Sociedad Chilena de Obesidad

Dr. Alex Valenzuela Montero, Chair

Sodexo

Paulina Hernández, Product Manager, 'Vivir Bien' Program, Sodexo in Chile
Thomas Jelley, Director, Sodexo Institute for Quality of Life

Universidad de Chile

Dr. Alfonso Valenzuela B

Dr. Fernando Vio

Professors in the Institute of Nutrition and Food Technology (INTA)

Universidad del Desarrollo and Clínica Alemana, Chile

Rinat Ratner, Director of Nutrition and Dietetic studies in the Faculty of Medicine

Universidad Mayor and Clínica MEDS, Chile

Dr. Sandra Marcela Mahecha Matsudo, Academic Director of the Postgraduate Faculty of Science and the Promotion of Physical Activity

Universidad Mayor, Chile

Daniela Godoy, Assistant Researcher and Professor

Universidad Nacional Autónoma de México UNAM¹

Workplace Wellness Council of Mexico²

Dr. Rafael Álvarez Cordero, ¹Surgeon, ²Representative

University of São Paulo, Hospital of the Clinics of the Medical Faculty, Brazil

Dr. Maria Edna de Melo, Associate of the Obesity and Metabolic Syndrome Group

Introduction

There are more people who are obese than underweight in every region of the world except for parts of sub-Saharan Africa and Asia. The World Health Organisation estimates that in 2014 there were over 600 million obese adults among almost 2 billion overweight worldwide and 41 million children under the age of 5 were overweight or obese. Many low and middle-income countries face a 'double burden': as they continue to tackle infectious diseases and under-nutrition, they are also experiencing a rapid rise in non-communicable disease risk factors such as obesity and overweight, particularly in urban settings. Indeed, it is not uncommon to find under-nutrition and obesity co-existing within the same country, the same community and even the same household¹. In Latin America, as elsewhere, it is little surprise to find that overweight and obesity have followed a number of population level developments including:

- rural-urban migration
- changes in the nature of work (less manual for a growing middle-class)
- increased access to inexpensive processed food
- other changes in lifestyle such as screen-based entertainment

What is remarkable is the speed of change. For example, Chile has experienced major demographic, epidemiological and nutritional transitions since 1960 when 37% of children under 6 years were under the normal weight. By 2000, the figure was 2.9% but some third of children under 6 are now malnourished due to being overweight². Almost one in every four children aged 6 to 7 years old in Chile is obese³ and 67% of people aged 15 years and over are overweight or obese⁴.

In Mexico, the number of hungry people has fallen by 30 million since 1991 but Mexico now ranks second (after the US) as the country with the highest proportion of obese people; 70% of Mexican adults are overweight and over 30% of adults are obese⁵.

In Brazil, the prevalence of overweight and obesity has risen faster than the prevalence of hunger has fallen since the 1970s⁶ and the phenomenon of overweight and underweight coexisting in the same household has been noted since the year 2000⁷. It is estimated that 58% of adults in Latin America and the Caribbean are overweight⁸ compared to a global average of 34%⁹ and 23% are obese¹⁰.

There is no shortage of statistics on obesity in Latin America. They paint a complex picture of development in relation to nutrition and diet, behaviour, public policy, marketing, advertising and health programs in the region. To address obesity, governments, the private sector and civil society need to take action across regulation, structural measures, behaviour change initiatives, public policy, social marketing, advertising and health programs. To gain an understanding of obesity in Latin America, its economic and social costs, this report will consider:

- what is 'obesity'?
- what are the social and economic costs of obesity and where are they seen?
- what does 'obesity' mean in Latin America?
- what is the difference between adult obesity and child obesity?
- what are the responsibilities and successes of the public, private and NGO sectors?
- what are the most significant risks and opportunities?
- what should be done? A call to action

This report reflects the broad range of responses to these questions by participants with relevant knowledge, experience and insight, from academia (the disciplines of biochemistry, endocrinology, nutrition and dietetics, sports medicine, surgery, public health and public policy), also from civil society and business. While some presentation of obesity in Mexico, Chile and Brazil is inevitable, this report's ultimate purpose is to provide a sense of what is possible to avoid the seemingly inevitable further growth of obesity in Latin America, and serve as a call to action.

What is 'obesity'?

'Obesity' was described as a "global epidemic" by the World Health Organisation in 2003¹¹ and, between 1980 and 2014, the worldwide prevalence of obesity more than doubled¹². In practical terms, the WHO defines overweight and obesity as "*abnormal or excessive fat accumulation that may impair health*". It refers to 'body mass index' (BMI) as a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults and calculated as a person's weight in kilograms divided by the square of their height in meters (kg/m²). An adult with a BMI of 25 or more is said to be overweight and 30 is the threshold for obesity. BMI is a useful population-level measure as it is the same for adult men and women of all ages but has to be treated with some caution when comparing different individuals as it may not refer to the same degree of fatness¹³.

Obesity arises from a long-term imbalance between the energy derived from the food we eat and the energy we expend. It is closely linked to the social determinants of health (income, education, race, location), nutrition (income, maternal education, rural / urban living) and behaviours^{14,15}. No single factor explains child obesity but many complementary changes have simultaneously increased children's energy intake and decreased their energy expenditure. These changes include high-calorie food and drink availability at school, transportation to school, parental food intake, food marketing and targeted advertising^{16,17}, and increasingly sedentary lifestyles¹⁸.

Many additional putative factors that contribute to an increase in the prevalence of obesity and low treatment success rates, and which illustrate the remarkable complexity involved include: reduced sleep, industrially produced endocrine disruptors, lower levels of smoking, more widespread indoor heating and air conditioning, the use of pharmaceutical products, a rise in maternal age at childbirth, *in utero* and intergenerational effects¹⁹.

Previously considered a cardiovascular risk factor, obesity is now classified by some as a disease, and genetics²⁰ are thought to influence between 40% and 70% of a person's BMI²¹. In a 2008 study of twins aged 7 and 10 years in the UK, BMI and obesity were found to be only relatively modestly influenced by environmental factors; the researchers concluded that it is strongly influenced by genetic predisposition but "*obesity is not a disorder that is etiologically distinct from normal variation in BMI*"²². If some children are more predisposed to obesity than others, there are implications for questions of responsibility or 'blame', for the range of interventions needed to tackle obesity, and the relative ease with which children will respond²³.

An *Obesity Society* 'infographic' that sets out many potential contributors to obesity both inside and outside of the individual can be found online **here**.

What are the social and economic costs of obesity and where are they seen?

In terms of health, overweight and obesity are major risk factors for non-communicable diseases such as cardiovascular diseases, diabetes, musculoskeletal disorders, some cancers including breast, ovarian, prostate, liver, gallbladder, kidney, and colonic cancer. Childhood obesity is linked to a greater likelihood of obesity, premature death and disability in adulthood. Obese children also experience breathing difficulties, a greater risk of fractures, hypertension, early markers of cardiovascular disease, insulin resistance (even in pre-school children²⁴) and psychological effects²⁵ e.g. from bullying / ostracism. While obesity is more widespread among poorer people in countries such as Chile and

Mexico, it transcends all socio-economic groups in Latin America.

However, in Latin America as in other parts of the world, awareness of the economic and social impacts of obesity is low though the costs are already large and rising:

- in Chile, the costs arising from obesity were estimated to account for 0.54% of GDP in 2016 (and set to treble by 2030)²⁶ and obese workers are reported to have been estimated to be six times more costly than those of regular weight owing to factors such as absenteeism and loss of productivity²⁷. The prevalence of obesity among children has risen from 5.0% among 2 to 5 year-olds in 1985²⁸ to 10.3% in the under 6 year olds by 2013²⁹.
- in Mexico, 13 BMI-related diseases are estimated to have cost the economy US\$806 million in 2010 rising to US\$1.2 billion by 2017 and in 2008 the loss of productivity owing to early death from overweight and obesity is estimated at just under US\$2 billion³⁰. The broader economic impact of obesity in Mexico represents 2.5% of GDP³¹. Diabetes - for which obesity is a contributing factor - accounts for 14% of all deaths³². Among primary school children, the incidence of obesity more than quadruples from 2% in the first year to 9% in the last³³. Only 17% of children aged 10 to 14 years old achieve the level of physical activity recommended by the World Health Organisation but 73% watch two or more hours of television per day³⁴.
- in Brazil, the healthcare costs associated with obesity are expected to double from US\$5.8 billion in 2010 by 2050³⁵ and its economic impact is estimated at 2.4% of GDP³⁶.

What does 'obesity' mean in Latin America?

A large portion of the population in Latin America does not consider obesity to be an important or urgent problem. In some countries, including Chile, lack of access to healthy nutrition and places to engage with it, low levels of physical activity and awareness are particularly common among the most vulnerable i.e. those with lower levels of educational attainment income. Low levels of awareness and perception overall can be explained through a variety of factors, such as:

- obesity is not perceived as a threat to quality of life that requires immediate attention because it is not a painful or acutely debilitating health condition in most cases
- in Chile, for example, some 70% of workers fail to appreciate their true weight, whether above or below regular weight³⁷. Obesity is often only addressed as a perceived priority if its consequences are immediately identifiable by those concerned e.g. cases of obesity-related school

playground bullying. For many, the absence of 'immediacy' relegates questions of overweight and obesity down the personal agenda so they are given little or no attention, time or resources

- in Mexico, to be overweight is indicative of strength, it is a sign of empowerment that suggests – as in other Latin American countries – membership of a higher socio-economic group and / or greater virility. However, according to the 2016 national survey of health and nutrition, over 95% of participants linked obesity to diabetes, 80% to cancer, over 95% to hypertension, heart disease and strokes, and 97% recognised that obesity is serious or very serious³⁸
- in Brazil, there is a perception that obesity is an individual 'lifestyle' choice
- in some communities, there is a religion-based fatalistic dimension to individuals' approach to health

As increasingly large proportions of many populations become overweight or obese, it is becoming the new 'normal' so individual recognition and perception is diminishing further still.

Obesity in adults and child obesity: what is the difference?

As the economic and social costs of obesity are better known, questions inevitably arise about the most efficient way to reduce them. In the experience of some, programs that aim to treat overweight and obesity in adults simply do not work; people either fail to complete programs or revert to their previous state within two or three years. Behaviour change in adults is very difficult to maintain.

This has led to calls for resources to be focused instead on education in schools to prevent overweight and obesity at the earliest opportunity, at a time when habits around food, drinks and physically active play are still being formed and financial constraints feature less. Action and education to manage the risk of obesity can start even before birth in relation to women's weight pre and during pregnancy; maternal obesity and diabetes are thought to be significant risk factors for later obesity and insulin resistance in their offspring^{39, 40}.

Early prevention or intervention has a return over the life-course but there is no simple 'either / or' choice. Obese adults with diabetes need medical care and adults generally have a very strong influence on children - 17% of parents in scope in Mexico refused to let their child be measured and weighed; adults' opinions and habits shape those of children.

What are the responsibilities and successes of the public, private and NGO sectors?

In light of the public awareness and perception challenges set out above, the public sector's first responsibility is to deliver policies and regulation in favour of *sustained* healthy nutrition environments and behaviour change. However, in common with other long-term public health challenges, obesity suffers from an ebb and flow of attention and resources as governments change, and obesity programs are not considered vote-winners.

From a structural perspective, obesity is all too often considered a matter for ministries of health though it requires concerted effort and collaboration, shared objectives and accountability with others such as ministries of education, agriculture, finance, sport and leisure, work, and the regulators for advertising and marketing standards.

In public policy, tackling obesity is not so much a challenge for lack of knowledge but for failure to organise resources to shift the discourse and intervention paradigm. For instance, where initiatives are in place, evaluation (as opposed to simple enumeration) is often absent or poor. *Progress and outcome* indicators that are not just based on weight but also behaviour to inspire action, to recognise performance and make sense at individual, community (including schools and the workplace environment) and population level are lacking.

Across Latin America, the majority of most people's food intake is from industrial production systems and includes a growing proportion of processed salts, sugars and fats. The food industry has a role to play, a responsibility, and there is significant scope for it to make a valuable contribution to tackling obesity:

- people eat what the food industry supplies and their demand is shaped through traditional marketing but also increasingly sophisticated neuroscience. For example, the use of MRI techniques can help producers to understand how the brain responds to different combinations of fats, salts and sugars. The possibility of seeing how they stimulate the release of dopamine - an endorphin linked to wanting and ultimately addiction - gives the food industry the opportunity to understand better the effects of food products and consider reformulation accordingly.
- some combinations of fats are deemed necessary e.g. to stop a biscuit from crumbling apart. Do such instances present highly marketable opportunities for reformulation breakthrough pioneers?

- very few nutritionists are currently employed in industrial food product design as compared with food engineers and there is little, if any, collaboration with the public sector. To develop and value the role of nutritionists more while increasing inter-sector stakeholder engagement could represent opportunities to demonstrate transparency, build trust and reduce confrontation.
- the urgent need to promote or 'sell' health – as desirable and possible for the average consumer - represents a reversal of the paradigm according to which profit is incompatible with health with enormous potential.

Non-governmental organisations (NGOs) have a part to play as they are often more trusted than the public sector or the private sector, and sometimes have very intimate knowledge of a specific population (e.g. pregnant women) or geographic community. NGOs are also known for their campaigning expertise. However, in the broader civil society, especially in the academic and scientific community, there is a challenge and a risk associated with funding, transparency and the perceived impartiality of research. Companies commission and use research in fields related to obesity, they set up non-commercial organisations, lobby, launch initiatives and events. There is a shared responsibility among all sectors to mitigate the risk that consumers are given reason to believe that we have entered an era of 'post-truth' science and research which means they should close their ears to everything.

While the social and economic costs of obesity are forecast to increase over time, we should not ignore what is being achieved. For example, Mexico is hailed for its 'soda tax' of approximately 10% (at 2013 prices) that came into force in 2014 and is said to have reduced sugar-sweetened soft drink consumption by 6% relative to the counterfactual in the first year with the greatest reductions seen in households of lower socioeconomic status⁴¹. Mexico is also considering a food labelling law similar to that in force in Chile since June 2016. This law regulates marketing and advertising to children up to 14 years old of food products that must carry a 'high in' saturated fats / sugar / salt /calories label. The law bans the sale of any of these products in schools. Early results in Chile are encouraging: in a study of 1,067 adults by the Instituto de Comunicación e Imágen, the University of Chile found that over 90% of participants had a good or very good view of the new front-of-pack labelling and restrictions on the sale of 'high in' foods in schools. Further, 44% of participants said that they compared food and drink front-of-pack labelling indicating products with critical nutrient composition when grocery shopping and 68% said that this comparison influenced their purchasing decisions⁴².

What are the most significant risks and opportunities?

Many of the most significant risks have already been referred to above and include:

- a failure to reduce highly-processed food consumption and sugar-sweetened drink consumption, especially among the less educated and lower income population
- a failure to increase food security and access to fruit and vegetables among the less educated and lower income population
- a failure to address contemporary cultural norms, awareness and perception including through marketing
- a failure to address obesity in concert through effective policies and programs across public ministries
- a failure to invest in early years education and prevention

A further risk is that obesity is seen only as a matter of nutrition when it is defined as a long-term imbalance between the food we eat *and the energy we expend*; to ignore the contribution of increasingly sedentary lifestyles is to misunderstand the challenge. In a recent mixed income 12 country study of over 6,000 children aged 9 to 11 years old, researchers found moderate to vigorous physical activity and television viewing (an aspect of sedentary behaviour) among correlates of obesity. They found “robust associations”⁴³ between lifestyle behaviour and obesity, and that approximately 90% of the variation in obesity levels in their research sample could be attributed to individual level risk factors including physical activity and television viewing in particular. However, there is currently no social indignation around sedentary lifestyles in Latin America and very little awareness of or alignment with the ecological model of physical activity which consists of:

- intrapersonal factors based on the individual’s knowledge, attitudes and behaviours, also their gender and age
- social surrounding factors including public, workplace and school policies, family and friends’ support of physical activity
- environmental factors related to both the natural and the built environment

From this model it is clear that the challenge of insufficient physical activity is a widely shared burden that no individual should carry alone: it is up to them, their family, and their social, work / school relations within the context of their environment. If well-leveraged, the numerous and diverse factors in the model represent a wealth of opportunity to prevent and tackle obesity.

What should be done? A call to action

Obesity trends in Latin America continue to justify the label 'epidemic' and the hurdles set out in this report remain. They can be summarised as:

1. a lack of perception and awareness of overweight and obesity
2. widespread access to highly processed food and drink combined with targeted marketing
3. inadequate access to nutritious food and drink among the less educated and lower income population
4. inadequate governance and a lack of cross-sector collaboration
5. growing risks concerning transparency and the perceived integrity of stakeholders

Diet-specific approaches have been researched leading to the conclusion that interventions in schools, via subsidies and taxes, and through labelling, can have an impact thanks to four key mechanisms: providing an enabling environment for learning healthy preferences, overcoming barriers to the expression of healthy preferences, encouraging people to reassess existing unhealthy preferences at the point-of-purchase, and stimulating a food-systems response⁴⁴. An approach that goes beyond diet is found in the 2016 recommendations of the World Health Organisation that also include e.g. the promotion of physical activity and reduction of sedentary behaviours in children and adolescents, the integration of guidance to reduce the risk of childhood obesity in antenatal and maternal care, early childhood guidance and support on physical activity and sleep⁴⁵.

For a lifestyle underpinned by the adoption and maintenance of physical activity, awareness and use of the ecological model of physical activity set out above can be adapted to all life stages and any location. To consider weight control, the prevention of obesity or a healthy lifestyle without regular physical activity is to ignore a fundamental aspect of our lives. Physical activity is associated with the prevention, control and treatment of many chronic illnesses; it not only increases physical and functional capacity but also mental health, cognitive ability and human quality of life.

At a high level of abstraction, the hurdles in evidence are not specific to obesity. They are shared with other challenges such as demographic change and climate change, all of which:

- need a combination of planning for the long term *and* immediate action
- present population level risks and require individual, community *and* population level engagement
- are highly political and include significant resource allocation trade-offs though not one of them is a majority vote winner
- involve a wealth of data and empirical evidence but face great difficulty in shaping a narrative discourse that is capable of serving them adequately

One of the best ways to tackle obesity in Latin America may be to look ‘beyond the navel’ - to climate change and demographic change - to work together and achieve the *popular support* necessary to inspire *new forms of governance* that will feel *empowered* to address these pressing 21st century challenges to our Quality of Life. Initial discussion points could include:

1. what examples exist of communications / marketing that have inspired individual awareness and sustained behaviour change in relation to obesity / demographic change / climate change? What do these examples share in common?
2. what examples exist of popular support that has inspired public policy-makers to feel empowered in relation to these challenges / others that are similar?
3. what would a framework for intelligent governance look like? What examples already exist and what have they achieved?

References

1. World Health Organisation, Obesity and Overweight Fact Sheet, updated June 2016, <http://www.who.int/mediacentre/factsheets/fs311/en/>, (accessed 12 January 2017).
2. C. Yáñez, 'Estudio sitúa a Chile entre los 10 países del mundo con más obesos menores de 20 años'. La Tercera, 8 June 2014, <http://www.latercera.com/noticia/tendencias/2014/06/659-581549-9-estudio-situa-a-chile-entre-los-10-paises-del-mundo-con-mas-obesos-menores-de-20.shtml>, (accessed 17 January 2017).
3. Plan Contra la Obesidad Estudiantil; Junta Nacional de Auxilio Escolar y Becas, <https://www.junaeb.cl/contralaobesidad/>, (accessed 30 January 2017).
4. Government of Chile, Ministry of Health, 'Encuesta Nacional de Salud ENS Chile', 2010, p.17, <http://web.minsal.cl/portal/url/item/bcb03d7bc28b64dfe040010165012d23.pdf>, (accessed 30 January 2017).
5. OECD, 'Obesity and the Economics of Prevention: Fit not Fat – Key Facts, Mexico Update 2014', https://www.oecd.org/mexico/Obesity-Update-2014-MEXICO_EN.pdf, (accessed 13 January 2017).
6. A. Arbex et al., 'Obesity Epidemic in Brazil and Argentina: A Public Health Concern', *Journal of Health, Population and Nutrition*, vol. 32, no. 2, 2014, pp. 327–334.
7. C. Doak et al., 'Overweight and Underweight Coexist within Households in Brazil, China and Russia', *The Journal of Nutrition*, vol. 130, no. 12. 2000, pp. 2965–2971, <http://jn.nutrition.org/content/130/12/2965.full.pdf+html>, (accessed 20 January 2017).
8. UN Food and Agriculture Organization and Panamerican Health Organization, 'Panorama of Food and Nutrition Security in Latin America and the Caribbean', Santiago de Chile, 2017 at p.97, <http://www.fao.org/3/a-i6747s.pdf>, (accessed 20 January 2017).
9. G. Stevens et al., 'National, regional, and global trends in adult overweight and obesity prevalences', *Population Health Metrics*, vol. 10, no. 22 at p.4, <http://pophealthmetrics.biomedcentral.com/articles/10.1186/1478-7954-10-22>, (accessed 20 January 2017).
10. Ibid. 8 above

11. World Health Organisation, 'Diet, Nutrition and the Prevention of Chronic Diseases', Report of a Joint WHO/FAO Expert Consultation, WHO Technical Report Series 916, 2003, http://apps.who.int/iris/bitstream/10665/42665/1/WHO_TRS_916.pdf, (accessed 20 January 2017).
12. World Health Organisation, Obesity and Overweight Fact Sheet, updated June 2016, <http://www.who.int/mediacentre/factsheets/fs311/en/>, (accessed 12 January 2017).
13. Ibid.
14. Ibid.
15. P. Katzmarzyk et al., 'Relationship between lifestyle behaviours and obesity in children ages 9-11: Results from a 12-country study', *Obesity*, vol. 23, no. 8, 2015, pp. 1696-1702.
16. J. Halford et al., 'Beyond-brand effect of television food advertisements on food choice in children: the effects of weight status', *Public Health Nutrition*, vol. 11, no. 9, 2008, pp. 897-904.
17. T. Robinson et al., 'Effects of fast food branding on young children's taste preferences', *Archives of Pediatric and Adolescent Medicine*, vol. 161, no. 8, 2007, pp. 792-797.
18. S. Mahecha Matsudo et al., 'Physical activity promotion: experiences and evaluation of the Agita São Paulo Program using the ecological mobile model', *Journal of Physical Activity and Health*, vol. 1, 2004, pp. 81-97.
19. S. Keith et al., 'Putative contributors to the secular increase in obesity: exploring the roads less travelled', *International Journal of Obesity*, vol. 30, 2006, pp. 1585-1594.
20. R. Puhl and S. Liu, 'A national survey of public views about the classification of obesity as a disease', *Obesity*, vol. 23, 2015, pp. 1288-1295.
21. A. Stunkard et al., 'The body-mass index of twins who have been reared apart', *The New England Journal of Medicine*, vol. 322, no. 21, 1990, pp. 1483-1487.
22. C. Howarth et al., 'Childhood obesity: genetic and environmental overlap with normal-range BMI', *Obesity*, vol. 16, no. 7, 2008, pp. 1585-1590.
23. Ibid.

24. E. Carmona-Montesinos et al., 'Obesity, oxidative stress and their effect on serum heme oxygenase-1 concentrations and insulin in children aged 3 to 5 years in a pediatric hospital of the ministry of health', *Childhood Obesity*, vol. 12, no. 6, 2016, pp.474-481.
25. Ibid. 1 above
26. S. Vargas, 'A 2030 se estiman 14.780 muertes a causa de sobrepeso y obesidad', *Escuela de Salud Pública, Dr. Salvador Allende G., Universidad de Chile*, 2016, <http://www.saludpublica.uchile.cl/noticias/128966/a-2030-se-estiman-14780-muertes-a-causa-de-sobrepeso-y-obesidad>, (accessed 16 January 2017).
27. C. Yáñez, 'Estudio calcula que este año Chile gastará 0,5% del PIB por causa de la obesidad', *La Tercera*, updated November 2016, <http://www.latercera.com/noticia/estudio-calcula-este-ano-chile-gastara-05-del-pib-causa-la-obesidad/>, (accessed 16 January 2017).
28. F. Vio et al., 'Nutrition transition in Chile revisited: mid-term evaluation of obesity goals', *Public Health Nutrition*, vol. 11, no. 4, 2008, pp. 405-412.
29. Ministry of Health, Government of Chile, 'Diagnóstico del estado nutricional de menores de 6 años, gestantes, nodrizas y adultos mayores, bajo control en el Sistema público de salud', August 2014, http://web.minsal.cl/sites/default/files/DIAGNOSTICO_ESTADO_NUTRICIONAL_DICIEMBRE_2013.pdf, (accessed 16 January 2017).
30. K. Rtveldadze et al., 'Obesity prevalence in Mexico: impact on health and economic burden', *Public Health Nutrition*, vol. 17, no. 1, 2014, pp. 233-239.
31. McKinsey Global Institute, 'The obesity crisis', originally published in *The Cairo Journal of Global Affairs* on 5 July 2015, <http://www.mckinsey.com/mgi/overview/in-the-news/the-obesity-crisis>, (accessed 13 January 2017).
32. World Health Organisation, 'Noncommunicable Diseases (NCD) Country Profiles – Mexico', 2014, http://www.who.int/nmh/countries/mex_en.pdf, (accessed 23 January 2017).
33. Dialogue participant with reference to the August 2016 meeting of the Mexico City Council for the Prevention of Obesity.
34. Secretaría de Salud e Instituto Nacional de Salud Pública, 'Encuesta Nacional de Salud y Nutrición de Medio Camino 2016', pp. 74-75, <http://www.epidemiologia.salud.gob.mx/doctos/encuestas/resultados/ENSANUT.pdf>, (accessed 22 February 2017)

35. K. Rtveladze et al., 'Health and economic burden of obesity in Brazil', *PLoS ONE*, vol. 8, no. 7, 2013.
36. *Ibid.*
37. Dialogue participant with reference to research undertaken by Sodexo in Chile.
38. *Ibid.* 34 above at p.11
39. L. Nicholas et al., 'The early origins of obesity and insulin resistance: timing, programming and mechanisms', *International Journal of Obesity*, vol. 40, 2016.
40. R. Gaillard, 'Maternal obesity during pregnancy and cardiovascular development and disease in the offspring', *European Journal of Epidemiology*, vol. 30, 2015, pp. 1141-1152.
41. M. Arantxa Colchero et al., 'Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study', *BMJ*, 2016, <http://www.bmj.com/content/bmj/352/bmj.h6704.full.pdf>, (accessed 30 January 2017).
42. Government of Chile, Ministry of Health, Seminar 'Obesidad un problema país: evaluación de la ley sobre composición nutricional de los alimentos y su publicidad', <http://web.minsal.cl/wp-content/uploads/2017/01/1-Presentación-inaugural-Seminario.pdf>, (accessed 30 January 2017).
43. *Ibid.* 15 above at p. 1700
44. C. Hawkes et al., 'Smart food policies for obesity prevention', *Lancet*, vol. 385, 2015, pp. 2410-2421.
45. World Health Organisation, 'Report of the Commission on Ending Childhood Obesity', Geneva http://apps.who.int/iris/bitstream/10665/204176/1/9789241510066_eng.pdf, (accessed 30 January 2017).

QualityofLifeInstitute@sodexo.com

