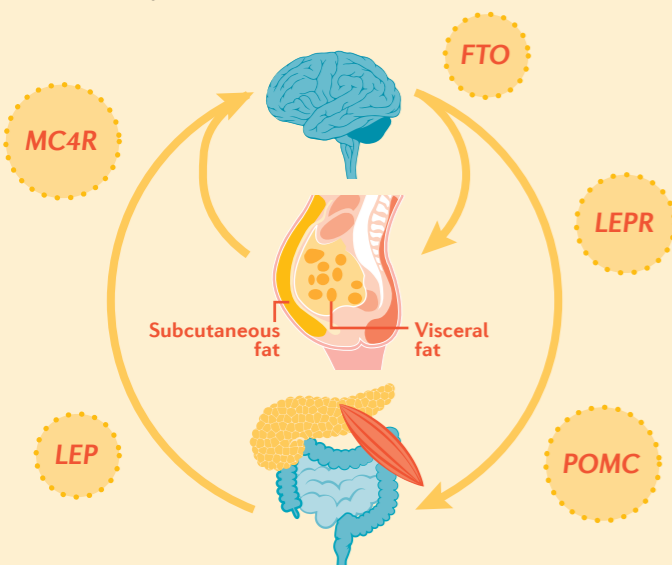


For the Primer, visit [doi:10.1038/nrdp.2017.34](https://doi.org/10.1038/nrdp.2017.34)

➔ Approximately 40% of the world population is overweight or obese. Obesity is associated with the development of type 2 diabetes mellitus, cardiovascular diseases and some types of cancer. Some of these comorbidities are considered features of the metabolic syndrome.

**MECHANISMS**

The pathogenesis of obesity is complex and determined by the interaction of genetic, environmental and psychosocial factors acting through several physiological mediators (such as hormones, cytokines and the nervous system) to regulate food intake, energy expenditure and fat accumulation. Pathological changes in adipocytes might explain some of the complications associated with obesity. Subcutaneous fat tissue accommodates the energy surplus through adipocyte hyperplasia, acting as a metabolic 'sink'. By contrast, visceral adipocytes often undergo hypertrophy, resulting in hypoxia, excess secretion of pro-inflammatory adipokines and an inability to store excess lipids, which causes low-grade systemic inflammation, insulin resistance and deposition of triglycerides in non-adipose tissues.



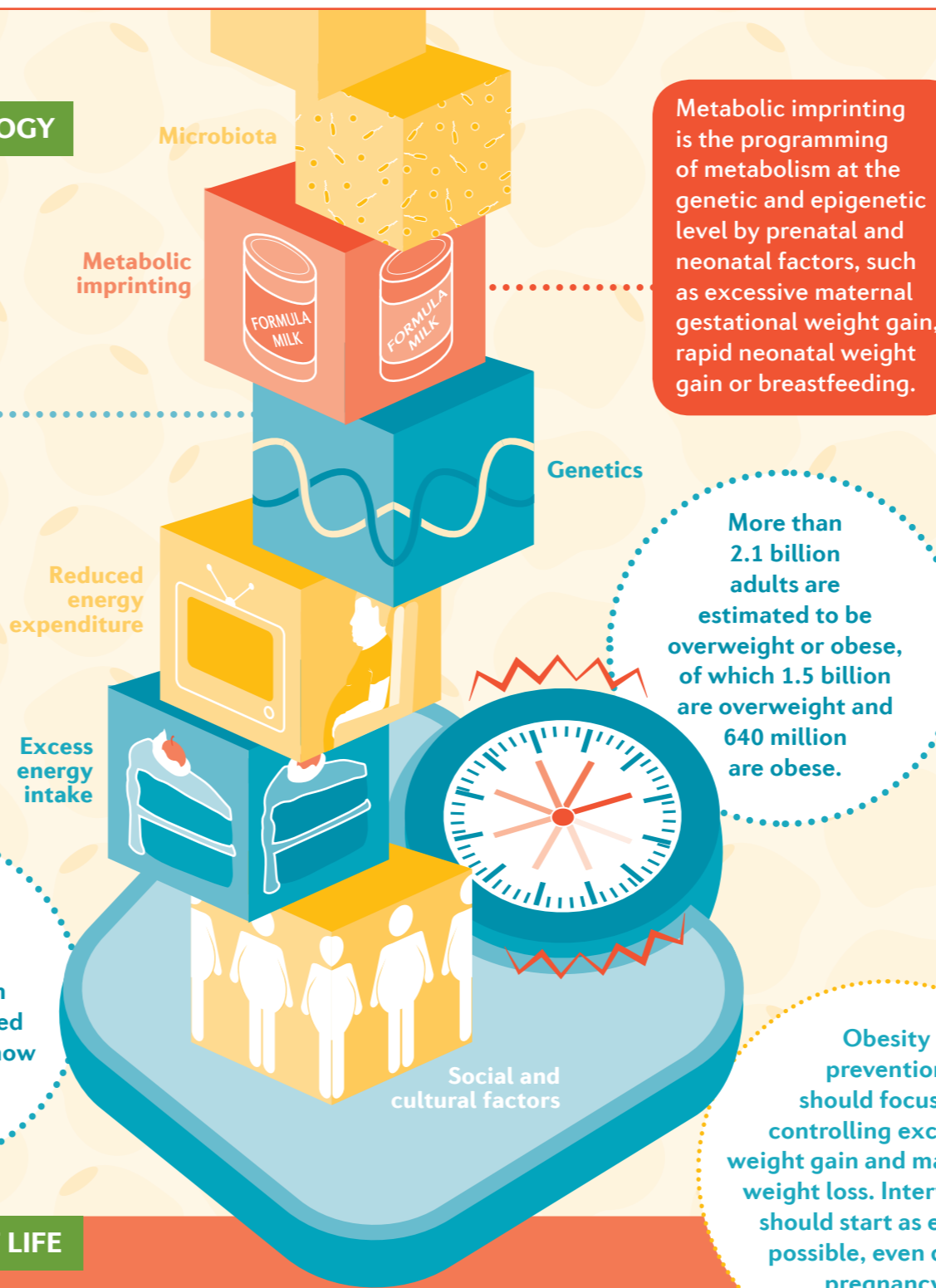
**EPIDEMIOLOGY**

Visceral obesity is more common in men than in women and poses a higher risk of developing complications than subcutaneous obesity.

The worldwide number of children and adolescents with obesity has doubled since 1980, and is now estimated to be 110 million.

**QUALITY OF LIFE**

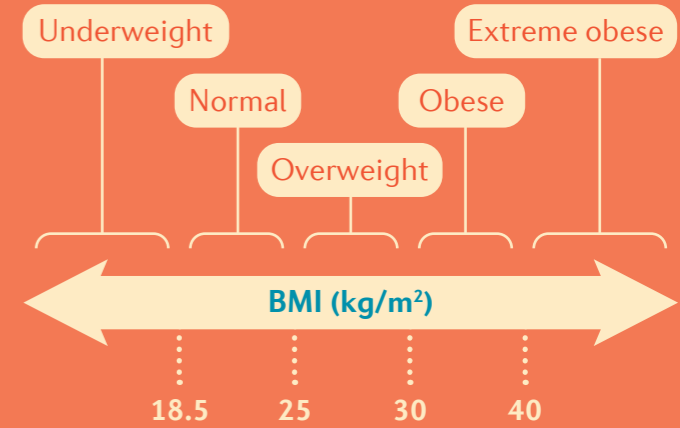
Obesity is associated with several comorbidities, including endocrine disorders (such as type 2 diabetes mellitus), respiratory problems (for example, sleep apnoea), cardiovascular diseases (such as atherosclerosis and myocardial infarction) and cancers (endometrial, liver and kidney cancer, among others). Obesity also has a substantial impact on quality of life. Weight loss improves quality of life, but the extent of weight loss needed remains unclear. Global health costs associated with obesity and its complications are estimated to be ~US\$2 trillion.



Metabolic imprinting is the programming of metabolism at the genetic and epigenetic level by prenatal and neonatal factors, such as excessive maternal gestational weight gain, rapid neonatal weight gain or breastfeeding.

**DIAGNOSIS**

Various methods are available to determine adiposity. Although the body mass index (BMI) is not a perfect index of adiposity, it is often used in clinical practice because of its simplicity and good correlation with cardiometabolic risk. The BMI should be complemented by measuring the ratio of waist-to-hip circumferences to discriminate between subcutaneous obesity and visceral obesity.



**MANAGEMENT**

Management of obesity is aimed at weight loss. Lifestyle interventions, dietary changes and physical activity are the first-line approach, followed by medical treatment and bariatric surgery in selected patients. Drugs approved for use include lipase inhibitors and agonists of the glucagon-like peptide receptor, serotonin receptor and adrenergic receptor. Criteria for surgery are a BMI of >40 kg/m<sup>2</sup> or a BMI of >35 kg/m<sup>2</sup> with comorbidities such as hypertension or dyslipidaemia. Personalized precision nutrition based on phenotypical and genotypical characteristics holds promise for the prevention and management of obesity.

