

Appendix 6: Rapid review of evidence on the developments and innovations in maintaining a healthy weight

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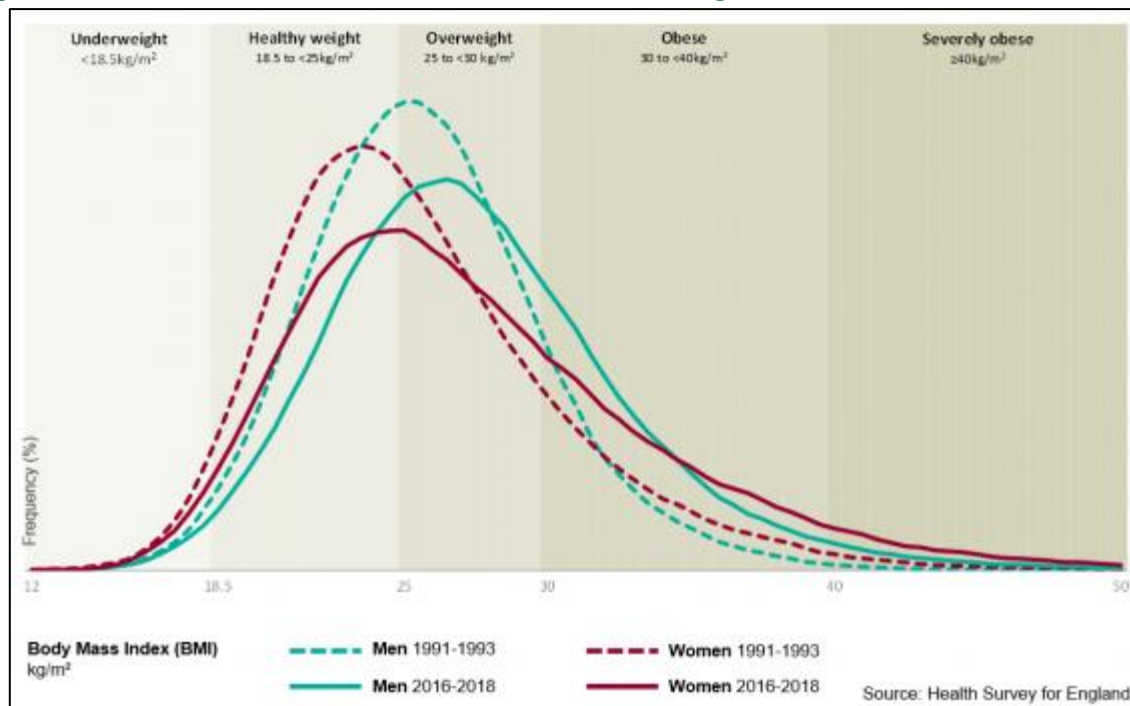
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Intentions of review

The whole distribution of body mass index (BMI) in the national population has shifted. Figure 1 shows the national trend in the distribution of adult BMI in different periods of time, split by sex. Results show that the whole distribution has shifted to the right. This highlights the phenomenon that over time the adult population as a whole is getting a little more overweight-not restricted to one subgroup of the population.

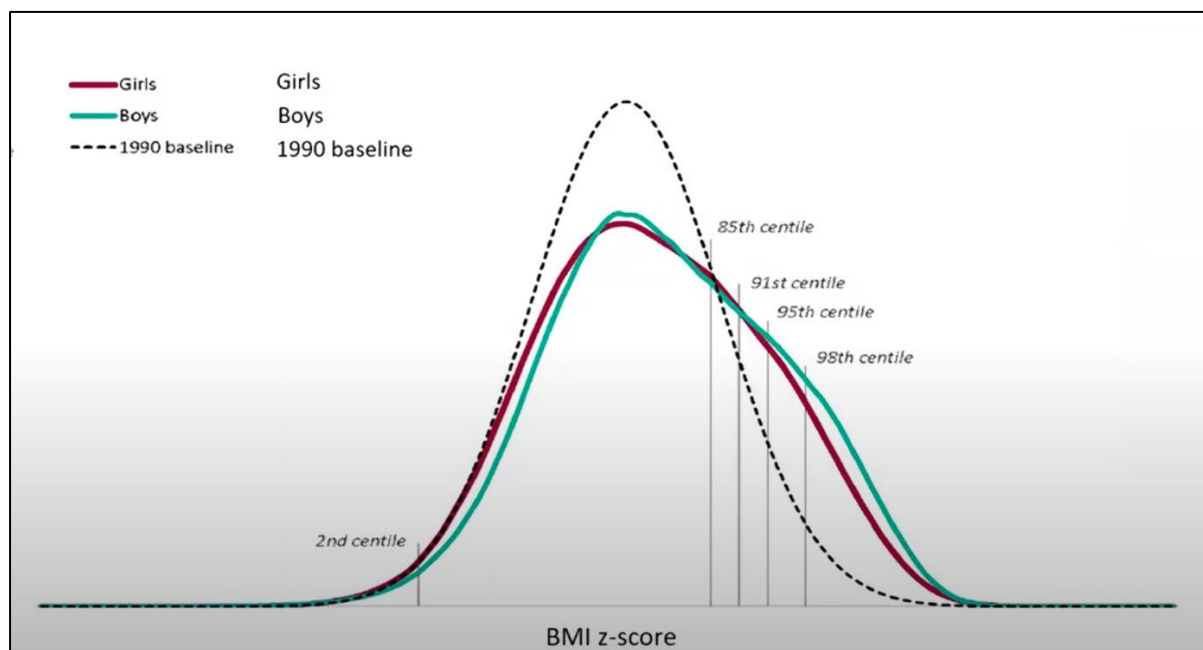
Figure 1: Trend in the distribution of adult BMI 1993-2018 in England



Source: [UK Health Security Agency](#)

The above figure highlights this for the adult population, but the same is also found in children and young people. Figure 2 shows the BMI distribution of children aged 10-11 years comparing children in England in the 1990's to children in 2016/17 using National Child Measurement Programme (NCMP) data. Results show a similar right shift, also highlighting that the child population as a whole is getting a little more overweight- not restricted to one subgroup of the population.

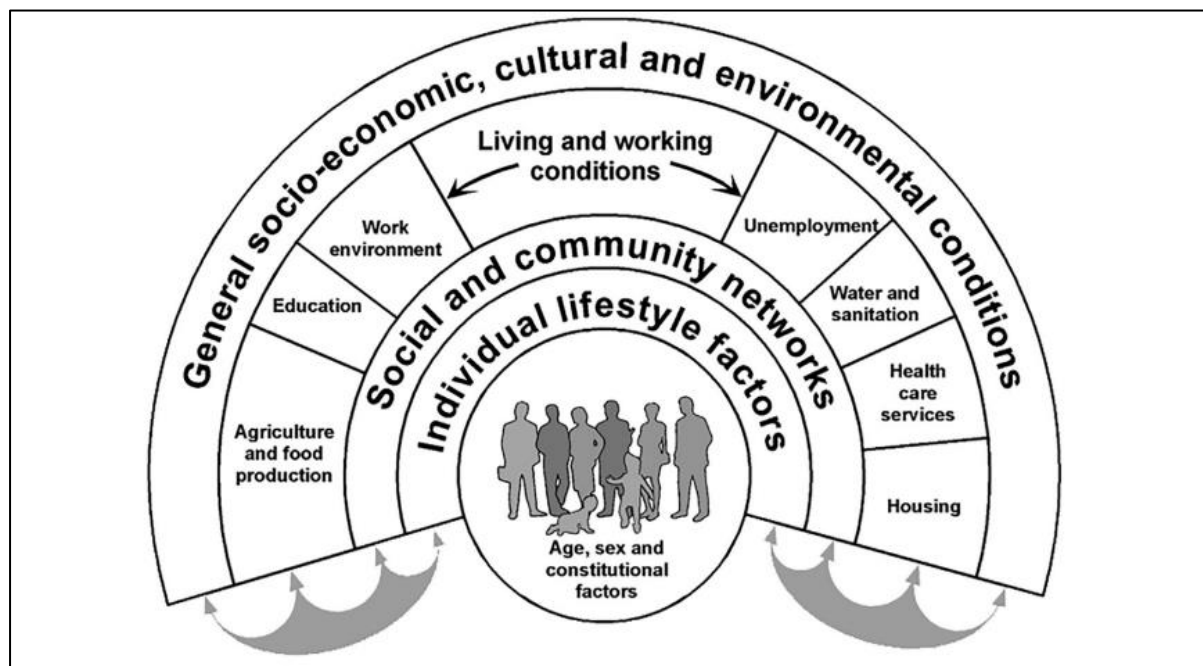
Figure 2: BMI distribution of children aged 10-11 years: 1990 vs 2016/17, in England NCMP data



Source: [NIHR Cambridge BRC](#)

This change in the whole population suggests a need to move away from a focus on individual risk factors and move to also consider factors the population share such as the general socioeconomic environment in which we live, work and play- highlighted in figure 3.

Figure 3: The Dahlgren-Whitehead model of health determinants



Source: [Dahlgren-Whitehead Model](#)

Therefore, this rapid review of evidence intends to examine the evolving landscape of healthy weight management. While individual choices and biology undoubtedly influence weight- key information already accessible on the [Feel Good Suffolk website](#)- the focus of this review shifts to the important community factors that shape our relationship with weight.

By reframing weight management as a collective responsibility rather than an individual burden, the review explores how our environment and society fundamentally impact our weight outcomes. The review investigates key areas including social determinants of health, environmental influences, the harmful effects of weight stigma, and practical implementations of whole system approaches to create healthier communities. Through this community-centred perspective, the review aims to provide a more complete understanding of what truly supports sustainable healthy weight management across populations.

Methodology

A literature review was conducted by North East London Foundation Trust (NELFT) library service to identify and synthesise the existing literature on the development and innovations in a whole system approach to healthy weight in February 2025¹.

The search strategy explored the determinants of obesity and weight management across multiple databases (Embase, Medline, Social Policy and Practice, and Public Health Database). The search combined four key concept areas: (1) weight and obesity terms, (2) weight management approaches (like prevention, maintenance, and loss), (3) a wide range of potential influencing factors (economic, environmental, social, behavioural, biological, etc.), and (4) terms related to relationships and associations. The strategy particularly focused on identifying review articles and meta-analyses to capture synthesised evidence. The search was refined to include only English language publications from 2007 onwards, while excluding conference abstracts, editorials, letters, and protocols.

After removing duplicates, the review initially identified 2,780 results across multiple databases (1,863 from medical databases, 54 from Social Policy and Practice, and 863 from the Public Health Database). From this, a NELFT Knowledge Specialist screened the remaining articles against the predefined scope criteria, defined by the Healthy Weight Health Needs Assessment steering group members. This led to a further exclusion of 2,590 irrelevant publications. This screening process yielded 190 potentially relevant articles that were thematically organised for in-depth review.

During the full-text review phase, completed by the Public Health and Communities Knowledge, Intelligence and Evidence Team, a further 41 articles were excluded for not meeting the predefined scope requirements. 39 articles published before 2020 were also removed to avoid duplicating findings from previous research completed. The final analysis included 110 articles.

Results

The issue

Current national policies aiming to tackle healthy weight management overlook community factors that shape people's relationship with weight. A paper critically examining the UK government's "Childhood Obesity: a plan for action" highlights that while the policy acknowledges obesity's higher prevalence in deprived areas, it primarily frames weight management as an individual issue of energy balance rather than addressing the broader structural determinants². This individualistic approach is further highlighted in a study on high fat, salt, and sugar (HFSS) food marketing policies, where experts across policy, commercial, and advocacy sectors emphasised that effective obesity interventions must extend beyond marketing restrictions to address underlying socioeconomic drivers³. Both studies reveal how current policies emphasise "healthy choices" without adequately accounting for food insecurity, poverty, and limited access to nutritious options that many communities face.

Exaggerating these policy shortcomings, the clinical measures used to assess obesity further contribute to the problem by reinforcing a narrow, medicalised view that overlooks social determinants of health. Despite recent updates to NICE guidelines recommending both use of body mass index (BMI) and waist-to-height ratio measurements⁴, these are not always included or recorded, and some tools remain problematic. BMI was established as a universal standard despite recognition, by medical organisations,

that it's an indirect and imperfect measure and has been shown to fail to account for racial and sex differences in body composition. Research shows it particularly stigmatises women of colour, who may be inaccurately categorised as “diseased” based solely on weight metrics that don't predict health outcomes consistently across populations⁵. In 2025, the Lancet Diabetes & Endocrinology Commission's distinction between “clinical” and “preclinical” obesity represents progress by acknowledging that excess adiposity doesn't uniformly impact health, but clinical practice still relies heavily on anthropometric measures that can both underestimate and overestimate actual body fat⁶. These diagnostic approaches, when combined with policies that emphasise individual responsibility, create a double burden: communities facing structural barriers to health are both less likely to benefit from policies that don't address their socioeconomic realities, and more likely to experience weight stigma and bias through inappropriate clinical categorisation.

Weight stigma and bias

Weight stigma is defined as the negative attitudes, prejudice, discrimination, and social devaluation directed toward individuals based on their body weight, while weight bias encompasses the negative attitudes and judgments—both conscious and unconscious—about people with higher body weights. Together, weight stigma and bias create a system of disadvantage that exists globally and affects individuals throughout their lifespan⁷. In the current system weight stigma and bias is pervasive, with one paper examining nearly 14,000 adults actively enrolled in an international weight management programme across six Western countries: Australia, Canada, France, Germany, the UK, and the United States found up to almost 2 thirds of participants (56–61%) may have experienced weight stigma⁸. Evidence reveals that the manifestation of weight stigma and bias occurs across numerous settings including within media representation^{9,10}, healthcare^{8,9,11,12}, workplaces^{9,10,13}, and family and social environments^{9,14,15}.

Factors influencing weight stigma and bias

The evidence-base identifies multiple interconnected factors that drive weight stigma and bias across society. Problematic narratives portraying people with higher body weights as “lazy”, “gluttonous”, or “lacking willpower” ignore the complex biological, social and environmental determinants of weight^{7,11}, while oversimplified “eat less and move more” messaging disregards barriers to behaviour change and places blame on solely individuals⁷. Healthcare practices contribute, with the traditional focus on BMI as a primary indicator¹¹ and the use of stigmatising clinical language reinforcing negative attitudes⁷. In clinical settings, insensitive communication, unnecessary weight-based screening, and differential treatment based solely on body size further enables stigma⁹. These practices reflect broader sociocultural factors, including attribution theory (where people assume weight is entirely under personal control), “thin ideal” cultural standards, negative media portrayals, and social consensus around weight-related stereotypes¹³. Together, these narratives, clinical approaches, misconceptions, and sociocultural norms create a system that sustains weight stigma and bias throughout multiple domains of life.

Health and wellbeing implications of weight stigma and bias

Weight stigma and bias have profound and wide-ranging impacts on health and wellbeing across psychological, physical and behavioural domains. Psychologically, weight stigma and bias contributes to higher rates of depression, anxiety, and reduced quality of life^{10,16}, while negatively affecting self-esteem, self-compassion, and social functioning¹⁶. Physiological consequences include elevated stress and cortisol levels^{9,15,17}, which may contribute to increased mortality risk and stress-related health issues¹⁰. For women during pregnancy and postpartum periods, weight stigma may disrupt mother-infant bonding and create breastfeeding difficulties⁹. Weight stigma also influences eating behaviours, with research showing higher rates of weight bias internalisation¹⁵, more frequent emotional and disordered eating^{9,16,17}, difficulty engaging in health-promoting behaviours, and problematic weight cycling^{10,16}. Weight stigma can also influence healthcare utilisation, with evidence highlighting that weight stigma can lead to healthcare avoidance and reduced frequency of routine checkups^{8,12,18}, diminished respect for and communication with providers⁸, lower perceived quality of care⁸, and ultimately delayed detection of

serious health conditions¹⁸. Together, these impacts create a harmful cycle where weight stigma and bias become a significant health risk factor.

Recommendations to support the reduction of weight stigma and bias

The evidence-based presented several recommendations to support the reduction of weight stigma and bias in society. Research showed that quality contact with people of higher weight is associated with reduced bias¹⁴. Supporting this concept, sporting figure Ilona Maher, a US Olympic rugby player, has provided quality contact by using her platform to speak out against weight stigma and body shaming, particularly in relation to her own body, challenging the idea that BMI actively reflects health or fitness and promoting body positivity, self-acceptance, encouraging others not to let external opinions define their worth, reaching and inspiring millions of people across the globe¹⁹.

From a public health and policy perspective, recommendations include shifting focus from weight loss to promoting healthy behaviours for everyone, creating environmental changes that support healthy living, implementing educational interventions explaining the true causes of obesity, enacting legislation to prohibit weight-based discrimination, and including the voices of people with obesity in public health messaging^{7,10}. Several evidence-based frameworks and tools have been developed to address this. The Weight Stigma Heat Map (WSHM) is a novel evaluation tool designed to identify stigmatising elements in public health materials across ten thematic areas, using colour coding to indicate whether content takes strengths-based or deficits-based approach toward larger-bodied people. When applied to Australia's National Obesity Strategy, the WSHM revealed stigmatising elements despite the strategy's aim of reducing weight stigma. This tool enables professionals to identify problematic content, develop fewer stigmatising resources, and quantitatively evaluate weight stigma in health communications²⁰. Additionally, Health at Every Size (HAES) represents a framework that shifts focus from weight management to overall wellbeing through principles including body acceptance, intuitive eating, joyful movement, and size diversity. Research demonstrates that HAES interventions improve physiological measures, metabolic parameters and psychological outcomes independent of weight changes, with better long-term adherence than traditional weight loss approaches²¹.

Healthcare-specific recommendations mirror these findings and include training in weight-sensitive communication^{7,11,12}, moving beyond BMI as the primary measure of health^{7,11}, focusing on health-related quality of life rather than just weight loss^{7,11,18,21}, implementing screening for eating disorders¹¹, asking permission before discussing weight, and creating welcoming healthcare spaces with appropriate seating and equipment¹⁸. Experts also recommend developing psychometrically validated measures of weight bias for healthcare professionals¹².

While these frameworks and recommendations represent important steps toward reducing weight stigma and bias, they remain insufficient in addressing the fundamental socioeconomic inequities that influence weight and health.

Socioeconomic inequalities in healthy weight management

Socioeconomic status (SES) represents one of the most significant and consistent determinants of weight outcomes across populations. The relationship between socioeconomic status and obesity follows clear patterns in developed countries, with lower SES consistently associated with higher rates of obesity since the 1980s. This relationship has been shown to operate bidirectionally- lower SES can lead to obesity through limited access to healthy foods, fewer opportunities for physical activity, and higher stress, while obesity can also lead to lower SES through employment discrimination and health implications²². The impact of socioeconomic status on weight begins early in life. Differences in weight outcomes have been documented as early as 3-9 months of age and widen over time, becoming more pronounced at age 11 compared to age 5²³.

Food environment and access

Building on the established relationships between SES and weight outcomes, food environments represent a critical pathway through which socioeconomic disadvantage translates into health

disparities. Lower-income neighbourhoods often face triple jeopardy in their food environments: food insecurity (limited or uncertain access to nutritionally adequate foods), food deserts (areas lacking affordable, nutritious food options), and food swamps (areas saturated with unhealthy food outlets).

Food access barriers in resource-poor communities include high food costs (consistently cited as the primary barrier), transportation challenges, geographic access constraints, prevalence of unhealthy food outlets, limited availability of healthy foods, and poor quality and variety of available fruits and vegetables²⁴. The economic burden is particularly heavy on low-income households, who would need to spend 45% of their disposable income (70% for households with children) to afford a government-recommended healthy diet²⁵.

This unequal food landscape creates what researchers have termed the “food insecurity-obesity paradox”. A meta-analysis found that individuals experiencing food insecurity were 50% more likely to have obesity compared to individuals with food security, highlighting how economic constraint can lead to higher weight. This relationship operates through multiple mechanisms: the home food environment (with greater availability of unhealthy foods), the neighbourhood retail environment (with more convenience stores and fewer supermarkets), and physiological adaptations to inconsistent food access²⁶.

The lived experience of navigating these challenging food environments reveals how socioeconomic constraints shape dietary patterns. Parents from low-income households consistently report that financial limitations “dictate the food provided for their families”, with food cost being “a primary influence of food choices”. Geographic barriers compound these challenges, as many families must “travel outside their neighbourhoods” because of “the scarcity of larger supermarkets in local areas” while simultaneously facing “a high prevalence of fast-food outlets” in their immediate environment²⁷.

For food insecure households, this often results in a feast-famine cycle that may trigger physiological adaptations. The “insurance hypothesis” suggests that when food access is inconsistent, the body responds by storing more fat during periods where food is available. Food insecure families frequently rely on cheaper, energy-dense foods high in fats, sugar, and sodium but low in nutrients, creating “hidden hunger” alongside excess calorie consumption²⁸. Longitudinal studies confirm these effects, showing that children experiencing food insecurity at multiple time points had greater BMI growth compared to consistently food-secure children²⁹.

Beyond physiological mechanisms, psychological pathways also link food insecurity to obesity. Stress from food insecurity may trigger emotional eating or disrupt eating patterns, and mental health may influence or mediate the relationship between food insecurity and obesity²⁸. Social vulnerability can affect weight through mental health impacts such as anxiety, depression, and emotional eating, with vulnerable children often using food as a way to cope with stress and anxiety³⁰.

Employment circumstances further complicate this relationship. Research shows that children with unemployed parents are at 2 times higher odds of being overweight or obese³⁰. In contradiction, in developing countries, maternal full-time employment has been associated with a 46% increase in risk of childhood obesity, likely due to reduced time for meal preparation³⁰. This time scarcity is consistently highlighted as a barrier to healthy eating, with “busy daily schedules due to parental work and children's school” leaving “limited time for cooking home-made food and planning of family meals”²⁷. Additionally, reduced sleep duration, associated with longer work hours, low SES, and lower education can lead to increased body mass³¹.

While food assistance programs aim to address these challenges, they often fall short of creating truly health-enabling environments. Food parcels from food banks, while providing much-needed calories, frequently exceed energy recommendations while lacking sufficient vitamins and minerals such as vitamin D, calcium and iron³². Fresh produce is typically limited, while sugar and salt content are often excessive. Although relying on food banks allows families to afford other essential bills, it frequently means sacrificing fresh food which exacerbates weight gain²⁶. Despite these limitations, targeted

approaches like diabetic-specific food parcels demonstrate that tailoring assistance to nutritional needs can improve outcomes³².

These intersecting challenges create a system where lower socioeconomic status constrains food choices in ways that promote higher weight, reinforcing the socioeconomic patterns described earlier and highlighting the need for interventions that address both economic constraints and environmental barriers to healthy eating.

The neighbourhood effect

The constraints imposed by food insecurity and challenging food environments don't operate in isolation but are embedded within broader geographic and socioeconomic contexts. These individual-level food access challenges are amplified by the structural conditions of the neighbourhoods themselves, creating what research has identified as a powerful "neighbourhood effect" on weight management.

A Dutch study found that people living in lower-SES neighbourhoods had significantly higher weight measurements than residents of higher-SES areas, even after controlling for personal factors like individual income, education, and employment³³. This demonstrates that community-level socioeconomic conditions create an independent influence on weight outcomes. These neighbourhood-level effects also manifest in body composition differences that begin early and widen over time. UK research following children from ages 7 to 17 found that those from disadvantaged backgrounds started with higher fat mass and fat-to-muscle ratios at age 7, with these disparities growing substantially by adolescence. Even after accounting for family income and education, simply living in a deprived area was independently associated with poorer body composition. Notably, when controlling for fat mass, teens from advantaged backgrounds developed significantly more muscle mass over time, suggesting better access to physical activity opportunities and nutritious food³⁴.

Lower-SES neighbourhoods typically have worse environments regarding food stores, places to exercise, and safety for physical activity. Areas with fewer active adults had more overweight/obese Year 6 children, while areas with poor access to green spaces had more overweight/obese Reception children³⁰. The physical environment including where children live, safe spaces for social and physical activity, housing, transport and infrastructure have also been shown to significantly affect health outcomes³⁵. This suggests that low-SES environments may influence healthy weight management.

However, the geography of obesity, follows complex patterns that highlight how environmental factors interact with SES. In England, the highest childhood obesity rates were found in specific environmental contexts—particularly deprived urban areas with limited food access and, in affluent rural areas—demonstrating that obesity risk concentrates in specific environments where multiple disadvantageous factors occur, rather than solely in lower-SES neighbourhoods³⁶.

Environmental influences on healthy weight management

While SES represents a powerful predictor of weight outcomes, the relationships between SES and obesity is mediated through complex environmental factors that can influence individuals across all socioeconomic levels. Understanding these environmental determinants is crucial for developing effective interventions that address the root causes of obesity beyond individual behaviours.

The built environment

The physical spaces where people live significantly impact weight management through multiple pathways. A systems mapping approach found that local access to play areas, green spaces, and areas for physical and social activity are critical environmental determinants of health³⁵.

Access to green spaces consistently emerges as a protective factor for healthy weight management, with research confirming that such spaces encourage physical activity^{37,38}. Greater time spent in these recreational environments has also been shown to have meaningful effects. A longitudinal study found that living in areas with better access to recreational facilities for more than 2 years was significantly associated with lower obesity rates, with stronger effects for those who had lived at their location for

longer³⁹. However, the presence of recreational facilities (such as parks, sports fields and fitness centres) has been shown to have a nuanced impact on obesity. Research from New Zealand found that merely having more physical activity venues didn't correlate with reduced obesity rates. Whereas facilities offering high-intensity exercise options were associated with lower obesity rates, especially in low-income areas⁴⁰. Therefore, access to facilities alone may be insufficient to promote usage. Additional support and encouragement are likely necessary to motivate people to utilise these recreational spaces.

Workplace neighbourhoods appear less influential for physical activity than residential neighbourhoods, possibly because workers have less autonomy during working hours⁴¹.

The quality of transportation infrastructure also impacts weight outcomes. People living in urban areas with better sidewalk access generally benefit from better weight-related outcomes, with this effect more prominent among adults than children and adolescents⁴². Safe walking and cycling routes were also shown to promote active transportation, while traffic safety concerns can limit outdoor play³⁷.

The relationship between commuting methods and health outcomes reveals significant differences across multiple dimensions. Research shows that active commuters experience lower stress levels, higher life satisfaction, more pro-environmental behaviours, and lower BMI compared to those using other transportation modes⁴³. A systematic review further strengthened these findings, demonstrating that active commuting to schools was associated with more favourable body composition in approximately two-thirds of studies, with particularly pronounced benefits observed in adolescents who actively commuted at least 3.5-4 days per week⁴⁴. These findings collectively suggest that active commuting represents an effective strategy for maintaining healthy weight while simultaneously improving overall wellbeing, emphasizing the need to incorporate the built environment in future public health strategies.

Retail food environments

The composition of retail food environments strongly influences dietary patterns and weight outcomes. Research shows that supermarkets don't create health-enabling environments, despite significantly influencing consumer food choices. A high proportion of supermarket shelf space is allocated to unhealthy foods, with unhealthy options frequently placed in high-prominence areas like checkout zones and end-of-aisle displays⁴⁵.

"The Broken Plate 2025" report reveals concerning patterns in the UK food environment: 37% of supermarket promotions are for unhealthy foods, 36% of food advertising spending goes to confectionery, snacks, and soft drinks (while only 2% goes to fruits and vegetables), and 74% of baby and toddler snacks with promotional claims contain medium or high levels of sugar. Additionally, 26% of food outlets in England are fast-food outlets, with higher concentrations in deprived areas²⁵.

These environmental factors translate into measurable health impacts. Research consistently links ultra-processed food consumption with higher LDL cholesterol, higher total cholesterol, higher triglyceride levels, higher diastolic blood pressure, increased BMI, larger waist circumference, and higher body fat percentage⁴⁶. Sugar-sweetened beverage consumption shows a consistent dose-response relationship with weight gain, with each additional daily serving associated with 0.07 kg/m² BMI increase in children and 0.42 kg weight gain in adults⁴⁷. A systematic review further strengthens these findings, demonstrating that living closer to fast-food restaurants was associated with 15% higher odds of obesity, while fresh fruit and vegetable outlet density and having supermarkets closer to home was linked to 10% lower odds of obesity⁴⁸.

Effective interventions to improve retail food environments include in-store measures co-designed with retailers. Studies show that restricting the placement of high fat, sugar, and salt (HFSS) foods while promoting healthier alternatives has increased healthier food purchases⁴⁵. Financial incentives (10-50% price discounts) significantly increase purchases and consumption of fruits, vegetables, and other

healthy foods, while health primes and warning labels can reduce consumption of energy-dense foods and sugar-sweetened beverages⁴⁹.

The economic case for transforming food systems is also compelling. A report suggests that health-related costs attributable to the UK's current food system amount to £268 billion annually, while ensuring everyone could eat according to the government's Eatwell Guide would cost approximately £159 billion - making the true cost of the current diet £210 billion higher than the cost of a healthy diet⁵⁰.

Environmental interventions have also showed promise for creating healthier food environments. One study found that increasing the availability of lower-energy food options led to significantly lower energy consumption (196 fewer calories), with similar effects across socioeconomic positions⁵¹. In Addition, Transport for London's policy restricting high fat, salt and sugar (HFSS) advertisements across its network reduced household purchases of HFSS foods by 6.7% compared to a control region. Importantly, the benefits were greater for people from lower socioeconomic groups, suggesting the policy helped reduce health inequalities⁵².

Public health approaches to improving retail food environments must include regulatory measures on product placement and pricing, partnerships with retailers on store layout and promotions, economic incentives for healthier options, and targeted interventions in disadvantaged areas where unhealthy food outlets are more concentrated.

School food environments

Schools represent crucial settings for weight management interventions. Children spend significant time at school and consume up to a third of their daily food there, making school environments important opportunities for nutrition interventions⁵³. This is further supported by a study highlighting that schools providing healthier food options reduce the risk of obesity in children⁵⁴.

The surrounding food landscape also matters, with research finding that fast food outlets and convenience stores near schools are generally associated with higher obesity rates among Latino, white, and African American students, though with mixed results for Asian students⁵⁵.

Regular school attendance itself might also help prevent weight gain. A meta-analysis found that children who received no specific obesity intervention but attended school as usual showed only minimal weight changes during the school year, supporting the "Structured Days Hypothesis" that the routine nature of school days may promote healthier behaviours by providing scheduled physical activity, regulated food intake, and less screen time compared to unstructured time at home⁵⁶.

Policy interventions like Universal Infant Free School Meals (UFSM) have shown positive impacts. After implementation, school meal uptake increased by 25 percentage points among younger children, who consumed about 7 percentage points less ultra-processed food at lunchtime. Improvements were greatest for children from low-income households, who saw a 19 percentage point decrease in ultra-processed food consumption⁵⁷. Exposure to universal free lunches was also shown to reduce obesity prevalence and BMI among children aged 4-5 and 10-11, though older children's body weights were shown to be less responsive than younger children's⁵⁸.

Factors influencing the success of school-based interventions include baseline BMI status, sex (with girls often benefiting more), parental education level, peer behaviour, and social norms. The most effective mechanisms include sufficient intervention dose (frequency and duration), environmental modifications, integrated approaches where components work together, and enjoyable, simple content⁵⁹.

Public health strategies should leverage the structured nature of school environments through universal free meal programs, restrictions on nearby fast food outlets, and integrated nutrition and physical activity interventions. Approaches may be more effective if tailored to children's developmental stage, with particular emphasis on early intervention when habits are most malleable.

Social relationships

Social networks significantly influence weight management across the life course. Research confirms that social networks have different effects on obesity spread depending on age groups. For younger people, networks increase the impact of external factors and social influences on obesity changes, while for older people, networks dull these effects, this may be due to increased autonomy⁶⁰.

People also tend to be connected to others with similar weight status (called "assortativity"), with social influence playing a significant role in weight gain and weight loss through social norms, social comparison, and social support⁶¹. Evidence suggests that social support systems can help mitigate adverse influences, with research highlighting that low-income parents actively seek nutrition-related advice from relatives and friends, which is readily understood and assumed to have high credibility²⁷. In addition, children with parents who lack social networks were shown to be at higher risk of obesity, and parental support significantly affected children's obesity risk in adulthood³⁰. This suggests that social networks are important for maintaining a healthy weight, and healthy weight interventions may be more effective when targeting connected groups rather than isolated individuals.

Additionally, family and caregiver influence is particularly powerful. Family and caregiver health behaviours were shown to directly shape children's nutrition habits, physical activity levels and screen time usage⁶². Parents' eating habits were also shown to directly influence children's food preferences, with children learning what and how much to eat by observing family eating patterns, with parental obesity significantly increasing a child's risk of becoming overweight⁶³. Evidence found that the first 1000 days of life, from conception through age two, is a critical period for establishing lifelong eating patterns, with maternal diet during pregnancy influencing future food preferences⁶⁴.

Parental feeding styles also significantly impact weight outcomes. Research identifies four main approaches: authoritative (setting boundaries while respecting child hunger cues), authoritarian (using directive strategies, rewards/punishments), indulgent (few food boundaries, responsive to hunger cues but lacks structure), and uninvolved (low responsiveness, few boundaries). Among these, the authoritative style best supports children's self-regulation of eating⁶⁴.

Public health initiatives addressing healthy weight management should harness the power of social networks through community-based interventions and family-centred programs that promote authoritative feeding styles, targeted support for parents during the critical first 1000 days, and engage entire social groups rather than focusing solely on individuals.

Industry and media influence

Beyond our immediate social circles and physical environments, commercial forces shape our food choices and activity patterns in ways that significantly impact weight management. The food, beverage, and advertising industries exert their influence through sophisticated strategies designed to increase consumption of their products—often those high in calories but low in nutritional value.

Evidence has shown that the commercial determinants of dietary behaviour operate through three key spheres: the political and legal sphere (generating business-friendly regulatory environments), the production and design sphere (optimising processing and cost viability), and the marketing and preference-shaping sphere (increasing brand loyalty and consumer desire)⁶⁵. Furthermore, research highlights that adolescents themselves recognise six major commercial influences: increased preference for unhealthy food, physical environments saturated with unhealthy food marketing, decreased demand for healthy food, social media influencers promoting unhealthy products, gender differences in body image pressure, and strategic targeting during developmental periods of increasing independence⁶⁶.

The impact of food marketing is particularly concerning for children's weight management. A Spanish study found that approximately 83% of food advertisements aimed at children promote "nonessential" products with poor nutritional value, with nearly 90% of analysed advertisements failing to comply with Spain's advertising regulatory framework⁶⁷. Experimental studies demonstrate the direct effect of these

advertisements: children exposed to high-sugar food advertisements consumed significantly more energy (203.3 kJ/48.6 kcal) and sugar (6g) compared to when viewing toy advertisements, with children with dental caries showing a dramatically stronger response (503.3 kJ/120.3 kcal more after food ads)⁶⁸.

Gender was also shown to influence food marketing's impact, with boys appearing to be more exposed to food advertising and more influenced to consume unhealthy foods. In relation to specific advertisements, boys were shown to be more attracted to products with sports celebrities and interactive features, while girls tend to respond more to aesthetic qualities like packaging colour and design⁶⁹.

The industry extends its reach through strategic partnerships that blur the lines between commercial interests and healthy activities. Research shows that corporate sponsorship of sport is framed in competing ways in media discourse, with public health perspectives highlighting the "health halo effect" around unhealthy foods (where unhealthy products gain an undeserved healthy association through sports sponsorship), and industry perspectives positioning sponsorship as corporate social responsibility and part of the solution to obesity⁷⁰.

Corporate influence extends beyond direct marketing to consumers, reaching into knowledge production and policy development. Industries fund research that often leads to "industry-favourable research findings," creating a biased evidence base that diverts attention away from industry culpability for health problems. Companies establish or fund "industry front groups" that advocate for industry positions while appearing to be independent voices⁷¹. A detailed study of Coca-Cola's influence revealed three main pathways: direct financial support to conference organisers, indirect funding through third-party organisations, and direct funding to individual speakers, with this influence often not visible to conference attendees or disclosed in conference materials⁷². These practices shape scientific discourse and public understanding of nutrition in ways that favour commercial interests over public health.

Public health approaches to healthy weight management must address commercial determinants by implementing comprehensive marketing regulations, mandating transparent sponsorship disclosures, supporting independent nutrition research, and developing policies that prioritise population health over industry interests, particularly for vulnerable groups like children and adolescents.

Trends over time

Weight management is significantly influenced by key developmental stages and life transitions, with each phase presenting unique challenges and opportunities for intervention. As individuals progress from early childhood through adolescence and into adulthood, the factors influencing weight-related behaviours shift in importance and impact, creating critical windows for establishing healthy patterns.

During early childhood, the personal food environment has the strongest influence, particularly parental feeding practices and sensory development. As children enter school age, the school food environment gains significant influence, peer influence begins to play a larger role, and external food marketing becomes more influential. The transition to adolescence brings increased independence from parents, stronger peer influences, greater social media exposure, and more autonomous purchasing power⁷³.

Specific life transitions mark important inflection points for weight management. The transition out of high school represents a particularly significant period, associated with an average decrease of 7.04 minutes per day of moderate-to-vigorous physical activity (MVPA), with larger decreases among males and those transitioning specifically to university. Employment transitions also impact physical activity, with starting a first job associated with a decrease of 18.7 minutes/day of MVPA in both males and females⁷⁴.

Physical activity patterns show distinct trajectories across weight categories during adolescence. Healthy weight children have the highest overall physical activity levels, but this shows a consistent decline with age. Overweight children show the strongest age-related decline in physical activity, while children with obesity have the highest baseline inactivity rates⁷⁵. For boys who experienced rapid infant weight gain (a known obesity risk factor), meeting physical activity guidelines in childhood could

substantially offset their increased risk for adolescent obesity, with approximately 75% of the excess body fat at age 14 associated with rapid infant weight gain attenuated in boys who met MVPA guidelines⁷⁶.

However, health behaviour clusters tend to remain stable over time, with over 81% of children in healthy clusters at baseline remaining in healthy clusters at follow-up and 75% of children in unhealthy clusters at baseline remaining in unhealthy clusters at follow-up²³. This suggests that health behaviours are established early in childhood and tend to persist, making early childhood (0-5 years) a critical period for intervention.

Public health approaches should target critical developmental transition points with stage-appropriate interventions, emphasising early childhood when habits are forming, school transitions when activity levels typically decline, and adolescent transitions when independence increases, with particular attention to maintaining physical activity among children at risk for unhealthy weight trajectories.

Demographic influences

Demographic factors—including gender, race, ethnicity, culture, migration status, and pregnancy—significantly influence weight management through complex biological, social, and structural pathways. These factors not only affect individual risk profiles but also shape access to resources, exposure to stressors, and cultural norms around food and body size.

The relationship between socioeconomic status and obesity is generally stronger among women than men²², and the magnitude of excess obesity in females is greater in countries with higher gender inequality³⁰. Gender differences appear in how social networks influence obesity spread, with individuals primarily influenced by others of the same gender⁶⁰.

Racial and ethnic minorities face distinct challenges related to weight management. Research has shown that non-Hispanic Black adults, Hispanic adults, and American Indian/Alaska Native adults have significantly higher obesity rates compared to White and Asian Americans, stemming from structural factors including obesogenic neighbourhood environments, limited access to safe outdoor spaces, inequitable healthcare access, and policies influenced by systemic racism⁷⁷.

Racism has also been shown to create stress that affects hormonal regulation, inflammation, and metabolic functions that may increase obesity risk⁷⁸. The relationship between socioeconomic status and weight varies by ethnicity in sometimes counterintuitive ways: White children from deprived families show higher risks of overweight/obesity than their less deprived counterparts, while Black African/Caribbean children from lower socioeconomic backgrounds demonstrate lower mean BMI than those from more affluent families⁷⁹. This suggests that socioeconomic factors interact differently with race and ethnicity in shaping weight outcomes.

Cultural factors significantly influence weight management practices and perceptions of healthy weight. Research shows that Black African-Caribbean and South Asian parents strongly emphasise maintaining traditional cultural diets for their children as part of cultural identity, while Polish parents show more flexibility in adopting local food practices⁸⁰. Many cultures view a "chubby" baby as healthy and a sign of good parenting—a perception that can influence early feeding practices. At the same time, traditional cultural values around family meals, home-prepared foods, and social cohesion may provide protective factors against obesity⁸¹.

Migrant and refugee populations face unique challenges in maintaining healthy weight. Refugee children often adopt unhealthy eating habits as they acculturate to new environments, while past food insecurity experiences may lead to overindulgence once food becomes plentiful⁸². Migrant children have been shown to face stressors like bereavement, language barriers, culture shock, and lack of acceptance, contributing to higher rates of overweight and obesity compared to native children³⁰. These challenges reflect the complex interplay between past experiences, acculturation stress, and adaptation to new food environments.

Pregnancy represents a critical period for weight management with implications for both maternal and child health. Women with higher ultra-processed food consumption during pregnancy have significantly lower intakes of important nutrients and are more likely to experience excessive gestational weight gain⁸³. Environmental factors also play a role, with women living in high-poverty neighbourhoods and areas with high violence rates showing higher risks of excessive weight gain during pregnancy⁸⁴. Cultural beliefs and social pressures, such as expectations to "eat for two" and acceptance of larger body shapes, can conflict with healthcare providers' advice, particularly among women of African and Caribbean ancestry⁸⁵.

These demographic factors rarely operate in isolation—gender, race, culture, and socioeconomic status interact in complex ways to shape weight management challenges and opportunities. Public health approaches must acknowledge these intersecting influences and develop culturally responsive, equity-focused interventions that address structural barriers while respecting cultural values and practices. Particular attention should be paid to critical periods like pregnancy and early childhood, vulnerable populations such as migrants and refugees, and communities facing disproportionate structural barriers to healthy weight management.

A whole system approach to tackling healthy weight management

Throughout this rapid review, a critical limitation has emerged: traditional approaches to obesity prevention typically operate in isolation, focusing on individual responsibility, specific environments, or singular interventions. These siloed efforts fail to address the complex, interconnected nature of obesity's many determinants.

A whole systems approach (WSA) represents a paradigm shift in addressing obesity—moving beyond fragmented efforts to create a coordinated, integrated framework that recognises obesity as a complex problem with multiple interconnected causes requiring collective action across different sectors and levels^{86,87}. This approach brings diverse stakeholders together—from healthcare and education to urban planning and food retailers—to create coordinated solutions that work across multiple levels simultaneously.

The innovation of WSAs lies in their ability to transform fragmented efforts into a cohesive strategy that addresses both upstream drivers and downstream consequences of obesity. By visualising these complex relationships through systems mapping, bringing together diverse perspectives and fostering collaboration between sectors traditionally operating independently, WSAs may achieve what isolated programs cannot: sustainable improvements in population health through environments where maintaining healthy weight becomes more accessible for everyone^{88,89}.

Guidance for implementation

Public Health England (at the time of publication) developed comprehensive guidance for implementing WSAs to obesity at the local level. Co-produced with local authorities, this guidance defines a WSA as "an ongoing, dynamic and flexible way of working" that brings together local stakeholders to understand obesity challenges, identify opportunities for change, and collaborate toward sustainable systems change^{86,87}.

The guidance outlines a six-phase implementation process:

1. **Set-up:** securing senior leadership support, establishing governance structures and forming a core working team
2. **Building the local picture:** collecting data on obesity prevalence, identifying community assets, and mapping current actions
3. **Mapping the local system:** bringing stakeholders together to create a comprehensive map of the local obesity system and develop a shared vision
4. **Action:** Prioritising intervention areas and developing aligned action plans
5. **Managing the system network:** maintaining stakeholder relationships and coordinating implementation

6. **Reflect and refresh:** monitoring progress, evaluating actions, and adapting the approach overtime

This guidance provides practical tools for implementation, including action mapping to identify current activities, network analysis to understand stakeholder relationships, and system mapping techniques to visualise the local obesity system. The "action scales model" helps identify interventions at different system levels, supported by templates for action planning and evaluation^{86,87}.

Core components of whole systems approaches

While the Public Health England guidance provides a practical implementation framework, research has identified specific core components that underpin successful WSAs across different contexts. The evidence identifies then key features essential for effective WSAs to obesity prevention⁹⁰:

1. **System identification and boundaries:** Clearly defining the scope of the system being addressed
2. **Capacity building:** Developing skills and resources within participating organisations
3. **Creativity and innovation:** Encouraging novel solutions to complex problems
4. **Establishing relationships:** Building partnerships across different sectors
5. **Engagement:** Ensuring meaningful involvement of all stakeholders
6. **Communication methods:** Creating strong channels for information sharing
7. **Embedding actions and policies:** Integrating initiatives into organisational structures
8. **Leadership development:** Cultivating leaders throughout the system
9. **Robust and sustainable approaches:** Creating long-term, adaptable solutions
10. **Monitoring and evaluation:** Assessing outcomes and adapting accordingly

While all ten features contribute to effectiveness, evidence suggests that not all are necessary to achieve positive health outcomes. Programs like Romp and Chomp in Australia demonstrated improvements in BMI, parental awareness, and community capacity with nine features, while Be Active Eat Well showed BMI improvements with just seven features⁹⁰.

Facilitators for successful implementation

Building on the ten core components outlined above, research has identified specific facilitating factors that enhance the practical implementation of whole systems approaches. These facilitators represent the "how" of implementation—the conditions and processes that enable the core components to function effectively in real-world contexts. While the core components provide the essential structural elements of a WSA, these facilitators create the enabling environment that determines whether those components will translate into meaningful action and sustainable change^{88,90–92}. The following key facilitators have emerged consistently across successful whole systems initiatives:

- **Strong leadership and full engagement of partners**
Successful approaches require senior leadership buy-in and active participation from multiple stakeholders. Research shows that successful approaches had genuine consortiums of actively engaged partners rather than relying on a single driving force. This leadership must span across different sectors to maintain momentum and integrate core principles into mainstream activities^{88,90,93}.
- **Community engagement**
Projects achieved the best results when they effectively involved the local community in identifying their needs. Active participation of community members in developing local solutions was critical for ensuring interventions were relevant and appropriate to local contexts^{88,90–92,94,95}.
- **Time for building relationships**
Building effective partnerships requires significant investment in developing trust and shared vision. Multiple studies emphasised that long-term commitment to relationship building created foundations for sustainable change^{88,89,96}.
- **Capacity building**

Capacity building was an area of focus in successful WSA implementations, consistently identified as critical for sustainability. Evidence shows that focus is needed on developing local abilities to understand and address obesity using systems thinking. Successful approaches balanced the pursuit of measurable health outcomes with building sustainable local capability, recognising that lasting change requires not just short-term intervention success but developing ongoing local competence to address obesity^{88,91,92}.

- **Good governance and shared values**

Clear governance structures and explicit commitment to shared values create a foundation for effective collaboration. This approach was "found to be effective across different types of communities regardless of population size or location"^{88,92,96}.

- **Consistent language across organisations**

Creating and using common terminology helps different sectors communicate effectively. This ensures that all stakeholders share common understanding of WSA terminology^{87,88,91,94}.

- **Policy integration**

Successful approaches embed the WSA within broader policy to integrate it into existing governmental frameworks rather than treating it as a separate initiative^{86–88,90,96}.

Systems mapping and understanding complex interconnections

Systems mapping has emerged as an effective tool for visualising the complex determinants of healthy weight. Group Model Building (GMB) workshops were identified as powerful tools to promote a shared understanding of the complexities of obesity in the local context and the need for collective actions.

Group Model Building (GMB) is a participatory method that provides a structured workshop format to engage diverse stakeholders in creating visual representations of complex systems. GMB workshops serve multiple purposes: they help communities visualise the nonlinear and dynamic interactions between variables operating across different levels or subsystems within the environment, create a shared understanding of obesity causes in the local context, and enable collective identification of potential intervention points. These workshops are typically guided by established protocols that allow for consistency while maintaining flexibility to adapt to local contexts⁹¹.

A central output of the GMB process is the creation of a Causal Loop Diagram (CLD), which visually represents a community's understanding of their local obesity system. CLDs map the relationships between different factors, showing how they influence each other through reinforcing or balancing feedback loops. These diagrams aren't static tools but dynamic resources used to "identify intervention opportunities and convert these to community-built and systems-oriented action plans"⁹¹. For example, a paper examining food environments identified 46 factors organised into four subsystems (societal, individual/socio-economic, commercial, and political) with nine key reinforcing loops, including how decreased traditional working hours lead to a 24/7 economy, which reduces traditional eating moments, increases preference for convenient meals, and further reduces time spent on meals⁹⁴. Another study focusing on physical activity in Suffolk identified 90 factors across nine themes, highlighting CLDs such as how observed walking/cycling shapes cultural attitudes, which influences policy formation and infrastructure development⁹⁷. Finally, research on adolescent obesity created a comprehensive map of 27 major feedback cycles across four themes: food environment, physical activity, mental wellbeing, and social norms. These cycles show how various factors reinforce each other—for example, how stress leads to emotional eating, which increases weight, which then increases stress further⁹⁸. This approach helps policymakers understand how obesity drivers interact as a system, allowing for more effective, coordinated interventions that address multiple factors simultaneously.

A different perspective to this approach was shown by The Foresight obesity system map, enabling researchers to develop classification systems that group people based on multiple obesity-related factors. This approach identified eight distinct population groups with different risk profiles, allowing for more targeted interventions⁹⁹.

These systems mapping approaches provide critical insights that traditional, reductionist methods often miss. By visualising the complex, interconnected factors driving obesity, communities can move beyond simplistic cause-and-effect thinking to identify strategic intervention points with potential for system-wide impact. The maps reveal how seemingly distant factors—like urban planning decisions and school food policies—may interact to either reinforce or counteract each other. This understanding allows stakeholders to develop more coordinated, synergistic interventions rather than isolated programs working at cross-purposes.

Case studies

The real-world application of these WSAs is best understood through examining how communities have implemented whole systems approaches in practice, as illustrated in the following case studies:

- The Amsterdam Healthy Weight Approach⁹³
- Go-Golborne Initiative^{100,101}
- A whole system approach to childhood obesity in Brighton⁹⁶

Additionally, Local councils across the country have embraced a variety of innovative strategies to promote children's healthy weight, including what are known as tier two weight management services. The link provides [6 case studies](#) published by the local government association that offer valuable insights into the challenges and opportunities associated with promoting children's healthy weight at the local level. They demonstrate the power of collaboration, innovation, and whole system approaches in driving meaningful change¹⁰².

Sustainable weight maintenance

Sustainable weight maintenance represents a critical but challenging aspect of healthy weight management that aligns closely with whole systems thinking. While whole systems approaches address the complex factors that contribute to healthy weight management, sustainable weight maintenance focuses on the equally complex task of maintaining weight management over time- a challenge that requires across not just the social inequities and environmental factors but the individual behaviours and biological influences too.

The evidence base has identified several factors influencing successful weight loss and maintenance. Self-efficacy and emotional regulation has been shown to impact maintenance success. Those with higher self-efficacy were more likely to take self-motivated steps toward maintaining weight loss, while emotional eating often hindered healthy behaviours¹⁰³. This further is demonstrated in a longitudinal study following women for two years after a structured weight management program found distinct differences between “Maintainers” and “Regainers”, Maintainers developed a “maintenance mindset” focused on preventing regain rather than continuing weight loss, demonstrated better emotional regulation, and created effective strategies for managing tempting food situations¹⁰⁴. Similarly, another study identified ‘key situations’ when weight management decisions are made. In these situations, behaviour is influenced by emotional state, perceived control, personal values, knowledge, skills, and existing habits. Successful weight managers developed effective strategies to handle these challenging situations differently from those who were less successful¹⁰⁵. A systematic review of successful weight loss maintainers noted important differences between short-term and long-term maintenance. Long-term studies (5-7 years) emphasised profound identity transformation, with weight maintenance becoming fully integrated into participants’ sense of self. Monitoring practices evolved to become more intuitive over time, maintenance strategies stabilised into established routines requiring less conscious effort, and maintenance behaviours become fully integrated into social identity¹⁰⁶.

In addition, the role of habit formation was emphasised to be particularly significant. Research distinguishes between merely stopping habitual behaviours and truly breaking underlying habit associations. Habits consist of three components: environmental cues that trigger the habit (locations, times, emotional states), mental associations between cues and actions (formed through repetition), and automatic behavioural responses (occurring with minimal cognitive effort). These mental associations persist even when behaviours change temporarily, explaining why people often revert to old

patterns when willpower diminishes or when returning to familiar environments. Effective weight maintenance requires "habit reversal" techniques that systematically replace existing habit associations through awareness training, competing response practice, contextual consistency, reinforcement, and an overwriting process¹⁰⁷

Support structures were also shown to be crucial, with regular supervision, weigh-ins, and check-ins highly valued. When interventions ended, many participants felt 'set adrift' and struggled to maintain weight loss^{103,104}. Building on this, family, friends, and peer support significantly facilitated weight maintenance, while 'social saboteurs' and cultural norms around food created challenges^{103,105}. A conceptual model integrates these findings, suggesting that positive social support reduces psychological stress, which improves executive functioning, facilitating healthy habit development- ultimately leading to successful long-term weight maintenance¹⁰⁸.

Geographic access to healthy foods, obesogenic food cues, and exercise facilities influenced maintenance. These environmental barriers become more significant during the maintenance phase than during the initial weight loss^{103,109}. For bariatric surgery patients, environmental factors play a role in long-term outcomes, though to a lesser extent than non-surgical populations. Living in areas with more fitness facilities, better exercise opportunities, and better "bikeability" was associated with improved weight loss in the short and medium term¹¹⁰. However, weight stigma also significantly affects bariatric patients, contributing to healthcare avoidance, dietary challenges, psychological distress, and reduced physical activity¹¹¹. Therefore, successful weight maintenance following bariatric surgery depends on address multiple factors, including psychological support, cognitive function, physical activity, dietary patterns and hormonal changes¹¹⁰.

These findings on sustainable weight maintenance highlighting how individual factors (habits, self-efficacy), social contexts (support systems, cultural norms), and environmental conditions (food access, exercise facilities) interact to influence long-term outcomes. This multilevel perspective aligns with the WSA principle that effective interventions must address interconnected factors across multiple domains rather than focusing on isolated behaviours. By integrating sustainable weight maintenance strategies into whole systems approaches, communities can create environments that not only prevent obesity but also support those who have lost weight in maintaining their healthier lifestyle over time.

Conclusion

This rapid review provides critical insight for Suffolk: while individual approaches to weight management remain important, they alone cannot address the complex, interconnected factors that influence healthy weight across communities. The evidence presented makes a compelling case for expanding Suffolk's focus beyond individual behaviour change to embrace a comprehensive Whole Systems Approach (WSA).

The review explains how weight stigma and bias, socioeconomic inequalities, built environments, retail food landscapes, school settings, social networks, and commercial influences all shape weight outcomes in powerful ways. These factors begin influencing weight trajectories from early childhood and continue throughout life, with significant impacts during key transition periods.

Key findings from this evidence suggest that:

1. Weight stigma and bias represents a persistent social issue with far reaching health consequences that extend beyond individual behaviour. Research shows that public health and policy perspectives shifting focus from weight loss to promoting overall wellbeing and healthy behaviours for everyone- including body acceptance, intuitive eating, joyful movement, and size diversity- can improve physiological measures, metabolic parameters and psychological outcomes independent of weight changes with better long-term adherence than traditional approaches.
2. While individual-focused interventions provide valuable support, research shows they achieve only modest results when implemented in isolation. Evidence highlights that comprehensive approaches addressing both individual behaviours and environmental factors produce more sustainable

outcomes. The historical over-reliance on individual responsibility models has diverted attention from the powerful influence of community infrastructure, food environments, and socioeconomic factors that shape health behaviours.

3. Sustainable weight maintenance has also been shown to require specific psychological adaptations- including identity shifts, improved emotional regulation, and habit breaking and formation- alongside robust social support systems. Programmes incorporating frequent behavioural coaching and mental health support achieve better long term outcomes.
4. A whole systems approach (WSA) offers a practical evidence-based framework for bringing together diverse stakeholders to create coordinated solutions that address multiple determinants simultaneously. Case studies from Amsterdam, Brighton and guidance documentation demonstrate critical success factors such as strong leadership, meaningful community engagement, relationship building, and capacity development-providing a roadmap for implementation. This approach effectively addresses the complex interconnected determinants of obesity that no single intervention can tackle alone.
5. By strategically integrating these evidence-based individual services with broader environmental and perspective changes, communities can create reinforcing systems that both prevent obesity and support those already affected in achieving lasting behavioural change.

By adopting this comprehensive perspective, Suffolk can transform its approach to healthy weight management—creating communities where maintaining healthy weight becomes more accessible for everyone while continuing to provide the individual support services that help residents navigate their personal weight management journeys.

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Appendix 6: Rapid review of evidence on the developments and innovations in maintaining a healthy weight

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