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**Scottish Public Health Network (ScotPHN)**

**Obesity Route Map Action Plan Review  
Literature Review**

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## **Aim**

The aim of this literature review was to assess the academic evidence since the Foresight Review (2007)(1) and to ascertain if there had been any developments which demand that the actions of the Obesity Route Map(2) should be strengthened or redirected.

## **Introduction**

Obesity is a BMI of >30.(3) It is a major risk factor for cardiovascular disease, Type 2 diabetes, some cancers and stroke(3). According to the 2013 Obesity Indicators for Scotland(4), 27.1% of Scottish adults (i.e., those over the age of 16) were obese, while 64.3% were overweight or obese. Using data from the Scottish Health Survey to produce time-period cohorts, Lean et al(5) found that from 1998-2008 there was a mean increase (7.4cm (8.1%) in men and 8.6 (10.9%) in women) not only in BMI but also in waist circumference which is a risk factor for type 2 diabetes(3). At the end of 2013 prevalence of diabetes in Scotland was 4.9% of the population (88.2% of which was Type 2).(4,6)

According to Wang et al,(7) using whole UK data, should this trend continue to 2020 unabated, 7 in 10 English people would be obese, with a projected healthcare cost in 2020 of £648 million higher costs. Prevalence of obesity in Scotland is higher than that of England (8).

The Obesity Route Map Action Plan attempts to halt and if possible reverse this increase in BMI/WC by interventions in recognised top-down drivers such as food consumption, lack of physical activity, health at work, and childcare environments which promote sedentary behaviour rather than physical activity, active travel or play, in order to balance the energy in/energy out equation.

## **Methods**

A search strategy was performed upon OVID databases and others including Medline, Embase, CINAHL, Web of Science, PsychInfo and Cochrane Reviews with a cut-off point of 2007. Search terms used were a combination of Obesity, Physical Activity, Sedentary Behaviour, Great Britain, Scotland, England, Secondary and Primary Preventions, Evaluation, Eating Disorders, Adult, Inequalities, Reviews and, within Medline, also subject headings and similar terms. While the search was initially constricted to systematic reviews as they would be most likely to have a higher level of evidence, references from articles studied were also followed up and the "most cited" articles from 2010 onwards were also viewed.

A further search of grey literature was carried out using the search terms; Obesity AND "healthy weight" or maternal obesity AND Scotland; there was also a search of Scottish Government Publications; search of UK Government Publications.

## **Reservations**

It should be noted that much of the evidence for obesity interventions is, even in the most controlled studies/reviews, at some point self-reported and so open to bias. On the subject of physical activity research much of the data reported is cross-sectional and, while much of the surveillance and assessment of outcomes uses BMI, this is not standard across all the literature(9).

## **Energy Consumption**

As noted in studies since the Foresight report(1), the obesity epidemic has global drivers in that the global price of certain foods (mostly animal, oil and sugar(10)) has become markedly cheaper. Not only have they become markedly cheaper, they have become more widely available, due to more efficient distribution systems, and research since then has consistently linked higher weight status with access to energy dense foods, easily purchased away from home(11) The obesity epidemic is the response of normal weight individuals exposed to an obesogenic environment, which is an environment which provides cheap and easy calories and a physical environment which does not ask enough of us(12,13)

The Department of Health has noted that now 26% of food is purchased away from home, where there is little control on either content or portion size(14). In a systematic review(15) Mehta and Chang(16) have suggested that it is the easy availability of fast food (17) in the away from home environment, in particular, that promotes unhealthy weight, and Kent et al that higher weight status was consistently linked to easily accessible and easily purchased energy dense food. (18)

Fleishenhacke found higher body mass index was associated with living in areas with increased exposure to fast food.(17) Giskes et al also found that residents of areas with greater access to supermarkets or lower accessibility to takeaways had lower obesity prevalence than those with opposite accessibility(12).

Interestingly, Nikolaou (14) noted in a controlled study held in a city centre university that displaying calorie content clearly and *visibly* had a significant effect on the purchase of those items. It has also been noted that food purchased away from home was more responsive to changes in price(19) and people were more willing to cut back in this area than for food purchased for home consumption.

## **Portion size**

There continues to be severe confusion over portion sizes(20), and a tighter definition and working with catering is recommended to produce a standard size(21)(14). This is an important point given that a French study strongly correlated overweight children with the portion size of biscuits or sweet pastries consumed (14)

Vermeer et al(22) in a European study discussed the feasibility of “environmental portion size interventions” where a variety of portion sizes and proportional pricing

was seen as feasible to implement both by consumers and point-of-sale representatives. A gradual decrease in “supersize” and unregulated portion sizes or noticeable portion size labelling would be seen as more effective in reducing food intake(22). Martineau notes in the BMJ that while very minor reductions in salt intake for health improvement can be achieved by nudging, much greater reductions were achieved by legislation(23).

## **Sugar**

Since the Foresight Report in 2007(1), one of the more widely researched topics has been sugar consumption (particularly in the form of sugary drinks) and weight gain that may be caused from over-consumption of this(24)(19). Sugar-sweetened beverages (SSB) are a form of so-called “empty” calories as they are low in nutritional value but high in calories(24); they are also more likely to be attractive to children and adolescents and weight gain at that age is harder to shift in adulthood(25). One study noticed that in the USA children’s consumption of sugary drinks had passed that of milk(19). Because of this there has been the call in some areas for a “sugar tax” in order to reduce consumption, or for an overall ban on subsidies on animal, sugar and oils in order to raise costs globally on these items(26). Certainly, cutting out SSB would reduce calorie intake if replaced with water, and not replaced with anything else(27) but there is still debate on whether they are, *per se*, a problem(28) or a major part of a much greater issue of easy access to energy-dense foods.(17)

It has been argued that a “sugar tax” would be regressive, that is it would impact most severely on those at the lower end of the socio-economic scale(29) and as it has been demonstrated that there is a confirmed gradient in the risk of obesity(30), i.e., that as the slope decreases down to the lower end of the socio-economic scale there is an equivalently greater risk of obesity; this is an essential point. However, economic modelling with Irish data(29) has found that while a sugar tax alone would be regressive, if it was inputted hand-in-hand with subsidies for fruit and vegetables, then the regressive aspect is lost. Green et al have stated that, particularly in richer countries, if animal food and confectionery food prices rise then these items will be dropped(31). The cost of healthier eating itself was seen as a barrier amongst lower SES families(32), so subsidising some foods (fruit and vegetables) might be seen to address this.

While Beauchamp et al (33) noted that the evidence for obesity prevention regarding socio-economic status is limited, those interventions which were more likely to be successful across all economic groups were those that involved some degree of environmental, social (34) or structural change and attempted to address underlying inequalities(32).

Fundamentally, the research shows that for excess consumption for food and calories to be lessened, then a change in the drivers of the obesogenic environment is needed.(11)

## **Physical Activity**

The other main driver of an obeseogenic environment is that of an environment which either does not demand much physical effort or makes the sedentary choice the easy one.(35)Physical inactivity has been shown to be the fourth highest cause of premature mortality globally(36), and is a major contributor to the obesity crisis. In England and Wales 67% of the modal share of transport is by motorised transport yet it has been shown that active travel (walking or cycling) has a significant effect not just on lower BMI but also on lower body fat(37). Indeed, Flint and Cummins have looked at nationally representative data for England and Wales and shown that even use of public transport rather than private has a significant effect on BMI and body fat(37). Walkability was a factor in obesity in neighbourhoods (38) Conversely, it was found that areas which had low walkability had a likelihood of a BMI above a healthy weight(38),(39) while areas which had better infrastructure and high connectivity encourages active transport; in Denmark, changes to infrastructure, and speed limits have boosted the cycling rate by 50% in two decades(35). This would need political will to prioritise public transport and active transport over private transport but could show health and weight benefits at a population level(40). It is further argued that promotion of cycling over motorized would have an effect on traffic congestion and air pollution as well as obesity (41). While people may not take up active travel as a health benefit in itself, particularly if they do not see themselves as overweight or obese(42)(43), Skouteris et al noted that an appeal can be made via personal or group values(44,45).

Physical activity outwith active travel has been usually promoted via sport, recreation or health interventions (46). However, there is evidence that those in lower socio-economic groups use these less often (47), possibly through reasons of cost, even though there are often discounts already available for children and lower income groups. Such investment may have the unintended consequence of exacerbating health inequalities. Also, people using sports centres are already, ipso facto, motivated to exercise, and the public health focus must be on the greater part of the population which is mostly sedentary(4). Although there is a small -moderate positive effect found in face-to-face physical activity interventions, there is little evidence that this is effective in the long term.(48)

## **Sedentary behaviour**

It has been noted in some studies that while physical activity may not by itself cure obesity (it needs dietary restriction to be effective)(49,50), it has been called almost a panacea for good health otherwise(36). In 2012, 35.5% of adults in Scotland spent more than four hours a day in front of a television or screen. N.B., this does *not* include time spent at work, which may very well be sedentary in nature(4). Not only has there been shift away from active travel and work-related physical activity(10) but there has been a move towards more sedentary leisure time(51). There is evidence to show (52) that greater time spent in sedentary behaviours increases the

risk of metabolic syndrome which is itself a precursor to Type 2 diabetes. Sedentary behaviour may also be a factor in weight gain from short sleep which there is some evidence to suggest may be a factor(53), particularly for older people(54).

### **Workplace**

In regard to Healthy Working lives, there is evidence to show(55)(25) that sedentary behaviour may be a contributory factor in employee weight gain. Epidemiologic studies(55) have shown associations between greater BMI and long works hours, shift work and job insecurity. Health promotion at work which has shown evidence of benefit, although that benefit has been modest, has focused on scheduled sessions for health promotion and behavioural counselling(56). Physical activity is increasingly associated with metabolic dysregulation. Short bouts of PA incorporated into the organizational working day have been found to be beneficial, although the evidence for this in the workplace is weak as most studies did not evaluate for physical activity.(40) It should be noted that most workplace interventions relied on staff opting in.(57)

### **Early Years**

Maternal Obesity in Scotland is a problem (58)with the Scottish diet too low in fruit and vegetables, fish and complex carbohydrates including dietary fibre, and too high in fat, sugar and salt(8,59). Maternal obesity increases the likelihood of gestational diabetes, which not only impacts on their health but also that of the infant, having a higher risk of childhood obesity(60). Obese women also have higher rates of induction and caesarean births, pre-eclampsia and longer labours(61). There is weak evidence that interventions to promote healthy eating and physical activity in pregnancy may have a beneficial effect on weight.(58)

Sacher et al(62) state that all international recommendations on child obesity/overweight interventions should have core elements involving the whole family, nutrition education, behaviour change and physical activity promotion. In the systematic review studies where behavioural counselling was on offer, where the child was pre-adolescent, and one family member accompanied the child showed significant greater reductions in weight loss than studies parents were not involved in this way.(63)

Outwith the family, those environmental factors which affect adult obesity affect children too, and the ones which are shown to have most impact in obesity prevention for children were portion size, (9)availability of sugar-sweetened beverages and food promotion. Modifying the school environment so that there is access to healthy food and drink can also be beneficial. (64)There is strong evidence that those activities of the commercial food industry are actively undermining those opportunities to create healthy food environments for children and adults,(9,11,64) so while there may be some benefit in settings-based approaches(65) these will always be hampered and likely have minimum benefit unless there are policies to reduce negative effects of the wider environment.

There are further drivers to set a healthy lifestyle such as access to green space, physical environment of the school(66) and healthy food available within school and its environs and all have been shown to have some impact(67) in primary prevention of child obesity. Reduction in television watching has also been involved in beneficial effects.(9) This may be due to a number of factors, perhaps increased physical activity but it also reduces the chance to snack. Notably, in a 2009 study, Harris et al found that exposure to television advertising promoting snacking increased food intake regardless of the food advertised.(68)

### **Perception**

An American study(21) of how consumers looked at health promotion literature found that the term “balance food intake with physical activity” was wrongly understood as it gave the impression that over-consumption could be counteracted with physical activity. Everson –Hock et al(32) while studying interventions aimed at lower socio-economic groups in the UK found that there was a corresponding problem in the UK with people “people felt bombarded by information, often confusing and contradictory, and distrust was common.”

However and problematically, an evaluation of the UK based “Change for Life” found a common perception that diet and exercise was satisfactory, and this was common across all SES(69). This may be due to the noted fact the overweight has become the norm and that those ,particularly in the 36-45 age range, find what would be “overweight” and is overweight according to BMI is now “alright”(43). It should also be noted that while so many people self-report that they take enough physical activity(4). It was found that when actually measured with accelerometers in comparison to self-report questionnaires, most people in the assessed group fell very far short of required physical activity for good health(70). Yet those who think their weight and activity are “alright” when actually very far from the case are less likely to opt-in to diet and exercise(43). This is an argument for greater environmental changes in both the food and physical environment so that people might reduce their intake/expand more energy without being aware of it.

### **Interventions**

Although treatment of obesity is not the remit of the Obesity Routemap Review, with a prevalence of overweight and obesity in Scotland of 66%(4) a “what works” for those already obese needs to be noted. In interventions reviewed, both diet with or without exercise and/or behaviour counselling demonstrated significant weight loss and improved metabolic syndrome and Type 2 diabetes risk for at least two years(50,64). In lower SES it was found that a number of methods made interventions for treatment more effective(32) ; gender specific, appealing to women’s desire to cook healthy food for their children or for men to be more active in a way that was perceived to be “masculine” e.g. training for a sport(34).



Fundamentally there needs to be knowledge of the community so interventions can be tailored.

The EPODE project(71) which employs both a grassroots and top-down actions was effective in decreasing the overall prevalence of overweight in children (8.8% in Fleurbaix Laventie Ville Santé and 17.8% in the two comparison towns) although it was eight years until this decline became apparent. Not only was it shown to be effective but in France it was effective across all socio-economic levels. Key learning in order to make this community wide intervention work involved political commitment, resources, support services, evidenced based interventions and sustainability over time. Among children there is evidence that community-based approaches can be effective in reducing population weight gain(72). That there is not as much evidence on adult measures for weight loss is due to lack of controlled evaluation of effect (72).

## **Conclusion**

From the above literature review it would seem to be the case that in order to reduce overweight/obesity there needs not only promotion of healthy eating but reduced access in environmental and social areas to calorie-dense, cheap, accessible food.

While there has been research into many aspects of obesity, the overall view is that the evidence for the actions put in place have been strengthened and while there are interesting developments in the matter of sedentary behaviour, which has become a driver in its own right separate to physical inactivity, the fundamental evidence for the current actions remains and has only become stronger. As well as promoting healthy items such as fruit and vegetables, there needs to be more emphasis on reducing access to calorie dense items. Haby(73) reports that there has been a shift from individual level interventions to a more socio-ecological approach which encourages action at many levels including the organisational and policy and WHO has noted this in its “What Works” report.

This, with a move away from a wholly “low-hanging fruit” intervention aspect of health promotion towards a more community based preventative measures could be effective in reducing population weight gain.

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