



GLASGOW CITY COUNCIL

LAND AND ENVIRONMENTAL SERVICES

ENVIRONMENTAL HEALTH

SATURATED FAT IN TAKEAWAY MEALS PROJECT

FINAL REPORT

**PREPARED BY EILIDH PATON, PROJECT MANAGER
LES, SUSTAINABILITY AND ENVIRONMENT**

eilidh.paton@glasgow.gov.uk

Table of Contents

Section		Page(s)
1.	Executive Summary	3 - 7
2.	Introduction	8 - 10
	- Diet-Related Ill-Health	
	- The Health of Glasgow	
3.	Saturated Fat Project	11 - 37
	- Background	
	- Phase 1 – Research	
	- Phase 2 – Information Gathering	
	- Phase 3 – Pilot	
	- Phase 4 – Main Project	
	- Results and Observations	
4.	Discussion	38
5.	Challenges within the Project	39 - 40
6.	Feedback from Businesses	41 - 42
7.	Further Work	43 - 45
8.	Conclusions	46 - 49
9.	Recommendations	50 - 52
10.	Acknowledgments	53
11.	References	54 - 55
12.	Appendices	56 - 73

SATURATED FAT PROJECT - EXECUTIVE SUMMARY

Background

Glasgow has many acknowledged health problems and inequalities. While these largely mirror those of the rest of Scotland, the City has a particularly strong association with poorer health and shorter life expectancy than other areas. ⁽¹⁾

It is acknowledged that considerable resources are already being devoted to tackling the general diet-related problems experienced in Scotland. However, it is the view of Glasgow City Council Environmental Health that there remain areas where there has been relatively little collaborative, multi-agency engagement and where Local Authority Environmental Health services can contribute meaningfully.

Environmental Health Involvement in Diet and Nutrition Work

There has, traditionally, been reluctance within the environmental health profession at Local Authority level towards engagement in diet and nutrition. This reflects the essentially statutory nature of food law enforcement, the relative absence of training and expertise on diet and nutrition within the profession and, latterly, the diminution of resources available to Local Authorities. This position has, however, been challenged by some Scottish Local Authorities, for example Perth and Kinross and South Ayrshire Councils, where diet and nutrition-related projects have been undertaken with notable success.

Recent experience has engendered a sense that environmental health services in Glasgow and elsewhere have an opportunity, unavailable to other agencies, to positively and materially influence health aspects of food by encouraging business operators to change practices and behaviours. Furthermore, it is perceived that the businesses enjoying the lowest levels of technical expertise and industry support, i.e. small independent caterers, are also the most dependent upon environmental health professionals for advice on food hygiene and standards as well as occupational health and safety. Consequently, such businesses may also be receptive to diet and nutrition advice.

The Saturated Fat in Takeaway Meals Project

It was determined that a project should be devised which would test the concept that Environmental Health professionals can, during the course of existing duties, influence food businesses and effect nutritional change. The concept of re-use of deep fat fryer oil was viewed as a strong theme.

The key focus of the project was upon practices prevalent in takeaway outlets which may result in dishes having a higher level of saturated fat than might otherwise be the case if produced differently. The project sought to establish if environmental health professionals would be able to identify suspect practices and, by providing verbal and written advice, effect a change in the saturated fat content.

It should be noted that the focus on saturated fat in this context was seen simply as a vehicle for demonstrating the potential for change. The project outcomes can and should be extrapolated to other aspects of food production and their effects.

Project Scope

The project, titled *Saturated Fat Levels in Takeaway Meals*, commenced in January 2015 and comprised 4 Phases:

- **Phase 1 – Research**
- **Phase 2 – Information Gathering**
- **Phase 3 – Pilot**
- **Phase 4 – Main Project and Analysis**

Three types of takeaway outlets were selected, i.e. fish and chip shops, Indian-style outlets and Chinese-style outlets. Specific meal-types were also identified and targeted.

Project Objectives

The primary objective was to engage with selected businesses in order to determine the degree to which a Local Authority Environmental Health Service may influence businesses to make significant and measurable and health-related changes to preparation/processing methods.

Secondary objectives were:

- To obtain data on the levels of saturated fat in meals sold by a range of takeaway premises within Glasgow; and
- To establish if saturated fat levels in takeaway meals are unnecessarily elevated as a consequence of the food preparation/processing methods used; and
- To determine if alternative methods of preparation/processing could lower saturated fat levels in targeted foods.

Core Project Activity

Phase 4 of the project comprised engagement with 19 takeaway outlets. Activity during this Phase included:

- Initial sampling ("Sample 1") and analysis of meals served by hot food takeaway businesses;
- Determination of saturated fat content via analysis;
- Observation of preparation/processing methodologies and ingredients;
- Provision of advice to business operators on alternative practices and ingredients;
- Re-sampling ("Sample 2") and analysis of meals following implementation of advice.

Business Engagement

Businesses were visited by officers solely for the purposes of the project. The nature of the interventions was not intended as a model for future Environmental Health activity in this area. Targeted meals were sampled and then officers identified the preparation and production methods used, assessing these against guidance contained in materials developed by Food Standards Scotland and Glasgow City Council's action packs. Recommendations were subsequently made and secondary samples obtained at a later date - once recommendations had been implemented.

Results of Analysis

Analysis of primary and secondary samples and subsequent comparison revealed a noticeable reduction in saturated fat in the majority of meals following the implementation of officer recommendations.

Conclusions

Officers of Environmental Health are capable of assessing catering methods and making recommendations for improvement

The project has demonstrated that environmental health staff are in a unique position to influence food business operators. They have an understanding of food preparation and production methods and are experienced in relaying messages to business operators. Critically, they have a statutory duty to enter and inspect food premises for food safety purposes. They do not, however, generally hold qualifications in, or have specialist knowledge of, diet and nutrition. It is contended, however, that a programme of training in diet and nutrition for environmental health staff allied to a robust suite of information materials aimed at businesses can help to overcome any existing shortfall.

The project did not seek to replicate a scenario whereby diet and nutrition matters are raised within the context of an *Official Control* visit or intervention. Rather, the aim was to establish if officers had the basic capability to identify issues on-site and encourage the business operator to make subsequent changes which might enhance the quality of food on sale. Feedback from project team members (who all have food safety enforcement duties) indicated a confidence that given targeted materials and a limited degree of training, they could embed a diet and nutrition component within routine interventions. Such a component could be minimal, especially at early stages, perhaps only extending to the issue of sector-specific guidance leaflets, with a gradual increase in engagement at subsequent interventions. In effect, the experience of running the project has instilled a sense of confidence at Glasgow that this work can be added to existing statutory functions with a minimal impact upon the Authority's capacity to deliver official controls at the current level.

The implications of this could be significant. Over 3,300 interventions are made within catering premises in Glasgow every year. Even if allowances are made for any slight increase in time on-site, it is clear that a very considerable number of businesses could receive focused FSS-sanctioned advice, especially if the practice were replicated across all 32 Scottish Local Authorities.

This will inevitably raise questions about Local Authority capacity. However, it is the opinion of Glasgow City Council Environmental Health that even where food law enforcement resources are straitened, it would be feasible to introduce a programme of engagement which would be light-touch to begin with but which would intensify gradually over a period of time (i.e. over several routine official control interventions).

Recommendations provided on saturated fat reduction were largely effective.

There was a measurable reduction in the levels of saturated fat in meals when Samples 1 and 2 were analysed and results compared.

The levels of saturated fat did not decrease within all samples taken, however the interventions carried out by officers were deemed to have resulted in the majority of dishes having reduced saturated fat levels at Sample 2 stage, particularly those found in fish & chip shops.

It should be stated that there have been no subsequent attempts to obtain confirmation of the maintenance of "new" practices as the principal objective of the project was to demonstrate that positive changes are possible. Additionally, it is accepted that the level of officer engagement at each business during the project would be unsustainable if replicated on a larger scale i.e. 45-60 minutes. However, visits were conducted in a particular manner in order to gain a better understanding of practices. This would not need to be replicated where established materials were available, such as guidance on diet and nutrition.

The saturated fat content of some of the samples was noticeably higher than the recommended Reference Intakes (RI).

The RI is a guideline based on the amount of nutrients and energy an average individual adult requires for a healthy balanced diet.

The evidence from this project does not demonstrate with complete certainty that the reuse of oil in dishes is a major contributory factor into increased saturated fat levels.

Despite this lack of evidence, further work should be considered as this practice may increase levels of other compounds associated with ill-health.

The project was designed to test the hypothesis that Local Authority Environmental Health officers can influence business operators in relation to the production and service of healthier meals and thus effect positive change in practices and ingredients. The long-term vision is that officers can use their influence and knowledge to encourage change based upon pre-determined science, ideally using centrally-produced materials. Consequently, any future efforts to effect change could be delivered via relatively brief engagements, embedded within existing official control/inspection activity.

A simple cost-benefit analysis indicated that the overall cost of diet and nutrition training for all food law enforcement officers in Scotland would be approximately £114,000. A trained complement of officers could thereafter deliver key messages to businesses and encourage key changes in up to 15,000 businesses per year.

Recommendations

1. There should be further work conducted into the practicalities and resource implications involved with delivering diet and nutrition advice during food safety interventions conducted by Local Authority environmental health services. This work should include a study on the optimum length of time required to do so effectively on each occasion, the nature of materials and supporting information required and the potential effect upon the overall food safety work programme. Creation of effectiveness measures would be essential in order to enable the design of the optimum, most cost-effective input strategy.
2. There is a need for a suitable forum where joint strategy on diet and nutrition input by environmental health can be formulated and actioned. This forum would enable Local Authorities, Food Standards Scotland, the Scottish Government, diet and nutrition specialists, Royal Environmental Health Institute of Scotland, NHS, representatives of the food industry and others to convene and develop plans for conveying an effective message to food businesses in Scotland. The key objectives of the forum should be the oversight of projects and the development of guidance materials.
3. Food safety enforcement staff within Local Authorities should undergo an appropriate level of training in diet and nutrition. Further consideration is required in order to establish the nature of such training.

4. Consideration should be given to the suitability of a reward or recognition scheme. The Healthy Living Award Scheme has successfully promoted awareness of healthy options in certain contexts. While small independent takeaway businesses would be unlikely to reach the threshold for a Healthy Living Award, the introduction of a scheme recognising more limited achievement in diet and nutrition could be of help. (Conversely, it could have a negative effect, e.g. by creating a false impression of the nature of food sold from a "badged" takeaway.)
5. There should be an effort to promote the availability and capability of Local Authority environmental health services in the diet and nutrition field. This process would be multi-faceted and would require engagement within Local Authorities (e.g. in relation to Community Planning), with professional bodies, such as the Society of Chief Officers of Environmental Health in Scotland (SoCOEHS) and the Royal Environmental Health Institute of Scotland (REHIS) and with national bodies including Food Standards Scotland, the Scottish Government and the NHS.
6. Work should be undertaken in order to assess the feasibility of co-ordinating analysis of dietary/nutritional values concurrently with existing food surveillance sampling work presently undertaken by Local Authorities.
7. There should be further work to establish whether changes made in response to environmental health recommendations are maintained for extended periods

INTRODUCTION

Diet-related Ill-Health – Obesity, Cardiovascular Disease and Type-2 Diabetes

The World Health Organisation has estimated that one third of all cases of Coronary Heart Disease are attributable to diet ⁽²⁾.

Poor diet and nutrition are believed to be key causes of ill health and premature death in Scotland where the two leading causes of death are coronary heart disease (CHD) and cancer⁽³⁾.

It is well established that a healthy diet can help reduce the risk of coronary heart disease, stroke, some cancers, obesity, type 2 diabetes, high blood pressure, osteoporosis and tooth decay ⁽⁴⁾. Development of these long term health conditions can lead to a decrease in life expectancy whilst also causing a financial burden on the National Health Service (NHS). It has been estimated that treatment of overweight and obesity-related ill health could cost £600 million annually within Scotland alone⁽⁵⁾.

There has been a 43.2% reduction in the number of deaths from CHD in Scotland within the last ten years which has been observed in both the most deprived and least deprived communities. While this trend is extremely positive, there were still 7239 deaths in Scotland in 2013 where CHD was the underlying cause ⁽⁶⁾.

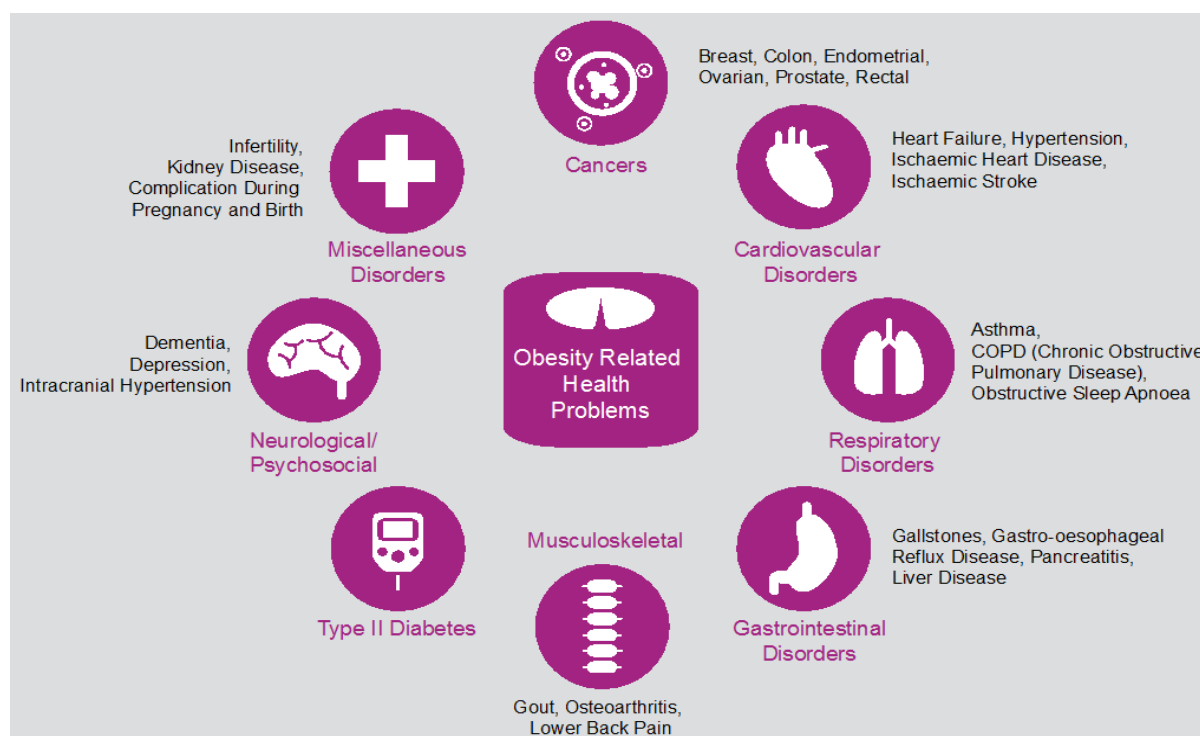


Figure 1- Comorbidities commonly associated with obesity Source SPICe Briefing - Obesity in Scotland. January 2015

Between 1995 and 2008, adult overweight and obesity rates increased dramatically but have since stabilised ⁽⁵⁾. Despite this Scotland has one of the highest levels of obesity in OECD countries. ⁽⁷⁾

In 1996, the Scottish Diet Action Plan set the Scottish Dietary Targets as a way of adopting population approaches to reduce obesity and diet-related cancer rates. In 2013, these goals

were revised in order to reflect advice from the Food Standards Agency Scotland. The guidelines for fats, saturated and trans fats are:

- Average intake of total fat to reduce to no more than 35% food energy;
- Average intake in saturated fat to reduce to no more than 11% food energy; and
- Average intake of trans fatty acids to remain below 1% food energy ⁽⁸⁾

These goals partly define the diet that will enhance and support the Scottish population health.

The Health of Glasgow

Compared with the rest of Scotland over the period 2012 to 2014, the city of Glasgow experienced a higher death rate ⁽⁹⁾. The life expectancy of a Glaswegian male at birth is more than six years below the national average. A Glaswegian female has a life expectancy of over four years less than the national average. This is often attributed to the “Glasgow Effect” - the term given to the unexplained poor health and low life expectancy encountered in the city compared to similar areas within the United Kingdom - such as Manchester and Liverpool. The effect is still not fully understood but is not solely attributed to poverty.

Whilst life expectancy has increased throughout Scotland, there are considerable differences in life expectancy between different areas. In October 2015 the National Records of Scotland published data demonstrating that males and females had the lowest life expectancy within the Greater Glasgow and Clyde area, with men living to 75.3 years and women 80 years ⁽⁹⁾.

A more worrying pattern emerged through this study, in that there are “spatial inequalities” observed within Glasgow itself. Between the areas of Jordanhill and Bridgeton, a distance of only four miles, the life expectancy differs by 13.9 years for men and 8.5 years for women. Figure 2 demonstrates the difference in male life expectancy between two different areas in Glasgow ⁽¹⁰⁾.

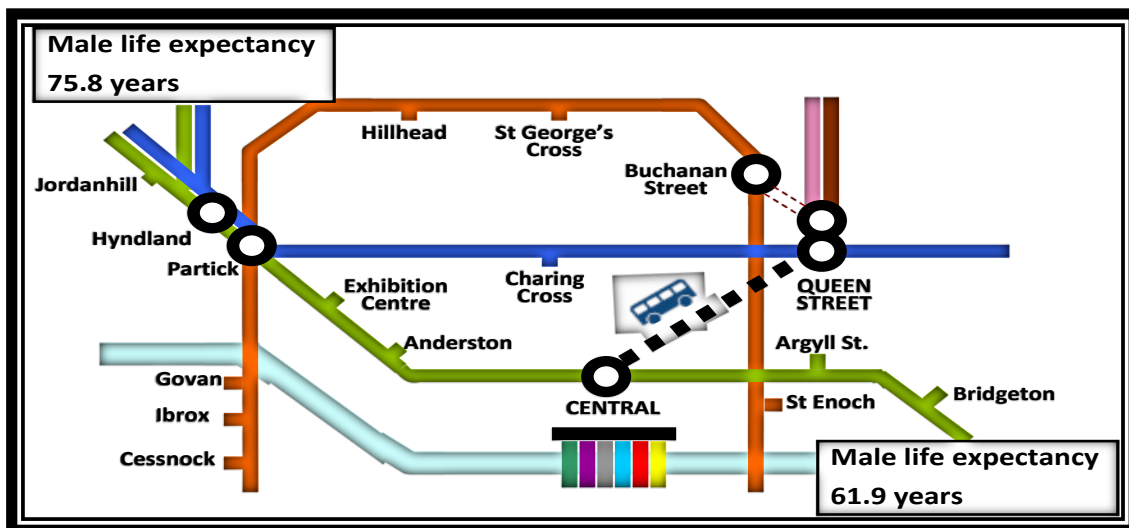


Figure 2- Extract of the Glasgow Rail system – illustrating geographical variances in life expectancy Source: McCartney G. Illustrating Glasgow’s health inequalities. *JECH* 2010; doi 10.1136/jech.2010.120451

Glasgow has a higher proportion of deprived datazones (30%) than any other area in Scotland⁽¹¹⁾.

There is a general perception that fast food outlets are more prevalent in deprived communities – possibly accounting in part for the higher obesity rates and poor health in these areas. Research by Cummins *et al* found that there was a higher proportion of McDonald's restaurants per thousand population in more deprived areas in England and Scotland than in less deprived areas⁽¹²⁾.

This is further supported by the views of locals obtained within these areas. The Observer published an article in 2004 about Shettleston, a deprived area within Glasgow, and made several references to the volume of fast food premises within the area. One resident interviewed commented:

"The children go to Burger Kings or McDonalds, and there's nothing you can do.... There is a fast food shop at every corner. Going to those places becomes a habit"⁽¹³⁾

In contrast to Cummins' research and quoted examples of public opinion, research carried out within Glasgow has not, to date, produced similar findings. A team of researchers within Glasgow plotted the location of the city's takeaway premises, comparing areas with higher levels of deprivation, e.g. London Road and Shettleston Road, with those in less deprived areas, such as the West End of the city. The results demonstrated that there was just as high a prevalence of takeaways within the affluent areas as there was in the deprived areas. The researchers did, however, surmise that the higher proportion of takeaways in the more affluent areas was reflective of the greater potential for daytime and evening custom as there is a higher density of entertainment facilities such as cinemas and theatres in these areas. It could also be contended that the overall nature of takeaway outlets differs between these areas of the city – and that this is reflected in the nature and quality of food sold⁽¹⁴⁾.

Environmental Factors

There are several factors which contribute to diet-related ill health. These include a sedentary lifestyle, genetics and a disproportionate availability of low-cost, high-calorie foods and discretionary foods. It has been asserted that by living in Western society, we inhabit an increasingly *obesogenic* environment, i.e. an environment where healthy food options and opportunities for physical activity are relatively unavailable. As a consequence, consumers' choices are even more limited depending on the area in which they live.

It has also been recognised that the size of portions, packages and tableware has increased over the past fifty years. The Cochrane review demonstrated that individuals consume more food or non-alcoholic drinks when offered in a larger sized portion or package or when using larger items of tableware⁽¹⁵⁾. Research has suggested that the simple elimination of larger portion sizes from the diet could reduce the average daily energy consumed by 12-16% amongst UK adults⁽¹⁶⁾.

SATURATED FAT PROJECT- THE BACKGROUND

The Role of Environmental Health

The Environmental Health function at Glasgow City Council sits within Land and Environmental Services. The function has suffered from resource restrictions in parallel with other Council Services and has seen its general role in relation to public health diminish over the past 20 years.

The Local Authority food law enforcement function in Scotland is, generally-speaking, delivered by environmental health services and is focused upon the application of legislation governing food hygiene, food standards and food information. Outwith the requirements of food standards and information law, there is no specific legislative role at present for environmental health in relation to the broad issues of nutrition and dietary health.

However, recent experience suggests that Local Authority officers are well-placed to not only identify poor diet and nutritional practice but are also able to convey standard messages to businesses potentially leading to positive change. Recent examples of these experiences in Glasgow include the identification of the practice of re-using fryer oil in stovetop cooking and the efficacy of messaging of healthy choice benefits in businesses located around Commonwealth Games venues.

Misuse of Oil

Commercial waste enforcement officers operating with the Environmental Health service in Glasgow noted that many takeaway outlets had no waste oil disposal arrangements in place. Initial concerns centred on the possibility that waste oil from fryers was being discharged down drains. However, it was established that a considerable number of businesses routinely removed used oil from deep fat fryers and re-used it by including within range-cooked dishes. This highly undesirable practice gave rise to concerns that seemingly 'healthy' (or not 'unhealthy') meals might contain unexpectedly high levels of saturated fats, acrylamides etc. Subsequent investigations indicated that this may, indeed, be the case

Food hygiene inspections conducted by Land and Environmental Services also revealed other, related practices within hot food takeaway businesses which could increase the saturated fat levels in certain meals. These practices included the excessive and repeated use of oil in deep fat fryers, the non-essential use of animal fats for frying and the use of high-fat ingredient options, e.g. cream.

Given the prevailing view that a diet containing high levels of saturated fat may be related to an increased risk of cardiovascular-type illness, it was considered that a project aimed at exploring the related issues would be beneficial.

Environmental Health capability to influence the Food Environment

It has been shown that the food and drink environment directly influences purchase and consumption choices. A recent series published in the Lancet has demonstrated that environmental factors exploit biological, physiological, social and economic vulnerabilities which subsequently promote overconsumption of unhealthy foods ⁽¹⁷⁾.

The recent Food Standards Scotland Board Paper entitled *Diet and Nutrition: Proposal for Setting the Direction for the Scottish Diet*, identified several principles upon which environmental health services will have a direct impact. These are:

- Principle 1 – *Collaborative Working*
- Principle 2 – *Progression Towards a Healthier Food and Drink Environment*

- Principle 3 – *All Options to be considered including non-voluntary measures.*
- Principle 6 – *A wide range of actions is required* ⁽¹⁸⁾

It is gratifying to note that Food Standards Scotland has recognised the role that Local Authority environmental health services can and do play in health promotion. Although it is acknowledged that any role for environmental health professionals in this area would be relatively minor, the prevailing view is that for any strategy to be effective, it must be multi-faceted and engage as many agencies as possible.

The McKinsey Global Institute issued the report entitled *Overcoming obesity: An initial economic analysis* in 2014 that identified a framework of interventions applied in other countries that could be used in the United Kingdom to tackle the obesity epidemic. The framework encompasses four mechanisms, which include those that enable, influence, motivate and inform. The report also acknowledges that engagement from many sectors will maximise the impact required to tackle this issue. This message has been mirrored by the recent FSS report. Furthermore, the McKinsey Report emphasised the need for a broad alliance, especially within the public sector and that interventions should not be viewed as *silver bullet* measures.

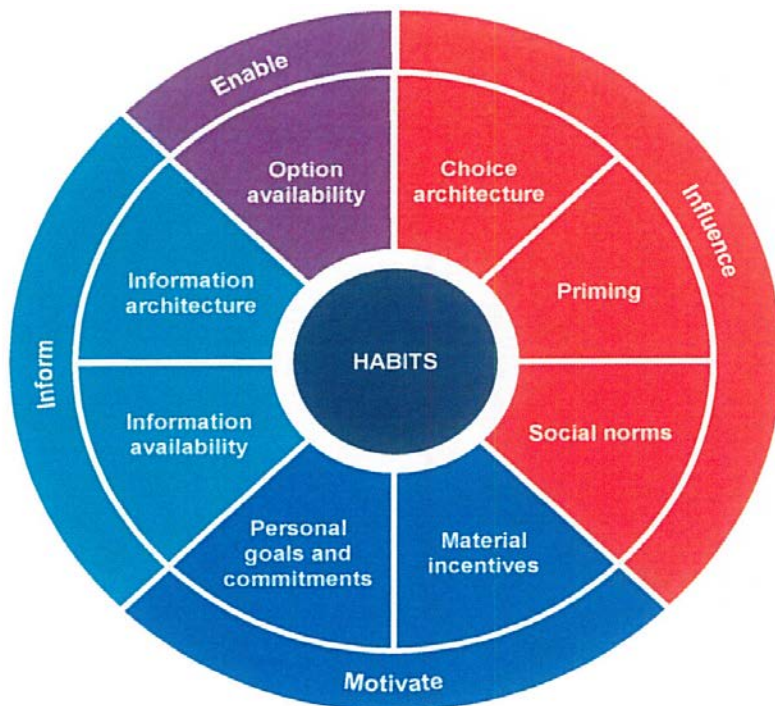


Figure 3- Framework to Disaggregate Mechanisms for Population Behavioural Change. Source: McKinsey Global Institute report, 'Overcoming obesity: an initial economic analysis', 2014


The Report listed 18 intervention categories relevant to tackling obesity. Of these, it is estimated that Environmental Health services within Scottish Local Authorities could feasibly engage with 7:

- Healthy meals – engage with catering businesses and encourage change in practice;
- High calorie food and drink availability – engage with business in order to encourage implementation of recommendations (or enforce if statutory);
- Labelling – continue to enforce existing (and future) legislation;

- Portion control - engage with catering businesses in order to encourage change in practice;
- Price promotion - engage with catering businesses in order to encourage change in practices (or to enforce if statutory);
- Reformulation - engage with catering businesses in order to encourage change in practice;
- Urban environment – to exert pressure upon businesses via licensing and planning mechanisms ⁽¹⁹⁾

Environmental Health - The Saturated Fat Project

The Nuffield Council on Bioethics' *Ladder of Intervention* details the different routes that can be taken by public sector agencies to influence change and improve public health.



Intervention Technique	Action	Method
"Smacks"	Eliminate Choice	Regulate to eliminate choice entirely
	Restrict Choice	Regulate to restrict the options available to people
"Shoves"	Guide choice through disincentives	Use financial or other disincentives to guide people to pursue certain activities
	Guide choice through incentives	Use financial and other incentives to guide people to pursue certain activities
"Nudges"	Guide choice through changing the default	Make "healthier" choices the default option for people
	Enable choice	Enable people to change their behaviours
	Provide information	Inform and educate people
	Do nothing	Do nothing or simply monitor the situation

Figure 4 – Based upon the Nuffield Council of Bioethics – *Ladder of Intervention*

Evidence suggests that the use of "nudge" theory can provide a "guiding hand" ⁽²⁰⁾ to individuals to make the right decisions. It is this type of nudge approach that environmental health can implement and was the methodology applied during this particular project.

The project employed the second step on the Nuffield ladder whereby officers provided information and educated businesses on the dangers associated with high levels of saturated fat and, more importantly, also informed business operators on the changes they can make to provide foods that are lower in saturated fat. It is hypothesised that the "nudge" approach can be implemented to address other dietary health concerns, such as high sugar and salt levels in certain foods.

The Environmental Health team designed the saturated fat project in order to establish a better understanding of the relationships between cooking methods and other catering practices within a range of hot food takeaways including Indian, Chinese and fish and chip shops, and the level of saturated fats within foods subsequently sold. A key aim of the project was to establish the extent to which certain changes in catering practices may reduce the levels of saturated fat and, ultimately, demonstrate the extent to which environmental health services can influence practices and behaviours in relation to this issue.

The project objectives were:

- To establish the degree to which a local authority environmental health service may influence businesses to make significant changes to preparation/processing methods and, thereby, reduce the intake of saturated fat by consumers of targeted meals;
- To determine the levels of saturated fat in meals sold by a range of hot food takeaways in Glasgow;
- To determine if saturated fat levels in takeaway meals are unnecessarily elevated as a consequence of the food preparation/processing methods used; and
- To determine whether alternative methods of preparation/processing could lower saturated fat levels in targeted foods;

Glasgow City Council has been actively involved in Beyond the School Gate (BTSG), a strategy to “reduce the disparity between what is on offer within schools and with what is available beyond the school gate”. Whilst the Saturated Fat project did not wish to replicate the work of BTSG, some takeaways were selected because of their close proximity to schools.

The project consisted of 4 main phases, which were:

1. Research
2. Information Gathering
3. Pilot
4. Main Project and Analysis

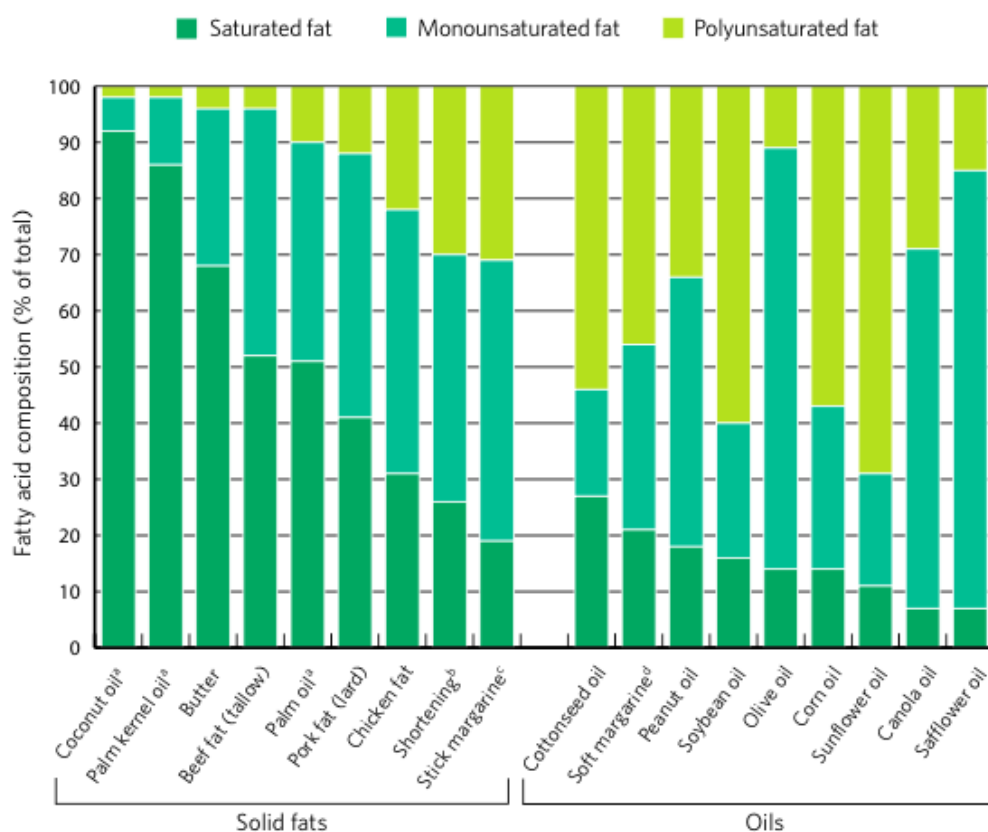
PHASE 1- RESEARCH

Research on two main topics was required to enable officers within the team to advise businesses of recommended changes. The research was broken down into:

- Oils and their effects on saturated fats
- Preparation and cooking methods and their effect on saturated fat

Oils and their Effects on Saturated Fats

There are various oils available for use both in the home and commercial environment. Consumers are opting to use oils that are considered “healthier” such as rice bran and avocado oils. Each oil studied in this project was assessed for a number of different factors including smoke point, fatty acid composition and saturated fat levels. The team also assessed oils that businesses were already using in order to provide data to business operators on the nutritional content of their current oils. Graph 4 details the fatty acid composition of a range of different oils.



Graph 1 - Fatty Acid Make-up of Different Oils. Source: The 2010 Dietary Guidelines for Americans policy document; Chapter 3; Figure 3-3

Rapeseed Oil

The research identified rapeseed oil as potentially the most suitable oil for use within takeaway premises for the following reasons:

Saturated Fat Level

Rapeseed oil has the lowest level of saturated fat at 6.6g/100g compared with other oils used in takeaway premises including soya bean oil, sunflower oil, lard and dripping.

Smoke Point

Smoke point is the temperature at which a fat/oil begins to break down, which in turn produces free radicals, which have been implicated in aging and age-dependent diseases such as cancer and cardiovascular diseases. As the typical frying temperature ranges from 170-190°C, it is best to use an oil that has a smoke point above 200°C. Rapeseed oil has a smoke point between 220-230°C, making it a very efficient oil for frying.

Cost

Overall, rapeseed oil appeared to be the most suitable oil for the purposes of this project although it is still more expensive than the oils those businesses currently use.

The team compared the costs of oils purchased from wholesale cash and carry premises in Glasgow. The cost of rapeseed oil varied between 77p and 95p per litre compared to 67p to 72p for vegetable oil. In effect, it was observed that rapeseed oil was generally more expensive than generic vegetable oils. Further consideration will be necessary in order to establish whether any perceived health benefits would justify the slight increase in costs.

Preparation and cooking methods and their effect on saturated fat levels

It has been observed that the use of a specific oil can have an impact on the level of saturated fat within a particular food cooked in it. However, it was also noted that particular practices used during preparation and cooking could also have an impact on these levels.

As discussed, a common practice within takeaways is the re-use of oil from the fryer during the stove-top cooking of dishes. Many businesses employ this practice as a cost saving, as it avoids the need for a waste oil contract and, more importantly, it reduces the volume of oil the business needs to purchase. As well as the re-use of oil, some businesses replenish their oil less frequently within the fryers.

The team identified and recommended a number of small changes that could be implemented by each business in addition to ceasing the re-use of oil.

The main recommendations that were made, based on advice from Food Standards Scotland, included:

- Use a high-oleic sunflower or rapeseed oil
- Stop re-using oil from fryers in dishes
- Use chips that are a minimum thickness of 1.4cm
- Use the shake, hang and bang technique*
- Place fried foods on absorbent paper to remove excess oil
- Change fryer oil after twelve uses
- Heat fryer oil to 175°C prior to use and turn fryers down when not in use
- Use low fat alternatives such as yoghurt in dishes - instead of cream
- Use cuts of meat that are less fatty

*The *Shake, Hang and Bang* technique requires the operator to shake the frying basket vigorously twice and hang it for at least 20 seconds – followed by a final bang on the side of the fryer.

The team worked with Food Standards Scotland (FSS) throughout the project term. FSS has recently published guidance on healthy catering, and some of the recommendations, including the temperature of frying oil and the change of oil after twelve uses, were taken from their guidance.

PHASE 2- INFORMATION GATHERING

The project saw the use of a number of questionnaires and surveys to gather data on business practices and upon public opinion on takeaways. The Council already held information relating to food hygiene practices within businesses but there was little information available which related to practices that influence nutritional content. Additionally, it was considered essential that information be obtained on consumer preferences when purchasing takeaway meals.

Public Surveys

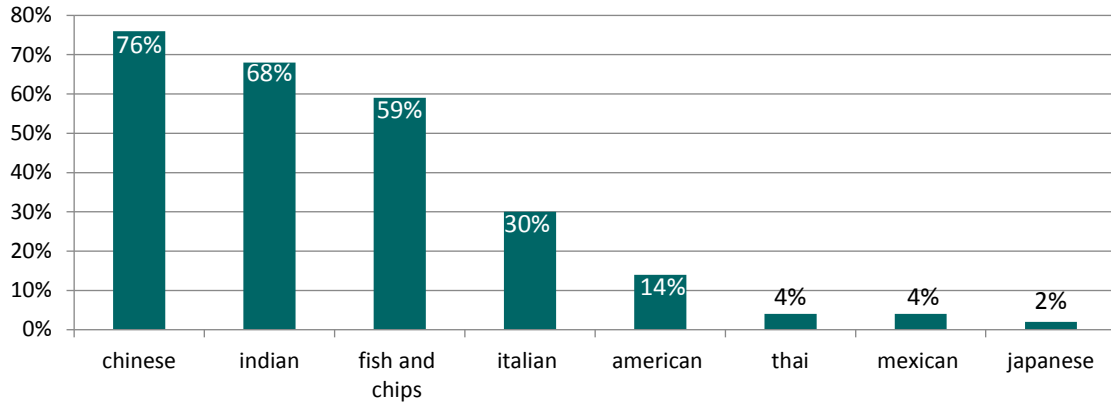
Both street and online surveys (appendix 1) were used to gain an insight into the public's takeaway meal preferences and purchasing habits. The information gathered from these questionnaires was used to determine the premises types that would be approached and the dishes that should be targeted for sampling.

An online survey was released on the Glasgow City Council website and was available to all Council employees and arms'- length external organisations such as Cordia, Clyde Gateway and Glasgow City Marketing Bureau. The team also carried out this survey work within shopping centres and markets within Glasgow. These areas included:

- Partick Farmers' Market
- The Forge Shopping Centre
- The Forge Market
- The Fort Shopping Centre
- The Savoy Shopping Centre
- Shandwick Shopping Centre

A number of shopping centres refused to allow the project team to carry out survey work. As a consequence, the range of survey centres did not fully reflect the different social and economic aspects of Glasgow.

A selection of results from the public survey are detailed:



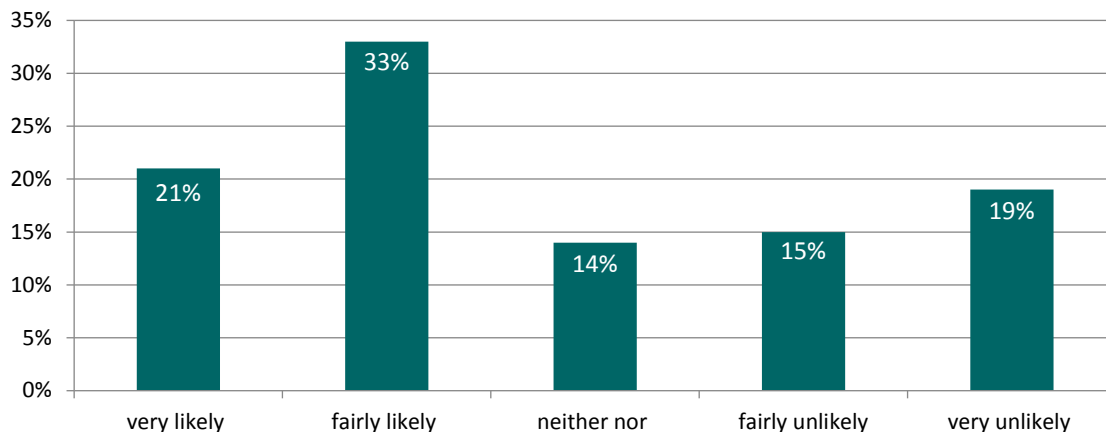
Base: 695

Graph 2- Question 2: What type of takeaway foods do you normally eat?



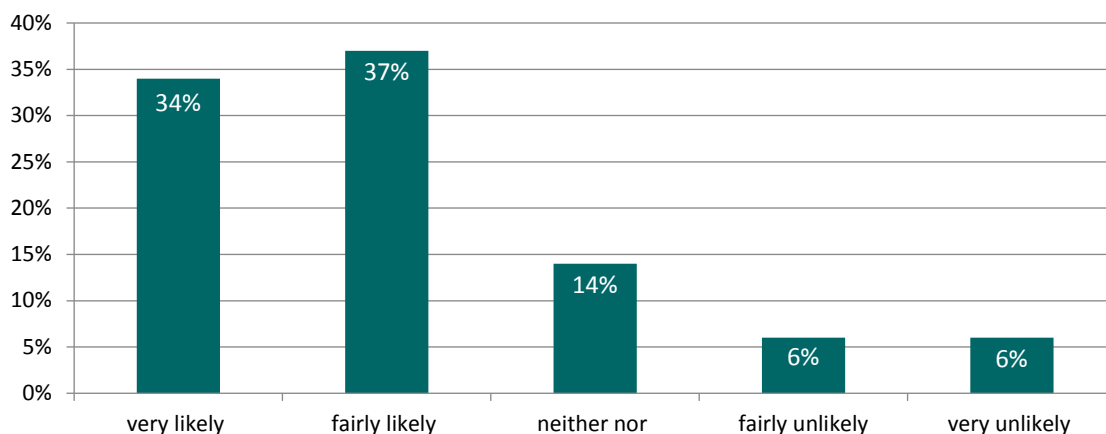
Figure 5 - Question 3: What type of takeaway meals do you order most frequently (e.g. fish and chips, pizza, curry, kebab, etc)?

The popularity of each dish specified is proportional to font size.



Base: 676

Graph 3 - Question 7: How likely or unlikely would having nutritional information (i.e. calories, fat content, salt, etc.) available for takeaways influence your choices in meals?



Base: 678

Graph 4 - Question 8: If your preferred takeaway meal was offered with a reduced fat content, how likely or unlikely would you be to eat it?

Officer Questionnaires

A questionnaire (appendix 2) was designed for use by all officers in the Glasgow City Council food team at the end of routine food hygiene inspections as a means of gathering data on business practice. The information gathered was used to identify the businesses which were most suited to the project's aims. These businesses were then invited to volunteer in phases three and four. Data was obtained on 80 takeaway-type premises at this stage. A similar but shorter questionnaire was used by the Council's commercial waste enforcement team. Whilst this latter questionnaire did not deliver a detailed insight into business practices, it did provide valuable data on many outlets, including intelligence on whether a waste oil contract was in place - it having been observed that an absence of such a waste oil contract was indicative of the re-use of fryer oil. This information provided limited data when compared with the questionnaires the food safety officers used, but commercial waste enforcement staff were able to access a relatively large number of premises within a short time frame.

Case Studies

Whilst the team did carry out research into methods and ingredients that would reduce saturated fat within takeaway meals, it was agreed that the findings from this may not fully apply to the premises within this project. To ensure that the advice provided was practicable and relevant, the team approached a number of premises to obtain advice from a food business operator's perspective.

Balbir's

Balbir's is a restaurant located within the West End of Glasgow. It provides both sit-in and takeaway options and was the first Indian restaurant in Scotland to obtain the Healthy Living Award (in 2009). The owner, Balbir Sumal, professes to have a singular interest in healthy cooking. In particular, he believes that Indian cooking should be generally healthy in nature and is only rendered unhealthy by the use of ghee, cream and the re-use of oil in curry sauces.

In order to obtain the Healthy Living Award, the business made a number of simple changes with the aim of producing healthier options. These changes included the substitution of vegetable ghee for ghee of animal origin – which was previously used. Rapeseed oil was already being used - as the owner considered it a healthier oil for deep frying as well as being more stable than other vegetable oils. Balbir's does not rely on the use of stock pots as a base for their curry sauces as all dishes are cooked to order. The business uses a small volume of oil in the initial cooking stage to fry spices, onion, garlic and ginger. No further oil is added to the dish after this stage.

Pakora Manufacturers

There are two pakora manufacturers in Glasgow, each with a very different method of using its oil.

Manufacturer A - Pakora is fried in Olleco vegetable oil, which is high in polyunsaturated fat, low in cholesterol and also contains an anti-foaming agent. The business changes the oil in the fryers twice weekly.

Manufacturer B – Pakora is fried in KTC vegetable oil - a brand and type which satisfies halal accreditation requirements. This business changes its oil less frequently than Manufacturer A - approximately once per month. Instead, the business operator has opted to filter the oil, using a filtration machine, i.e. Purafilters Puraoil 250, on a daily basis as it is believed that regular filtration delivers a higher quality product and also saves on the cost of buying oil due to the lower volume that is used.

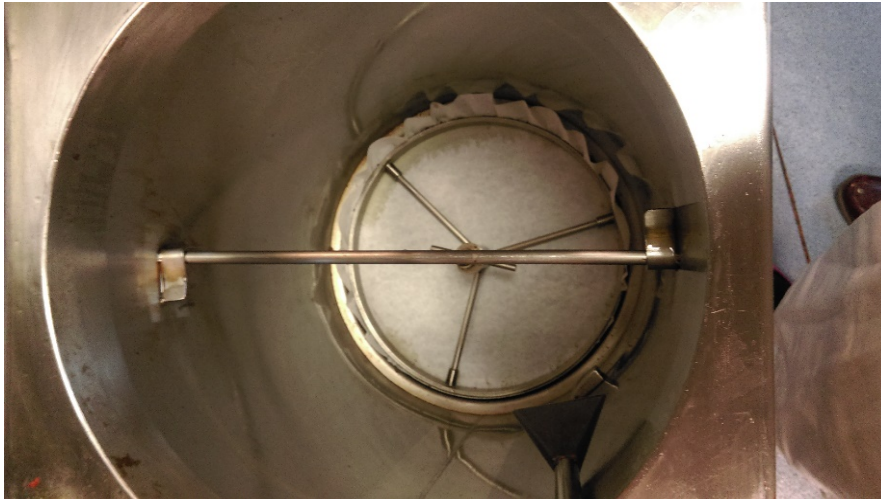


Figure 6 - The filter paper before use



Figure 7 - The filter paper after one filtration run

While the use of a filtration machine is not a feasible option for the majority of takeaways, the team wanted to see whether filtration has a significant effect and whether there were any consequent differences in saturated fat levels between the two manufactured products.

It transpired that there were no significant differences in the levels of saturated fat between the two manufacturers. Consequently, there was no evidence to suggest that either method/technique would produce products with a lower saturated fat content than the other.

The results were also not dissimilar to those observed within the takeaways, although the manufacturers' results showed a slight decrease in saturated fat levels. These results could be attributed to the manufacturers having better systems in place to control portion size.

Action Packs

The team engaged with a number of agencies including Food Health Innovation Scotland (FHIS) and FSS to get further guidance and advice on the recommendations that were to be made. FHIS worked with scientists within the Rowett Institute and Camden BRI to produce an Innovation Action Plan specific to this project. The advice gathered from these agencies, coupled with the research carried out in Phase 1, provided the team with a suite of information that could be made readily available to each business in a format that is easy to understand.

Action packs specific to each premises-type, Chinese (appendix 3), chip shops (appendix 4) and Indian (appendix 5) takeaways were developed, each detailing recommendations that business operators could introduce with the aim of reducing saturated fat. The packs were translated into Turkish, Mandarin, Cantonese, Urdu and Punjabi.

The project team felt that the provision of advice in written form would be essential to the effort to achieve understanding by business operators, cooks and chefs. The packs were designed to provide simple, concise messages which could be actioned by most businesses. It was considered that the translation of these documents would also send a positive message to business operators as they and their food-handling staff would feel more valued, thus encouraging more businesses to participate in the project.

It is proposed that the use of action packs be continued for future work - with key input from relevant researchers and agencies. These packs could be circulated by Local Authority Environmental Health services.

PHASE 3 - PILOT

Three premises were selected for the pilot, one from each premises category, including chip shops, Chinese and Indian takeaways.

The dishes selected for sampling were based on the findings from the public surveys. It was agreed that a sample of chips would be purchased from each premises to enable a comparison of a similar dish across the takeaways and as an indicator of portion size.

The dishes selected for each premises were:

	Chinese Premises	Indian Premises	Fish & Chip Shop Premises
Dish 1	Chips	Chips	Chips
Dish 2	Chicken Chow Mein	Chicken Pakora	Fish & Chips
Dish 3	Chicken Curry & Fried Rice	Chicken Korma and Pilau Rice	Sausage Supper

Diagram 8 below demonstrates how the pilot visits were organised.

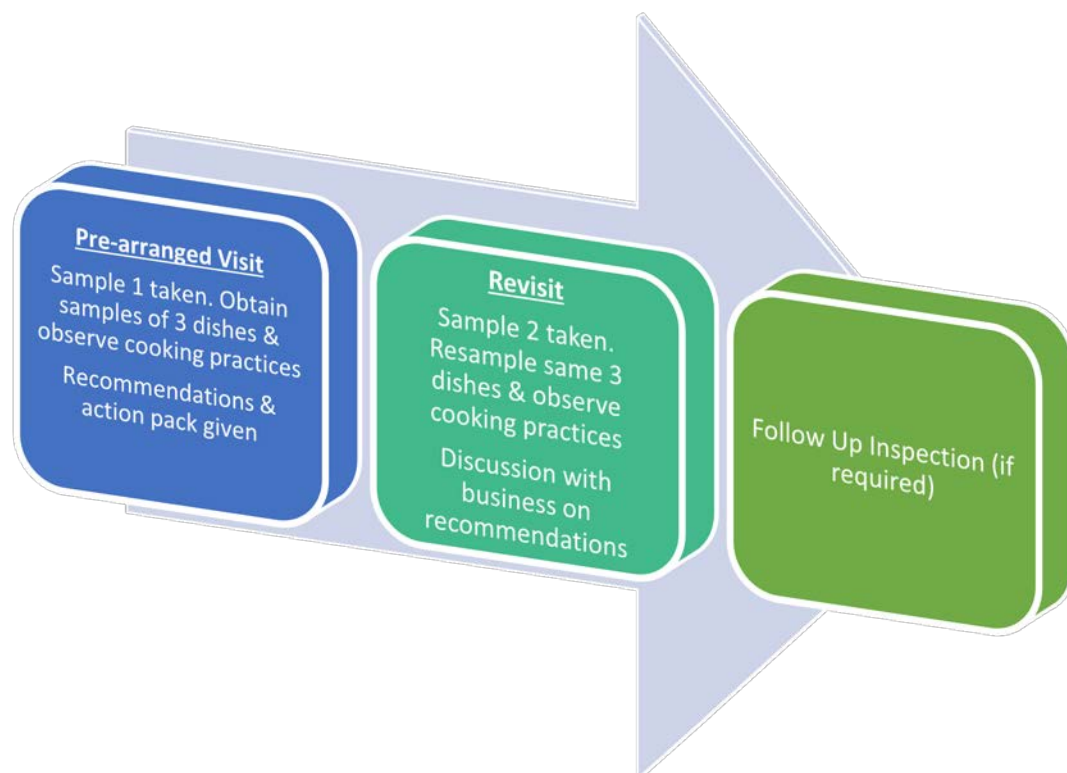


Figure 8– Planning of pilot premises visits

PHASE 4- MAIN PROJECT AND ANALYSIS

Nineteen premises were selected for the main project. Due to the perceived success of the pilot, the process for Phase 4 was identical - with the addition measure of each business being provided with a drum of rapeseed oil (free of charge) and the addition of two extra samples taken per premises – in recognition of survey findings

It should be stressed once again that the key objective of the project was to establish whether environmental health staff can identify key diet and nutrition issues within food businesses and then induce relevant change. Consequently, the purchase of a drum of rapeseed oil for each business should not be considered to have introduced a notable bias in the project outcome. Rather, it is considered to be an effective short-term measure to facilitate the changes identified as desirable. The team wished to make participation in the project as straightforward as possible and felt that direct provision of the rapeseed oil would make adherence more feasible. The likelihood of businesses implementing and maintaining change was not a matter of interest to this project.

The dishes selected for each premises were:

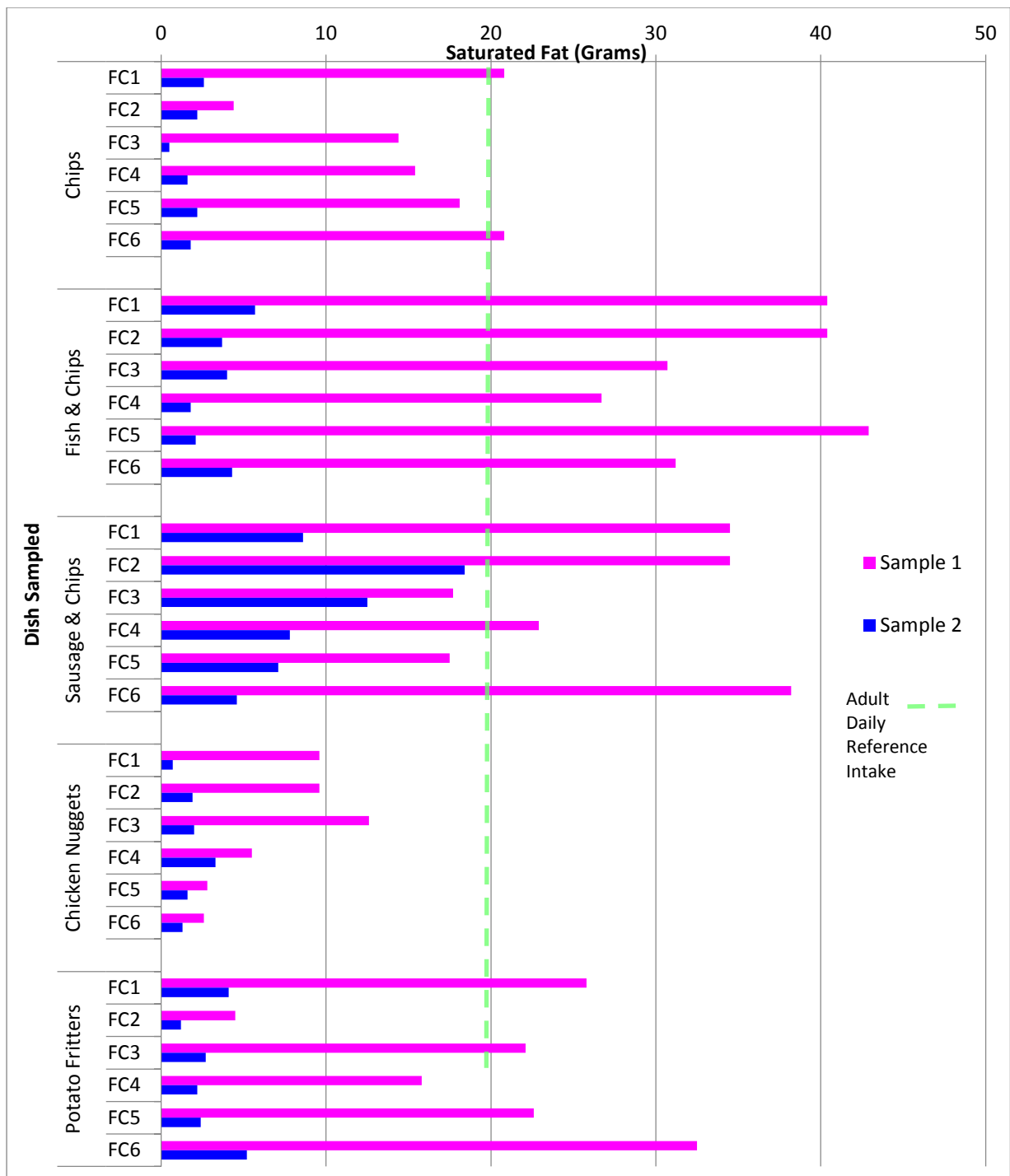
	Chinese Premises	Indian Premises	Fish & Chip Shop Premises
Dish 1	Chips	Chips	Chips
Dish 2	Chicken Chow Mein	Chicken Pakora	Fish & Chips
Dish 3	Chicken Curry & Fried Rice	Chicken Tikka Masala and Fried Rice	Sausage Supper
Dish 4	Crispy Shredded Beef & Fried Rice	Lamb Bhuna & Fried Rice	Portion of Fritters
Dish 5	Sweet & Sour Chicken Balls & Fried Rice	Fried Rice	Chicken Nuggets (children's portion)

RESULTS AND OBSERVATIONS

The results are presented in graphs to enable a comparison of Sample 1 and Sample 2 for a range of dishes for the different takeaway premises. The graphs are for Total Saturated Fat Content, Percentage Saturated Fat Content, Percentage Saturated Fat Reduction and Portion Size.

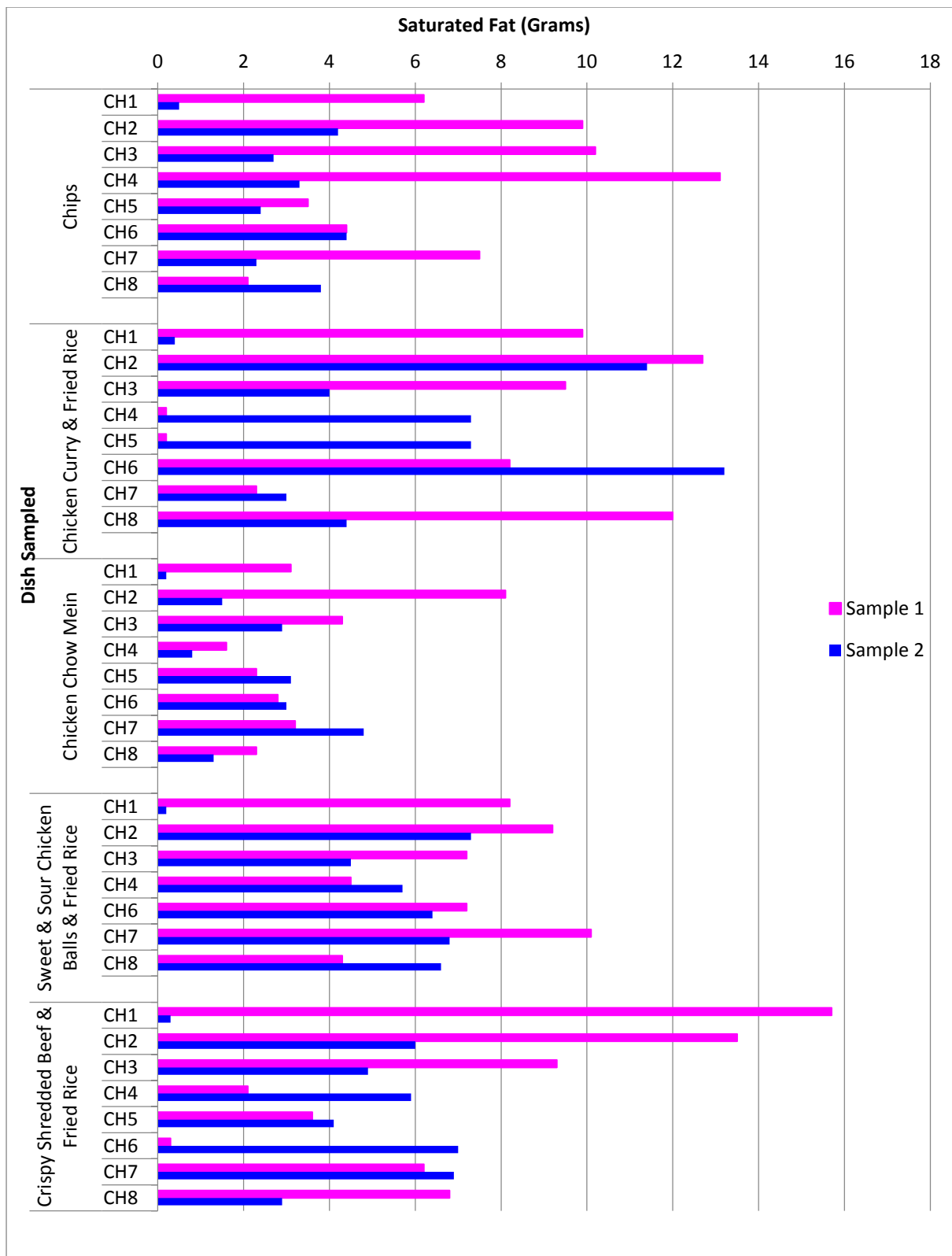
Total Saturated Fat Content

The total saturated fat content allows for comparison of the results against the reference value of the RI. This is a European Law requirement used in Food Labelling namely EU Regulation No. 1169/2011. RI values are based on the requirements for an average female with no special dietary requirements and an assumed energy intake of 2000 kcal. The RI for saturated fat is 20g. The total saturated fat content is directly affected by the wide variations in the portion size of the dishes which is demonstrated in the graphs below.



Graph 5 - Fish and Chip Shop - Total Saturated Fat Content

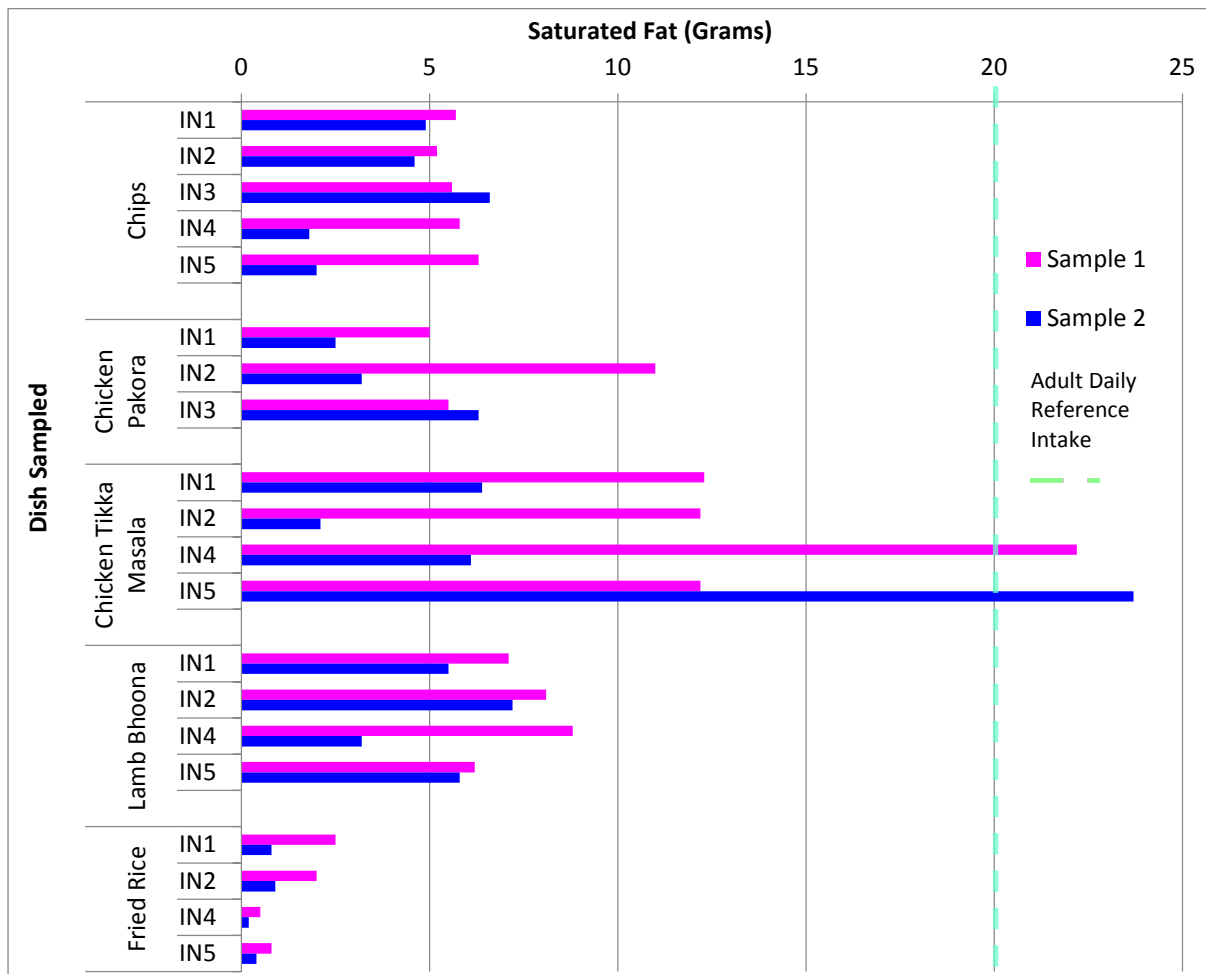
- The highest value was for Sample 1 of a portion of Fish and Chips in FC5 which contained 42.9g of saturated fat. For Sample 2 this reduced to 2.1g.
- 53% of Sample 1 dishes were above the RI of 20g saturated fat. This is in contrast to the levels of saturated fat in Sample 2, where none of the samples were above the RI. The highest was Sausage and Chips in FC2 at 18.4g a decrease from 34.5g.



Graph 6 - Chinese Takeaways - Total Saturated Fat Content

- The Total Saturated Fat Content of the Chinese Takeaway dishes did not exceed the 20g RI.
- The highest value was Sample 1 for Crispy Shredded Beef and Fried Rice from CH1 with 15.7g. For Sample 2 this reduced to 0.3g.

- The highest Sample 2 result was for Chicken Curry and Fried Rice from CH6 at 13.2g from a Sample 1 result of 8.2g.

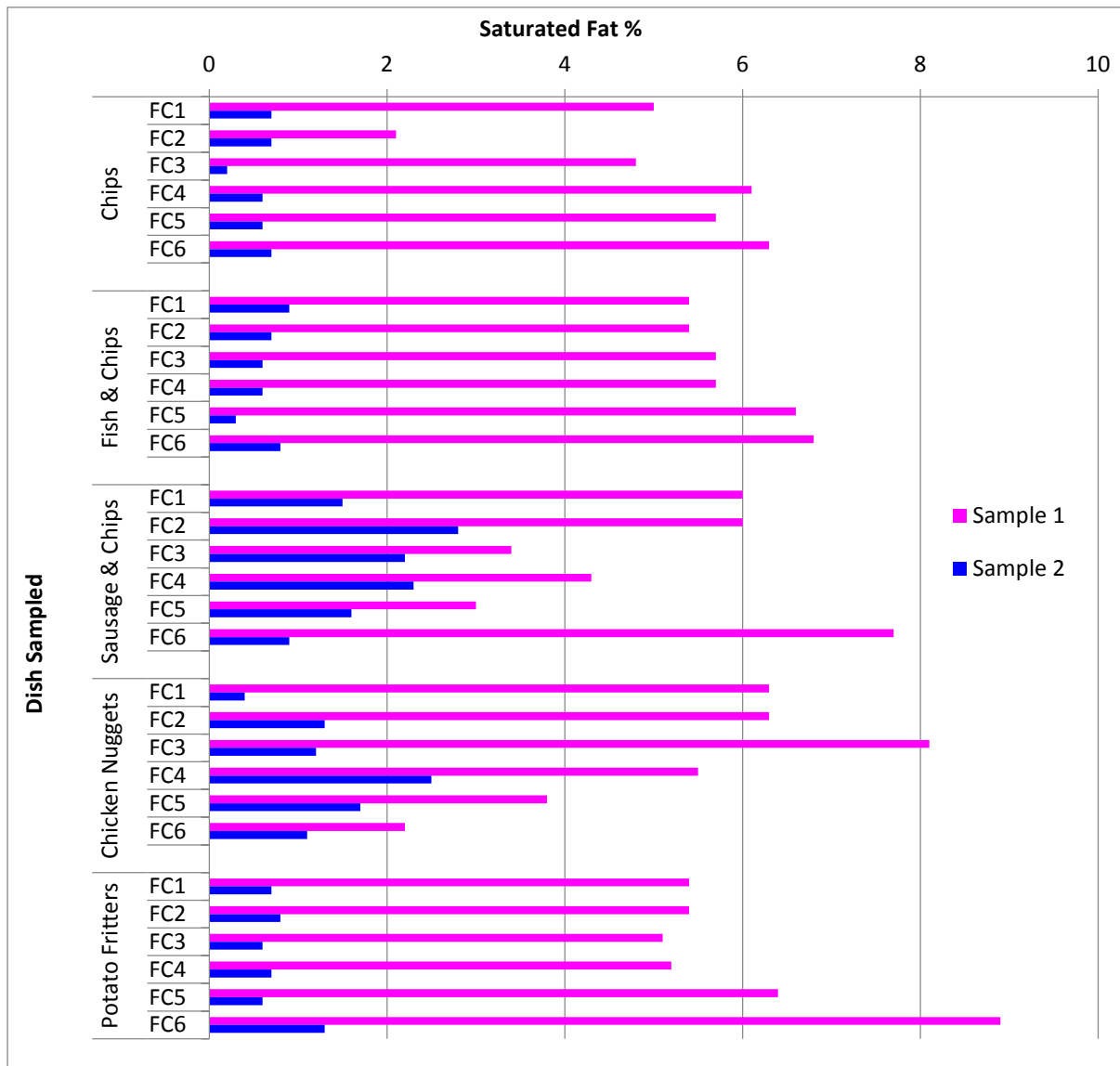


Graph 7 - Indian Takeaways - Total Saturated Fat Content

- The highest value was for Sample 2 of the Chicken Tikka Masala from IN5 with 23.7g The Sample 1 result for this was 12.2g.
- 5% of the Sample 1 dishes and 5% of the Sample 2 dishes exceeded the Adult Daily Reference Intake of 20g Saturated Fat.

Percentage Saturated Fat Content

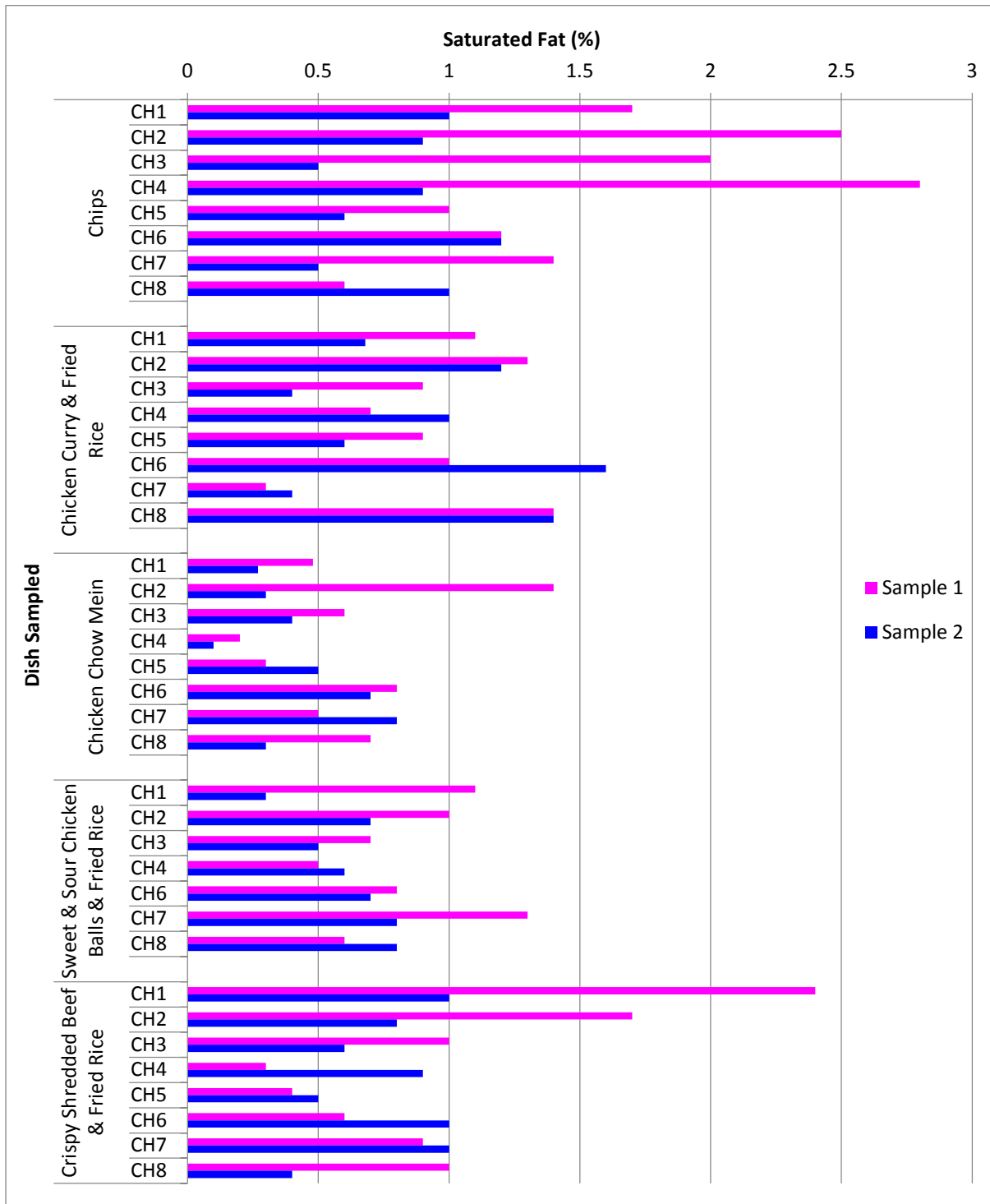
Due to the wide variation with the portion size of the dishes it is more accurate to compare the results using the percentage saturated fat content rather than the total saturated fat content.



Graph 8 - Fish and Chip Shops - Percentage Saturated Fat Content

- All of the dishes demonstrated a reduction from Sample 1 to Sample 2 results
- The highest value was for Sample 1 of the Potato Fritter in FC6 with 8.9% saturated fat. For Sample 2 this reduced to 1.3%.
- The lowest value was for Sample 2 of a portion of Chips in FC3 with 0.2% saturated fat. The Sample 1 value for this was 4.8%
- The largest reduction for a dish was a portion of Chips from FC3 which achieved a 96% reduction in saturated fat. From a Sample 1 of 4.8% to a Sample 2 of 0.2%.
- The smallest reduction for a dish was a portion of Sausage and Chips in takeaway FC3 where a 35% reduction was achieved. From a Sample 1 of 3.4% to a Sample 2 of 2.2%.

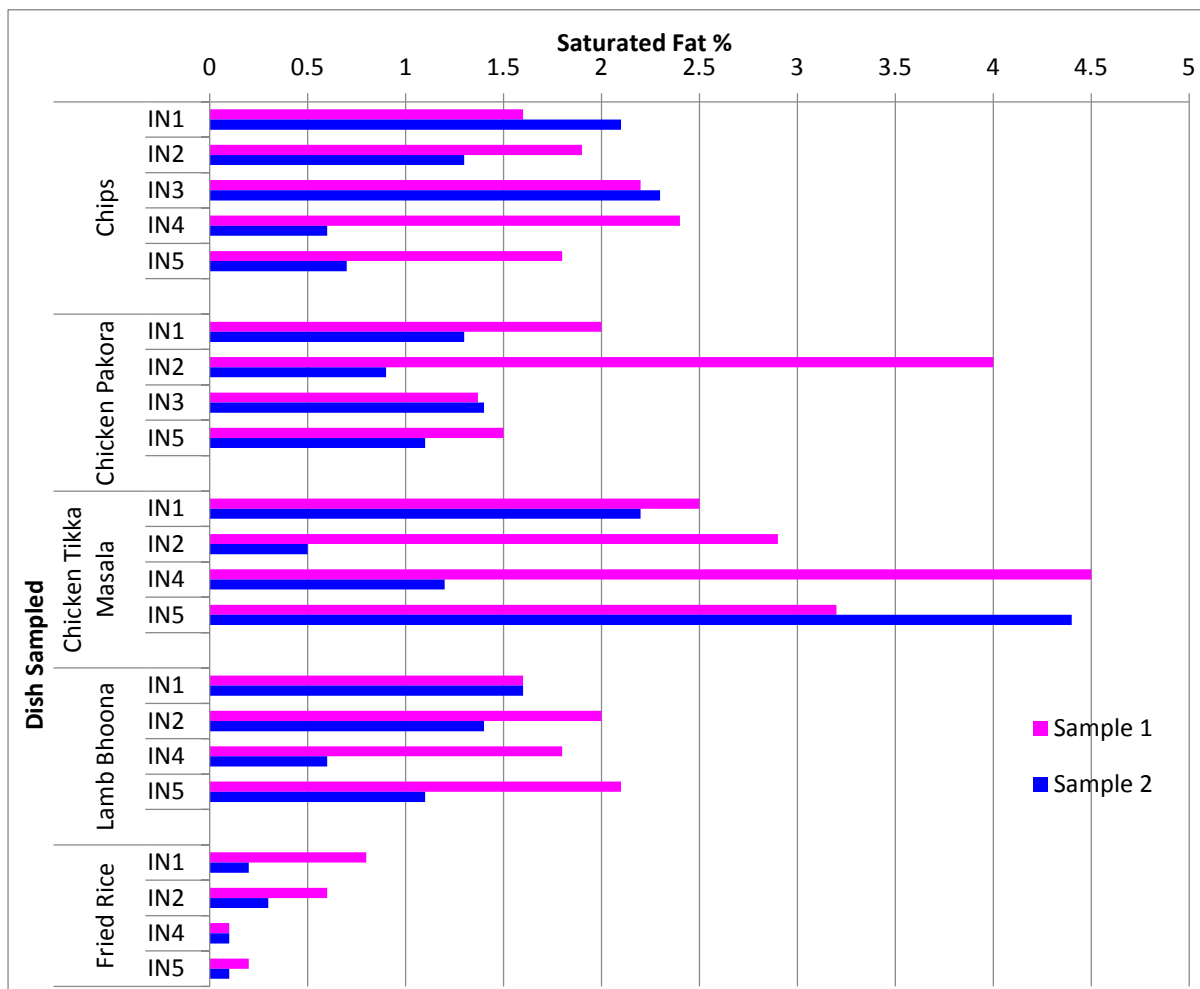
- All Fish and Chip Shops achieved a Percentage Saturated Fat Level reduction. This was the greatest reduction of the three types of takeaway.



Graph 9 - Chinese Takeaways - Percentage Saturated Fat Content

- What is apparent for the Chinese Takeaway dishes is that as the total saturated fat was the lowest of the takeaways so too is the percentage saturated fat.

- The baseline (Sample 1) percentage saturated fat in dishes obtained from Chinese Takeaways outlets was relatively low, i.e. below 3%. It is surmised that this may be due to the pre-existing use of either rapeseed oil or soya bean oil (as opposed to animal fat as used in the Fish and Chip Shops).
- Chinese Takeaway results were noticeably more varied than those for the Fish and Chip Shops. This is due to wok-fried dishes having a greater variation in the composition of the dishes and the reduced ability to control the temperature of frying in the wok.
- 33% of the dishes demonstrated a reduction from Sample 1 to Sample 2 results
- The highest value was for Sample 1 of a portion of Chips in CH4 with 2.8% saturated fat. For Sample 2 this reduced to 0.9%.
- The lowest value was for Sample 2 of Chicken Chow Mein in CH4 with 0.1% saturated fat. The Sample 1 value for this was 0.2%
- The largest reduction for a dish was a portion of Chicken Chow Mein served in CH2 which achieved a 79% reduction in percentage saturated fat. From a Sample 1 of 1.4% to a Sample 2 of 0.3%.
- The smallest reduction for a dish was for Crispy Shredded Beef and Fried Rice in CH4 where a 67% increase was achieved. From a Sample 1 of 0.3% to a Sample 2 of 0.9%.

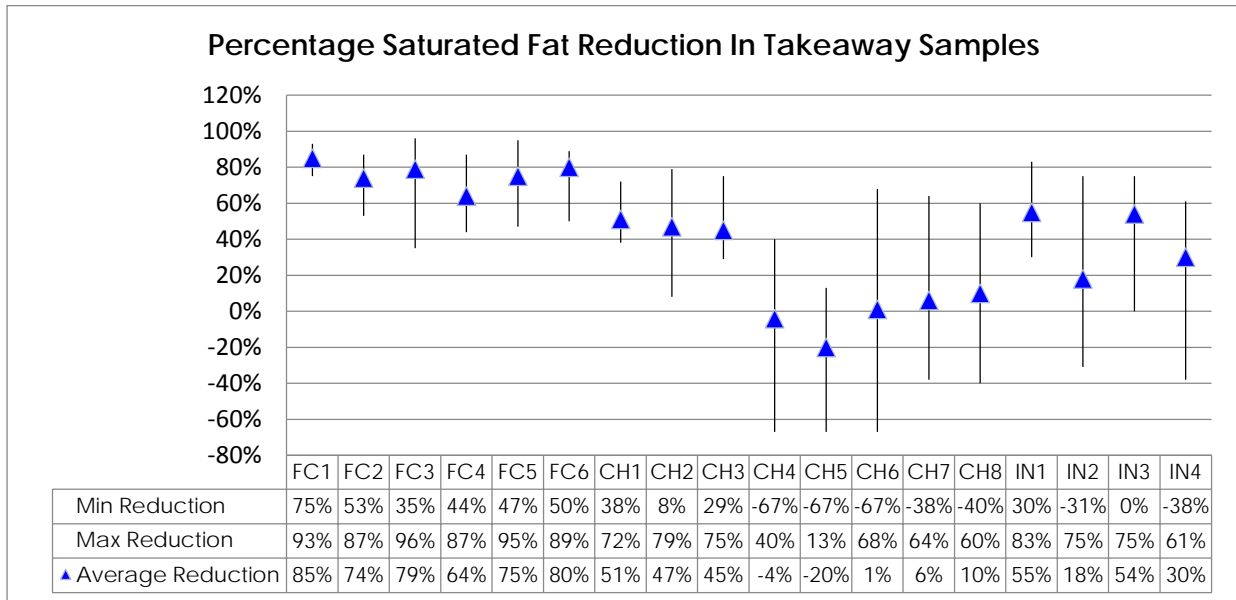


Graph 10 - Indian Takeaway - Percentage Saturated Fat Content

- 24% of the dishes showed a reduction in percentage saturated fat.
- The highest value was for Sample 1 of Chicken Tikka Masala in IN4 with 4.5% saturated fat. For Sample 2 this reduced to 1.2%.
- The lowest value was for Sample 2 of a portion of Fried Rice in IN4 and IN5 with 0.1% saturated fat. The Sample 1 values for these were 0.1% and 0.2% respectively.
- The largest reduction for a dish was for Chicken Tikka Masala served in IN2 which achieved an 83% reduction in percentage saturated fat. From a Sample 1 of 2.9% to Sample 2 of 0.5%.
- The smallest reduction for a dish was for Chicken Tikka Masala served in IN5 which achieved a 38% increase in percentage saturated fat. From a Sample 1 of 3.2% to Sample 2 of 4.4%.

Percentage Reduction in Saturated Fat

The percentage reduction of saturated fat was averaged for the takeaways across the range of dishes. This average is displayed in Graph 11. As there was a broad range of reduction across the different dishes the minimum and maximum reduction is also displayed on the Graph

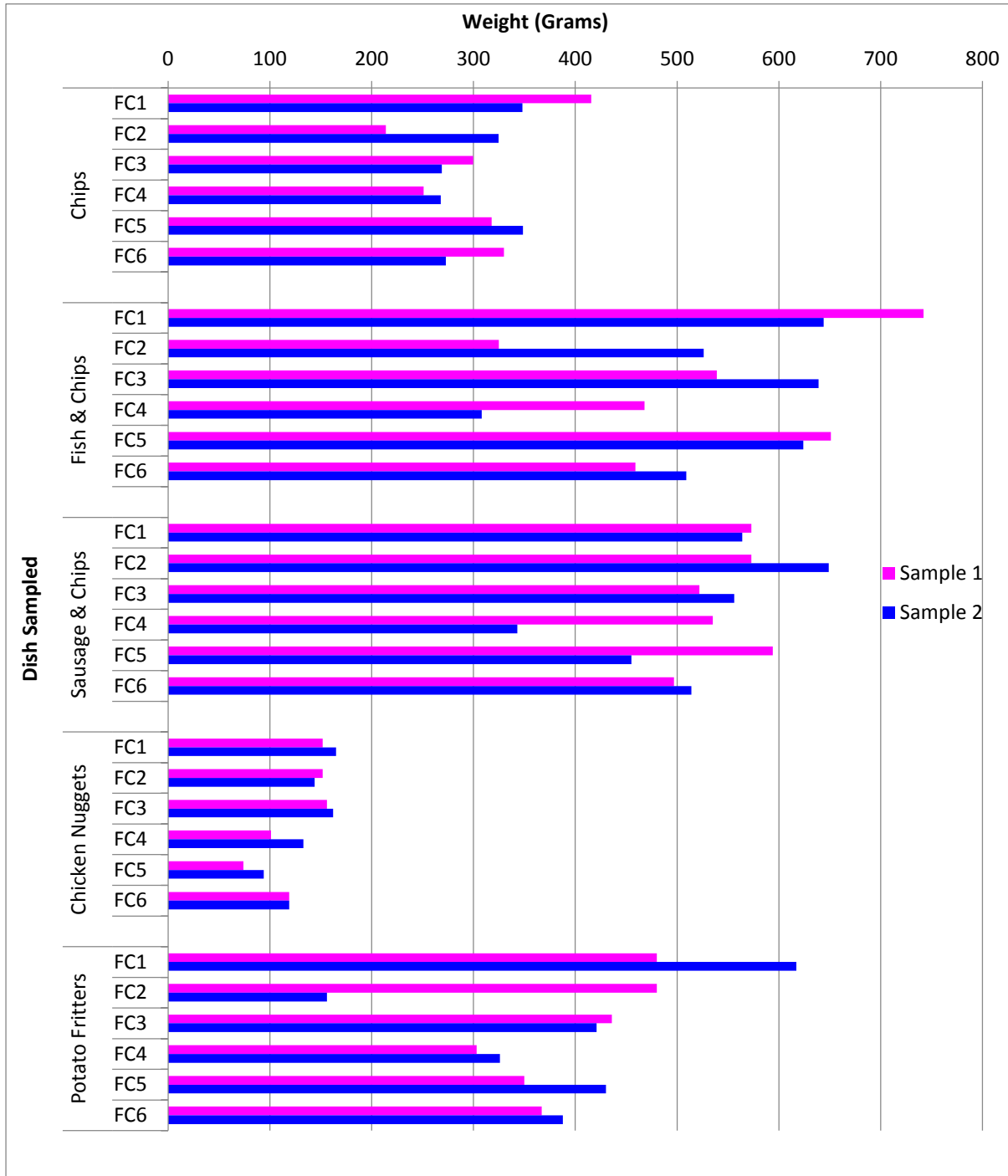


Graph 11 – Percentage Reduction of Saturated Fat

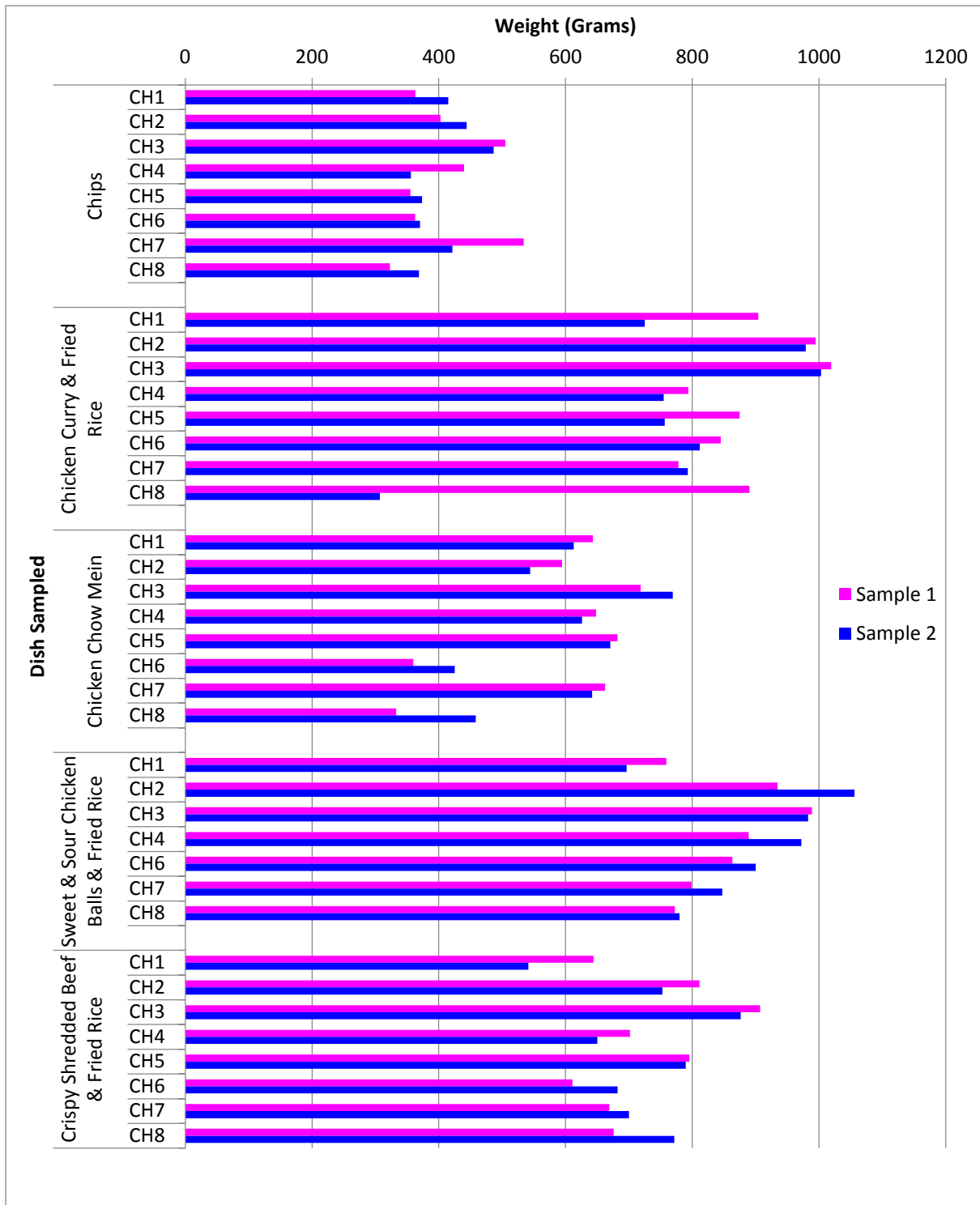
- FC1 demonstrated the highest average reduction across all the dishes with a percentage saturated fat reduction of 85%.
- The minimum reduction was 75% for the sausage supper and the maximum reduction was 93% for the chicken nuggets.
- The range of reductions in the Fish and Chip shops was small in comparison to the other takeaways. This could be due to a more uniform/standardised dish.
- The results for the Chinese Takeaways CH4 and CH5 indicated that two products had an increased percentage saturated fat content for Sample 2. Chinese Takeaways CH1, CH2 and CH3 all recorded average reductions of over 40%.
- All of the average results for the Indian takeaways showed reductions even though there were Sample 2 results for IN2 and IN4 which recorded an actual increase in saturated fat levels.

Portion Size

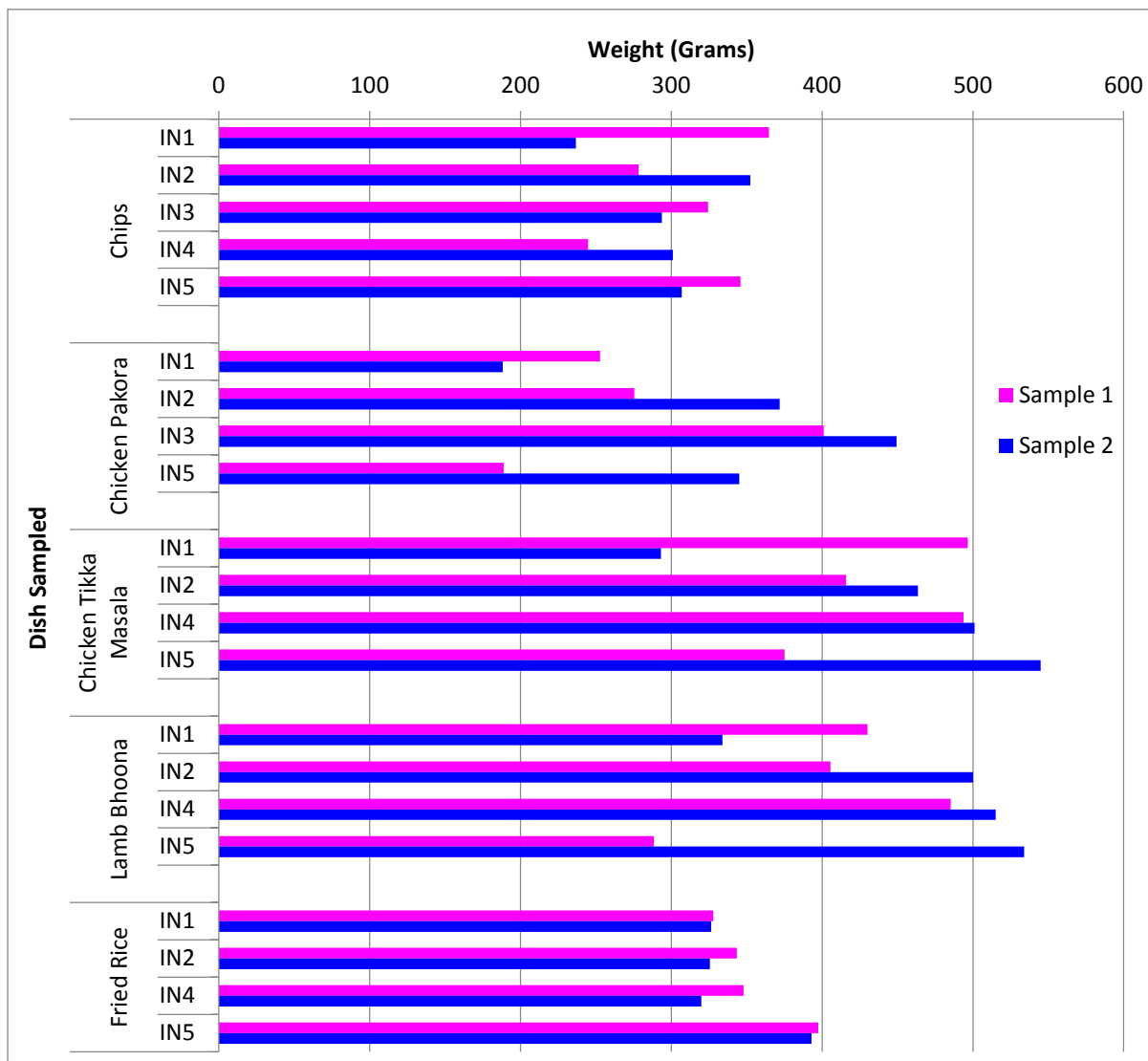
The significance of the portion size variation was not apparent until the sample results were available. Therefore, advice relating to portion size was not provided by the officers during the advisory visit. The following graphs highlight the wide variation in portion sizes between the same dishes at the same takeaway.



Graph 12 – Fish and Chip Shop Portion Sizes



Graph 13 – Chinese Takeaway - Portion Sizes



Graph 14 - Indian Takeaway - Portion Sizes

- Sample 2 of sweet and sour chicken balls and fried rice from CH2 recorded the largest portion size of all of the samples with a weight of 1056 grams.
- The largest portion size for the Fish and Chip Shop was Fish and Chips from FC1 with a weight of 742g.
- The largest portion size for the Indian Takeaway was Chicken Tikka Masala from IN5 with a weight of 545g.
- The greatest variation for one dish was from a Chinese Takeaway for a sample of Chicken Curry and Fried Rice from CH8. Sample 1 was 890g and Sample 2 was 307g - a difference of 583g.
- The greatest variation for a Fish and Chip Shop dish was for a sample of Potato Fritter from FC2 with Sample 1 480g and Sample 2 156g a difference of 324g
- The greatest variation for an Indian Takeaway dish was for a sample of Lamb Bhoona from IN5 with Sample 1 289g and Sample 2 534g a difference of 245g

“Beyond The School Gate”

One aim of the project was to identify premises located in close proximity to Secondary Schools and to determine the saturated fat content of relevant foods sold there. Consideration was given to principals set out in the Scottish Government Publication “Beyond the School Gate” which aims to improve the nutritional quality of food sold from establishments outside schools. The Scottish Secondary School Nutritional Standards requires no more than 8.1g of Saturated Fat in an average school meal ⁽²¹⁾. By applying this standard to the takeaway dish samples we can see that this was exceeded by 83% of the dishes in Fish and Chip Shops, 40% of the dishes in Chinese Takeaways and 33% of the dishes in Indian Takeaways. Whilst the portion sizes served at school lunch times are likely to be smaller - thereby reducing the total saturated fat content - the project demonstrates that there is scope to positively influence the nutritional quality of foods sold within the vicinity of schools.

Takeaways FC6 and CH1 were located in close proximity to Secondary Schools and were serving lunch time meals.

DISCUSSION

The majority of the results show that there was a measurable reduction in saturated fat after interventions by officers. The fish and chip shop premises in particular showed a significant percentage reduction in saturated fat. However, there were some discrepancies within the results for the Chinese and Indian takeaways. The fact that improvements in the fish and chip shop samples were more pronounced can possibly be attributed to the lower potential for variation in the dishes, with a greater level of consistency in terms of constituents and ingredients. Indeed, the only significant changes these businesses made was to the type of oil used.

Results from Indian and Chinese premises were more variable than those observed in fish and chip shops. In addition to the potential for variation in dishes referred to above, this may also be due to the fact that many Chinese and Indian takeaways were unwilling to implement the full suite of recommendations – especially those relating to reformulation of recipes - as operators did not believe the changes would guarantee a similar product to the original. Chinese and Indian dishes also tended to have lower baseline levels of saturated fat at Sample 1. Therefore, a smaller overall reduction than that observed within the chip shops was probably to be expected.

Another factor which may have resulted in the inconsistent results in Chinese and Indian outlets is that these businesses often employ several different chefs, each producing dishes which vary slightly from those prepared by colleagues. While efforts were made to ensure that the dishes prepared for initial and secondary samples were the same, the fact that different chefs prepared dishes for Sample 1 and Sample 2 may have resulted in slightly altered products. Environmental Health officers recommend that all businesses strictly adhere to recipes in order to control the risk from allergens, however, many catering businesses still do not use standardised recipes. Instead, chefs tend to have their own method of cooking particular dishes.

A further reason that may account for the discrepancies in results is that business operators may not have fully understood the recommended changes and, therefore, may have implemented them incorrectly. Although the action packs had all been translated, the advice may not have been fully understood when officers were discussing proposed changes face-to-face.

One area that was not initially considered but became apparent as a major issue during the sampling was the inconsistency in portion sizes. This related not only to differences between premises but also to differences between the first and second samples within the same premises. The variations in portion sizes did raise concerns as premises were providing their consumers with dishes with very different nutritional profiles from one day to the next.

It was observed that there was a slight increase in trans fats in some dishes between Samples 1 and 2. One possible explanation for this is that rapeseed oil may be susceptible to trans fat formation due to cis/trans isomerisation of unstable monounsaturated fatty acids to trans fatty acids when subjected to high temperatures. Further samples of fresh and week-old rapeseed oil were taken to explore this issue. Results indicated that week-old oil had higher trans fat levels than its fresh equivalent. This is addressed in the further work section.

CHALLENGES WITHIN THE PROJECT

The project faced a number of challenges, some of which were premises-specific and others which affected all those involved.

Co-operation and Communication

The project team encountered some reluctance when attempting to obtain business operators' agreement to take part in the project. There were several reasons for this, one of which being that the manner of approaching operators – by telephone – proved to be inefficient. Officers within Environmental Health had previously conducted questionnaire surveys on-site with business operators and it was assumed that subsequently telephoning the said operators to enlist their co-operation would be appropriate. However, this approach was not as successful as hoped as the team encountered difficulties communicating with the operators – often as a consequence of language barriers - and many were unavailable when calls were made.

Whilst some businesses volunteered when approached in the way described, others had to be visited on more than one occasion in order to properly explain the project and to obtain the agreement of the operator. The team learned that face-to-face meetings were more valuable for building rapport with the operators and allowed for a greater understanding of the benefits that such a project can bring to the businesses' reputation. It is envisaged that obtaining cooperation from businesses would not be a major difficulty should further work in this field be carried out. One of the recommendations ensuing from this project is that engagement on diet and nutrition aspects should be embedded into routine food hygiene inspections. By so doing, the officer would be in a position to assess cooking methods and meal composition, identify potential change and make recommendations at the same time as dealing with food hygiene and food standards matters. Making recommendations on good nutritional practice is entirely congruent with providing advice on good hygiene practice.

Many of the premises approached were also reluctant to take part due to the competition within their locale. In some areas of Glasgow there can be several takeaways offering similar products within the same street. Consequently, some owners feel that making any changes to their ingredients or practices may result in loss of customers to competitors. Some business owners advised that members of the public did not consider diet and health when ordering, with some even going as far as to ask for no vegetables within their orders.

Some of the chip shop operators were hesitant when agreeing to participate as they felt that their industry was already viewed in a negative light by the public and that the project would only exacerbate the situation further.

The team worked with nineteen premises in Phase 4 of the project. This number was slightly lower than the twenty five originally proposed. One of the Indian takeaways was also removed from the final phase as the premises ceased trading before second samples could be taken.

Equipment

One of the biggest issues faced by the pilot chip shop premises was in relation to their frying range. Older frying ranges are generally not equipped with drainage facilities as they were designed solely for use with animal fat – which is usually removed while cold and in solid form. Consequently, removing liquid oil such as rapeseed oil was perceived as being time-consuming, awkward and potentially dangerous. Some businesses approached the problem by scooping the cooled oil out with a bucket. While this was not an issue faced by all businesses it must be considered when suggesting the use of liquid oil in older premises. Another consideration when suggesting liquid oil for use in older ranges is the cost of fitting drains or

pumps, as such a pump can cost up to £400 per pan and a drainage pump is approximately £2000.

Costs

The reuse of oil was most commonly observed within Chinese premises, to a lesser extent in Indian restaurants and not at all in chip shops. The majority of owners advised that the main reason behind this is cost savings, although some did acknowledge that the pre-used oil did give stir fry dishes and curry sauces "more flavour". The project team are fully aware of the financial difficulties facing all sectors within the city and, therefore, did not wish to increase the burden on any of the businesses which offered to volunteer. It was hoped that the results would convince those owners that were reluctant to cease this practice. The team also discussed with those owners the negative health impact such a practice can have. This point was stressed particularly with those that only applied the practice in order to enhance flavour.

FEEDBACK FROM BUSINESSES

Rapeseed Oil

The majority of chip shop operators reported that the products looked a lot paler when fried with rapeseed oil, an appearance that most did not view favourably. Some owners also advised that the food was "tasteless" and did not give the same texture compared to their previous oils. One owner advised that he had to refund a family's order as they were so dissatisfied with their meal.

All the chip shops used the rapeseed oil provided, some for only one day, but the majority advised that they would not continue to use it. Overall the chip shops owners would only use a different product if it behaved in the same way as the oil that they currently used.

It is disappointing that the team could not persuade any of the chip shops to change the oils they use considering the reductions each achieved. It is acknowledged that rapeseed oil may not be the most suitable oil for the chip shops to use for the reasons given below, however research should be carried out to identify a more suitable oil for use within these premises.

The Chinese premises operators were all happy to use the rapeseed oil for the purposes of the project, however, some were not keen on continuing its use after the project ended as they were used to their previous ingredients. It should be noted that there was no significant difference between foods cooked in rapeseed oil when compared with the same foods when cooked in the vegetable oil, i.e. the oil previously in use. The lack of difference in product quality coupled with the higher cost of rapeseed oil may explain the failure to persevere with rapeseed oil.

The Indian premises operators were all happy to use the rapeseed oil with some agreeing to continue its use after the project had ended.

Some businesses advised that the rapeseed oil did not last as long as the previous oil they had used which may account for the lack of its use.

Use of Low Fat Alternatives

The Indian premises were not generally willing to use low fat yogurt and coconut cream in their curry dishes but were willing to use these lower fat alternatives to provide "low fat" curries on request by customers. The majority of owners were unwilling to alter long-established menus.

Chip Size

The recommendation for businesses to change from a minimum thickness of 10mm to 14mm was not as well received as hoped, particularly amongst the Chinese and Indian premises. The majority of those premises believed that the current customer preference was for skinnier chips and were not willing to change in case their customers were dissatisfied with their food.

Shake, Hang & Bang

The majority of business operators felt that using the shake, hang and bang method and the use of kitchen roll to absorb excess oil were too time-consuming, particularly during busy operating periods. Whilst many were happy to use these methods during the project period, they advised that they would only continue with them at times when they were less busy.

Change of Oil

Business operators were advised that oil in the fryers should be changed after twelve uses. While this was based upon advice from Food Standards Scotland, it was not seen as a practicable measure for any of the businesses to implement - as it would mean that oil would require to be changed in the middle of service or on multiple occasions within each day. This practice would be more likely to be suitable in a manufacturing or domestic setting.

FURTHER WORK

Oils

The use of rapeseed oil was initially recommended as it was considered to be the best option for use in takeaways given its high smoke point and composition of unsaturated fatty acids. The project team was, however, later advised that there is evidence that rapeseed oil, as well as other oils high which are high in saturated fat, can produce compounds, such as peroxides and polar compounds as a consequence of repeated heating and cooling.

Polar compounds are produced when an oil is altered and therefore is an effective measure of oil degradation. High levels of polar compounds can negatively affect the taste of the oil and also human health as they can affect the heart and arteries

It should be noted that some countries such as Austria and Belgium (Figure 9) have enacted legislation requiring that frying oils are monitored against specific limits for polar compounds. There is currently no such requirement within the United Kingdom (UK) to test oil. It is possible that the imposition and enforcement of a legislative limit within the UK would lead to food businesses adopting healthier frying practices.

COUNTRY	LIMIT OF POLAR COMPOUNDS	LEGISLATED?
Austria	<27%	Yes
Belgium	<25%	Yes
Czech Republic	<25%	No
Finland	<25%	No
France	<25%	Yes
Germany	<24%	Yes
Netherlands	<27%	No
Hungary	<27%	No
Italy	<27%	Yes

Figure 9- Polar compound allowances in European Countries

Further research is required to assess various oils to see whether their repeated use does cause the creation of unwanted compounds, such as trans fats, peroxides, polar compounds and acrylamides.

Portion Size

The results revealed inconsistencies in portion size. This was discussed with some business operators, however, they did not seem overly concerned. Further sampling to analyse the difference in calories, fats, salts and sugars served between each portion would be

advantageous. It is suspected that more consistent portion sizing may make a positive contribution towards tackling obesity.

Organoleptic Testing

Reformulation of a product or the use of a different cooking oil are likely to affect the flavour and texture of the food. One of the barriers to change encountered within the project takeaways is the risk-averse attitude of the food business operator. In order to overcome this barrier, evidence in the form of testing could be used to convince the business operator that changes would not necessarily lead to a reduction in quality of the product.

Cost/Benefit Analysis for Changes at Independent Takeaways

The costs of making the necessary changes to improve the nutritional value and provide standard portion sizes of the foods should be identified and examined. Potential increase in costs presents another significant barrier to change. If proposed changes were fully costed and described in tandem with the potential benefits associated with change, a more convincing case can be made

Provision of Nutritional Information

The public surveys indicated that customers would appreciate the availability of information on the nutritional content of food sold by takeaways - thus enabling them to make an informed choice. Suggested further work might provide more information on the feasibility of independent takeaways providing the requisite information on an accurate, consistent basis. Furthermore, the premise that customers would be attracted by healthier options in a takeaway context requires further research.

Recognition Scheme

It has been discussed that some business operators initially lacked the motivation to provide healthier options. In effect, there was no impetus to consider the dietary or nutritional profile of foods sold as this would offer little or no benefit to the business. In recognition of this, it is suggested that further work should be conducted into the potential benefits of positive marketing of healthy options in this context, i.e. would a recognition or award scheme be effective as a means of encouraging positive change?

The success of the Healthy Living Award (HLA) could be considered at this point. Unfortunately, the HLA standard is considered too high for a typical takeaway to achieve. Any scheme would have to recognise the improvements that could realistically be achieved by a typical small, independent business of this sort.

It has been suggested that a scheme running parallel to, or embedded within, the Food Hygiene Information Scheme could be effective, particularly if nutritional advice were linked to official control activities.

Engagement with Oil/Ingredient Suppliers

The project recommended the use of rapeseed oil to the businesses. This was considered to be the most appropriate option in that context, but its introduction on a large or permanent scale may be unfeasible.

Fryer Oil

One variable which significantly affects the uptake of the oil by foods during frying is oil temperature. Temperatures of fryer oil were not measured during the project in response to

safety concerns associated with inserting a thermometer in oil heated to over 150°C. (Thermostat readings were used to assess the oil temperature. However, the accuracy of such thermostats is not dependable.) Any subsequent survey work of this sort should include accurate recording of oil temperature.

Re-Use of Fryer Oil

The project was unable to establish whether the re-use of fryer oil in stovetop-cooked dishes resulted in elevated saturated fat levels. However, it is suggested that further work be carried out on the consequences of this practice.

Local Authority Sampling Plans

The project required that a small proportion of routine Local Authority sampling activity be diverted to non-statutory work. Currently, sampling is almost exclusively undertaken in order to determine whether foods satisfy hygiene or compositional requirements which have a legal basis. There are no statutory guidelines for nutritional values in foods sold by caterers. If non-statutory nutrition-based sampling work is to be undertaken, consideration would be required as to the feasibility and costs of marrying with existing sampling activity as far as possible. Alternatively, additional funding streams should be investigated – with the possible outcome of centrally-funded nutrition sampling on a national basis.

“Mystery” Customer

It was perceived that the sample results may have been influenced by the presence of the food officer. Samples were purchased during advisory visits. In order to eliminate any bias, a repeat of such a project should apply the concept of a “mystery” customer who purchases the samples anonymously. This may give a true reflection of the nutritional levels resulting in more accurate assessments to be made to the improvements in the dish.

Extending the Project to Small Independent Manufacturers

The project team engaged with two local pakora manufacturers and noted that they treat their oils in very different ways. To ensure that takeaways are not perceived to be unfairly targeted it is suggested that other business groups such as small manufacturers of discretionary foods are included in any future work.

Other Nutritional Levels

The project was restricted to the investigation of saturated fat levels and to the relevant practices affecting these levels. However, practices such as the re-use of oil may have an unhelpful effect upon levels of trans fats and acrylamide in food. Further sampling to assess levels of these is suggested.

CONCLUSIONS

The objectives determined at the beginning of the project were all achieved in full. Whilst all objectives were of equal importance, objective one was of particular significance to the team as it related to the suitability of Local Authority environmental health services having an input into future nutrition and diet strategy.

Objective 1- To establish the degree to which a local authority environmental health service may influence businesses to make significant changes to preparation/processing methods and, thereby, reduce the intake of saturated fat by consumers of targeted meals.

The team used a number of different methods to engage with the business operators, including the use of translated action packs, telephone calls and face-to-face discussions. The most effective interaction was face-to-face discussions with business operators and kitchen staff. A key strength of environmental health staff is the ability to effectively engage with business operators in order to give advice and guidance which ultimately induces change. Each business that the team engaged with implemented change at some level. Some operators did so for only a very brief period while others made changes which were more likely to be permanent. Ultimately it was the interventions by food safety officers and environmental health officers that initiated these changes.

Objective 2- To determine the levels of saturated fat in meals sold by a range of hot food takeaway businesses in Glasgow.

The team took 256 samples throughout the project which included baseline samples from randomly selected takeaways in the city and also initial and secondary samples from each voluntary premises. These samples revealed the levels of saturated fat in a number of different take away meals.

Baseline Samples	46
Chinese Samples	82
Indian Samples	68
Fish and Chips Samples	60
Total	256

Objective 3- To determine if saturated fat levels in takeaway meals are unnecessarily elevated as a consequence of the food preparation/processing methods used.

Those businesses that implemented the suggested changes, particularly the use of rapeseed oil in chip shops, did produce a product with decreased saturated fat levels. Whilst there was a reduction noted when variations were made, the research did not prove conclusively that any particular method or ingredient used raised the level of saturated fat in popular dishes.

Objective 4- To determine whether alternative methods of preparation/processing could lower saturated fat levels in targeted foods.

Research identified a number of ways in which each business could lower saturated fat levels. Some businesses implemented some of these changes with a consequent reduction in saturated fat in most results. However, given the number of different changes suggested, it is difficult to determine the exact ingredients/methods that made the most significant impact.

The Educative Role of Environmental Health

Environmental health and food safety officers are able to engender trust and build strong relationships with business operators as they conduct their food safety inspection duties. Food

safety interventions usually involve a degree of persuasion – where officers encourage businesses to make positive changes either by means of legal requirement or by recommendation of good practice. The leverage available to officers in relation to recommendation of good practice is largely a consequence of the officers' statutory role allied to their existing skills and to the aforementioned relationship. It is the view of the project team that the same principle could be applied when persuading businesses to implement good dietary and nutritional practice. In effect, the environmental health services within Scottish Local Authorities are uniquely placed to change behaviours and practices in food businesses by carrying clear messages to operators. It is contended that the intrinsic lesson taken from the project is that behaviour change can be effectively encouraged and achieved in small food businesses.

There is considerable anecdotal evidence obtained from food enforcement officers in Glasgow to suggest that small and medium food businesses are generally not proactive in relation to obtaining food hygiene and food standards information from web-based sources – including the Food Standards Scotland and Glasgow City Council websites. It is suggested, therefore, that such businesses would be similarly disinclined to access nutritional information. In the light of this, it is proposed that Local Authority officers can not only deliver key nutritional messages directly but can also signpost relevant additional website information.

Cost-Benefit Analysis of Environmental Health Advice Delivery

An attempt was made to quantify the cost of a national nutrition strategy involving delivery of advice to businesses by Local Authority environmental health staff. The figures provide an indication of the potential reach of the strategy with respect to the initial outlay. The analysis uses data from the FSS annual LAEMS report (2014-2015) – in particular, the number of Full Time Equivalent Staff (FTE) involved with food enforcement work in Scotland, and the number of businesses receiving a food intervention over the course of the year.

Costs

The FTE for food hygiene inspections in Scotland is 229. It is hypothesised that if each officer were to undergo nutrition training at an estimated cost of £500 per officer, the total cost would be $229 \times 500 = £114,500$.

Benefits

The total number of businesses receiving a food intervention in Scotland was 15,299. Consequently, a national strategy would, in theory, be able to engage with up to 15,299 businesses in relation to nutrition in one year at a cost of £114,500. This equates to £7.48 per business.

Additional considerations

It is acknowledged that such a strategy would be unlikely to attempt to engage with all businesses within one year. Similarly, training of officers would be spread over more than one year.

There would be additional costs associated with producing resources as well as costs to LAs in terms of officer time during inspections.

The training cost is an estimate.

LAs would benefit from having staff trained in nutrition principles.

The benefits to society are more difficult to quantify.

Business Commitment to Healthier Options

The project did not seek to assess the existing levels of understanding of, or commitment to, the dietary and nutritional value of food amongst food business operators. However, the perception was that operators of small, independent catering businesses are generally unaware of the nutritional content of the food they prepare and, more crucially, have little impetus to learn or make changes on an independent basis. Conversely, many of the operators were, when the issue was raised by the project team, keen to learn about nutrition and expressed a willingness to provide healthier dishes as long as this would not significantly increase costs or deter custom.

Evidence obtained during this project would suggest that independent businesses are not particularly motivated to acquire knowledge in this area but can be persuaded to do so when engaged on a one-to-one basis.

Benefits of Environmental Health Involvement

It is recognised that that improvements could have been made to the model used throughout this project, in that the team's strengths did not lie in survey work or scientific research. It has always been acknowledged that the team's expertise lay in working with the businesses to induce change.

Some of the businesses may not have continued with all of the practices and ingredients recommended, however, it should be reiterated that the aim of this particular project was never to implement long term change. Rather, the objective was to demonstrate that an environmental health service can influence businesses to make changes to their preparation/processing methods with the added aim of reducing saturated fat within popular take away meals. The project outcomes should and can be extrapolated to numerous aspects of food production and their effects.

This project has clearly demonstrated that environmental health teams play a pivotal role in health improvement and that they can provide assistance to other agencies that are working to improve diet and nutrition. Environmental health and food safety officers are in the unique position of gaining access to premises and using their working relationships with food business operators to make changes which will hopefully improve the quality and nutritional value of foods they produce.

It is envisaged that diet and nutrition activities can be embedded into official controls and interventions carried out by environmental health departments in the future. Environmental health services cannot readily, and in isolation, develop dietary-centred materials based on scientific evidence. Food Standards Scotland (FSS) and the Scottish Government (SG) are better placed than environmental health services to do this, however, environmental health services could be utilised to disseminate advice and materials prepared by these other agencies.

It should be noted that if the delivery of diet and nutrition advice were introduced into the routine of environmental health work, there would be a need for tailored training for officers.

A new Scottish diet and nutrition forum has been established under the auspices of the Scottish Food Enforcement Liaison Committee (SFELC). It is envisaged that The SFELC Diet, Nutrition and Health Working Group will drive future change within this field engendering stronger links between nutritional policy makers and scientists at FSS/SG and the Local Authority officers who can deliver the core messages directly into commercial kitchens around Scotland.

There may be interventions that incorporate other stages of the Nuffield Council on Bioethics' *Ladder of Intervention* such as taxes on fatty or sugary foods or legislation that may restrict the sale of unhealthy foods.

RECOMMENDATIONS

1. There should be further work conducted into the practicalities involved with delivering diet and nutrition advice during food safety interventions conducted by Local Authority environmental health services. This work should focus *inter alia* upon the optimum length of time required to do so effectively on each occasion, the nature of materials and supporting information required and the potential effect upon the overall food safety work programme.
2. There is a need for a suitable forum where joint strategy on diet and nutrition strategy can be formulated and actioned. This forum would enable Local Authorities, Food Standards Scotland, the Scottish Government, diet and nutrition specialists, Royal Environmental Health Institute Scotland, NHS, representatives of the food industry and others to convene and develop plans for conveying an effective message to food businesses in Scotland. The key objectives of the forum should be the oversight of projects and the development of guidance materials.
3. Food safety enforcement staff within Local Authorities should undergo an appropriate level of training in diet and nutrition.
4. Consideration should be given to the suitability of a reward or recognition scheme. The Healthy Living Award Scheme has successfully promoted awareness of healthy options in certain contexts. While small independent takeaway businesses would be unlikely to reach the threshold for a Healthy Living Award, the introduction of a scheme recognising more limited achievement in diet and nutrition could be of help. Conversely, it could have a negative effect, e.g. by creating a false impression of the nature of food sold from a "badged" takeaway.
5. There should be an effort to promote the availability and capability of Local Authority environmental health services in the diet and nutrition field. This process would be multi-faceted and would require engagement within Local Authorities (in relation to Community Planning and Public Health management), with professional bodies, such as the Society of Chief Officers of Environmental Health in Scotland (SoCOEHS) and the Royal Environmental Health Institute of Scotland (REHIS) and with national bodies including Food Standards Scotland, the Scottish Government and the NHS.
6. Work should be undertaken in order to assess the feasibility of co-ordinating analysis of dietary/nutritional values concurrently with existing food surveillance sampling work presently undertaken by Local Authorities.
7. There should be further work to establish whether changes made in response to environmental health recommendations are maintained for extended periods

Local Authority Alignment with Food Standards Scotland Proposals

Food Standards Scotland presented a paper to the FSS Board on 20th January titled *Proposals for Setting the Direction for the Scottish Diet*. The paper includes a number of key principles and areas for action which aim to “generate the paradigm shift” in the Scottish Diet. Many of these have direct relevance to this project and to Local Authority input on a wider scale.

Principle 1 – Collaborative Working. The FSS paper alludes to the need for an inclusive, multi-faceted approach to tackling obesity. Glasgow City Council Environmental Health believe that Scottish Local Authorities can make significant contribution to the task and should be enlisted in the national strategy.

Principle 2 – Progression towards a healthier food and drink environment. Local Authorities have influence upon the food and drink environment via the planning and licensing processes.

Principle 3 – All Options to be considered including non-voluntary measures. Lack of progress with voluntary measures may warrant regulation. Local Authority Environmental Health services would be well-placed to police certain forms of regulatory requirements placed upon the food industry.

Principle 6 – A wide range of actions is required. No single action or component will be sufficient to bring about the nature and scale of change required to improve diet in Scotland. The widest possible range of effective measures should be included in the suite of actions.

The aforementioned FSS paper also lists a series of Areas for Action – several of which are analogous to the objectives of this report and, in particular, to the future work identified:

Area for Action - Portion Size Reductions (Para graph 7.2) – Food sold in Retail and Out-of-Home settings is available in a wide range of portion sizes and with concerns over high energy density and poor nutritional value foods. The obesity crisis warrants the exploration for the potential for regulation to address the problem.

Area for Action - Advertising and Marketing (Paragraph 7.3) – FSS should explore opportunities to take action in the way food is promoted and marketed in stores and catering establishments. Local Authorities can assist FSS to provide support and recognition to businesses (particularly SMEs) with the purpose of encouraging best practice in terms of marketing and provision of consumer information

Area for Action – Reformulation (Paragraph 7.4) – There is industry evidence that progress has been made. However, there is more to be done and a targeted approach should now be taken which is time bound.

Area for Action – Labelling and Consumer Information (Paragraph 7.6) large catering businesses provide full nutritional information for consumers. Encourage manufacturers to provide front of pack labelling.

Area for Action - Nutrition training for Health Professional and Educators (Paragraph 7.9) — Online training tool for use by LA Environmental health staff.

Area for Action - Working with Local Authorities (Paragraph 7.14) FSS encourage LAs to improve the food and drink offering by local businesses. Explore the potential for regulatory measures such as planning/licensing conditions for certain food premises that may be available to control the food and drink environment.

Area for Action - The Public Sector (Paragraph 7.15) – expansion of the Healthy Living Award.

ACKNOWLEDGEMENTS

OUR SINCERE THANKS TO THE VARIOUS STAKEHOLDERS THAT CONTRIBUTED AND SUPPORTED THE WORK CARRIED OUT BY THE PROJECT TEAM. WE WOULD ALSO LIKE TO THANK THE BUSINESSES THAT VOLUNTEERED, THEIR COOPERATION WAS INVALUABLE.

Glasgow Scientific Services
Food Standards Scotland
The Scottish Government
Balbir's
Subzi Spice
D&D Foods
Glasgow City Council - Chief Executive's Office (Health Policy Team)
The Royal Environmental Health Institute of Scotland
Food Health Innovation Scotland
Henry Colbeck
Glasgow Caledonian University
The Food Businesses
Healthy Living Awards (NHS Scotland)
Glasgow Centre for Population Health
NHS Scotland
Royal College of Physicians Glasgow

I WOULD ALSO LIKE TO THANK THE PROJECT TEAM FOR THEIR HARD WORK AND COMMITMENT SHOWN THROUGHOUT THIS PROJECT.

References

1. Watt GCM, Ecob R. Analysis of falling mortality rates in Edinburgh and Glasgow. *Journal of Public Health Medicine*. 2000 Sep;22(3):330-6
2. WHO. "World Health Report 2002: Reducing Risks, Promoting Healthy Life", Geneva, World Health Organization
3. Scottish Public Health Observatory. Public Health Information for Scotland March 2016. Available from:
<http://www.scotpho.org.uk/behaviour/diet-and-nutrition/introduction> 17th January 2016 (accessed 17th January 2016)
4. World Health Organization. Report of a Joint WHO/FAO expert consultation. *Diet, nutrition and the prevention of chronic diseases*. Geneva, Switzerland: WHO. 2003.
5. Scottish Parliament Information Centre (SPICe) Briefing - Obesity in Scotland. January 2015. Edinburgh: Scottish Parliament. Available from:
http://www.scottish.parliament.uk/ResearchBriefingsAndFactsheets/S4/SB_15-01_Obesity_in_Scotland.pdf (accessed 21st November 2015)
6. Information Services Division Scotland Heart Disease Statistics Update Year Ending 31 March 2014. Published 27th January 2015. Available from:
<https://isdscotland.scot.nhs.uk/Health-Topics/Heart-Disease/Publications/2015-01-27/2015-01-27-Heart-Disease-Summary.pdf?15876406432> (accessed 22nd November 2015)
7. Scottish Government February 22, 2010. *Preventing Overweight and Obesity: A Route Map Towards Healthy Weight*. Available from:
<http://www.gov.scot/Publications/2010/02/17140721/0> (accessed 12th January 2016)
8. The Scottish Government 2013. *Revised Dietary Goals for Scotland*. Available from:
<http://www.gov.scot/Resource/0042/00421385.pdf> (accessed 10th March 2016)
9. National Records of Scotland. *Wide variation in life expectancy between areas in Scotland*. 13 Oct 2015. Available from:
<http://www.nrscotland.gov.uk/news/2015/wide-variation-in-life-expectancy-between-areas-in-scotland> (accessed 13th December 2015)
10. McCartney G. Illustrating Glasgow's health inequalities. *JECH* 2010; doi 10.1136/jech.2010.120451
11. Scottish Index of Multiple Deprivation. March 2013 Available from:
<http://www.gov.scot/Topics/Statistics/Browse/SocialWelfare/TrendSIMD> (accessed 13th December 2015)

12. Cummins SC, McKay L, MacIntyre S. McDonald's restaurants and neighborhood deprivation in Scotland and England. *Am J Prev Med.* 2005;29(4)
13. Smith D. *The Observer*, London, England; 14th March 2004. *You'll be lucky to live to 60 here. But it's not the third world ... it's Glasgow's East End*
14. S. Macintyre, L. McKay, S. Cummins, C. Burns Out-of-home food outlets and area deprivation: case study in Glasgow, Scotland *International Journal of Behavioural Nutrition and Physical Activity*, 2 (2005)
15. Hollands GJ, Shemilt I, Marteau TM, Jebb SA, Lewis HB, Wei Y, Higgins JPT, Ogilvie D. Portion, package or tableware size for changing selection and consumption of food, alcohol and tobacco. *Cochrane Database of Systematic Reviews* 2015, Issue 9. Art. No: CD011045. DOI: 10.1 Marteau
16. Theresa M, Hollands Gareth J, Shemilt Ian, Jebb Susan A. Downsizing: policy options to reduce portion sizes to help tackle obesity *BMJ* 2015; 351 :h5863
17. Roberto et al. (2015). Patchy progress on obesity prevention: emerging examples, entrenched barriers, and new thinking. *Lancet (Obesity)*, 385 (9985)
18. Food Standards Scotland, Diet and Nutrition: Proposals for Setting The Direction For the Scottish Diet; January 2016
19. McKinsey Global Institute report, 'Overcoming obesity: an initial economic analysis', November 2014 002/14651858. CD011045.pub2
20. Nuffield Council on Bioethics (2007). Public Health: Ethical Issues. Available from: <http://nuffieldbioethics.org/wp-content/uploads/2014/07/Public-health-ethical-issues.pdf> (accessed 10th March 2016)
21. The Nutritional Requirements for Food and Drink in Schools (Scotland) Regulations 2008

Appendices

Appendix 1- Public Surveys

Fast Food Takeaway Public Survey		
Officers	Location	Date
1	Generally, how often do you eat takeaway meals (i.e. meals from fast food places such as Chinese, Indian, Fish and Chips takeaways/restaurants etc)	
	<ul style="list-style-type: none"> • More than five times a week • Three to five times a week • Twice a week • Once a week • Once or twice a month • Once or twice a year • Never 	
2	What type of takeaway food do you normally eat? (select all that apply)	
	<ul style="list-style-type: none"> • Chinese • Indian • Italian • Fish and Chips • Thai • American • Japanese • Mexican • Other, please specify 	
3	What type of takeaway meal do you order most frequently (i.e fish and chips, pizza, curry, kebab, etc)?	
4	What would you say are your reason(s) for eating takeaway food? (select all that apply?)	
	<ul style="list-style-type: none"> • Convenience • Unable to cook • As a treat • Tastes good • Dislike cooking 	

	<ul style="list-style-type: none"> • Not enough time to cook homemade meal • Other, please specify
5	How would you best describe your understanding of saturated fats?
	<ul style="list-style-type: none"> • I fully understand what saturated fats are • I have a basic understanding of what saturated fats are • I've heard of saturated fats but couldn't describe what they are • I don't know what saturated fats are and I haven't heard about them
6	To what extent, if any, do you consider saturated fat when ordering takeaway food?
	<ul style="list-style-type: none"> • A great deal • A fair amount • Somewhat • Not very much • Not at all • Don't know/No opinion
7	How likely or unlikely would having nutritional information (i.e. calories, fat content, salt, etc.) available for takeaways influence your choices in meals?
	<ul style="list-style-type: none"> • Very likely • Fairly likely • Neither/nor • Fairly unlikely • Very unlikely • Don't know/No opinion
8	If your preferred takeaway meal was offered with a reduced fat content, how likely or unlikely would you be to eat it?
	<ul style="list-style-type: none"> • Very likely • Fairly likely • Neither/nor • Fairly unlikely • Very unlikely • Don't know/No opinion
9	If you have any general comments about the nutritional content of takeaways, please use the box below
10	Gender
	<ul style="list-style-type: none"> • Male • Female

11	Age
	<ul style="list-style-type: none">• Under 16• 16-24• 25-34• 35-44• 45-54• 55-64• 65-74• 75+• Prefer not to say
12	Post Code (i.e. G2, G43, G31)

--	--	--	--	--

Commercial Waste Enforcement Questionnaire				
Premises Name			Premises Address	
Premises Contact			Phone Number/ email	
Officer			Date	
Premises Type	Fish and Chip	Chinese	Indian	3-in-1
Saturated Fat Questionnaire				
		Yes	No	Comment
1	Does the business have a waste oil contract? Company Used How frequent are the uplifts?			
2	What type of oil/fat is used? Why? Who supplies the oil?			
3	How often do you change the oil in the deep fat fryers?			

Appendix 3- Action Pack for Chinese Premises

Healthier Chinese takeaway advice



Healthier eating is becoming more important to consumers.



Environmental Health - Sustainability and Environment
Land and Environmental Services
Glasgow City Council, 231 George Street, Glasgow, G1 1RX
Environmental Health Officer **Eilidh Meechan**
Phone 0141 287 6623
Email eilidh.meechan@glasgow.gov.uk

Healthier Chinese takeaway advice



There are a number of ways you can provide healthier choices for your customers.

Chips

Use plain, uncoated, medium or thick cut chips

- ✓ These absorb less fat, so you use less oil and are healthier for your customers.

Size of chips

- ✓ To reduce the amount of fat absorbed by chips during the frying process the cut the chips to 1.4 centimetres wide.

Meat

Ingredient selection

- ✓ Use leaner cuts of meat, avoid fatty cuts of meat that are high in saturated fat.
- ✓ Remove skin and excess fat from meat and poultry before cooking or request your suppliers do this for you.
- ✓ If you offer curries with creamed coconut, try to replace with reduced fat coconut milk as this contains less saturated fat.

Oils

Reuse of oil

- ✓ Old oil should be discarded through a reputable waste oil company.
- ✓ Old oil from deep fat fryers should not be used for shallow frying as this oil is higher in saturated fat.

Use liquid oil

- ✓ Such as high oleic sunflower oil or high oleic rapeseed oil, as they contain less saturated fat. These oils are some of the most stable for use when frying at high temperatures.



Healthier Chinese takeaway advice



Keep your oil fresh

- ✓ Fill the frying basket beside the fryer, not over it, to avoid crumbs falling into the oil. Never fill the basket by more than half.

Maintain oil quality

- ✓ Skim debris from oil after use, filter daily and change oil before it foams or smokes.
- ✓ Excessive foaming, smoking, increased thickness or a change in odour, colour or flavour are all signs of oil breakdown and signal that the oil should be replaced.

Renewing frying oil

- ✓ When renewing your oil, clean and dry the fryer.
- ✓ If the fryer is used frequently, change your oil after every 12 uses

Turn fryers off when not in use

- ✓ Turn fryers down or off when they are not needed to maintain the quality of the oil. Cover the oil when not in use.

Cooking (including frying and roasting)

Cooking method

- ✓ Grill, oven bake, steam or stir fry in minimal amount of monounsaturated or polyunsaturated oil, where possible.
- ✓ When roasting meat or poultry, use a roasting rack to drain excess fat away for example, pork ribs.
- ✓ Skim off fat and oil floating on top of curries and soups.

Fry foods according to manufacturer's instructions

- ✓ Do not allow cook from frozen foods to thaw before frying for example, frozen chips, as this will add water in the frying oil and lower its temperature. These foods will take longer to cook and will absorb more fat.



Healthier Chinese takeaway advice



Drain deep fried food well before serving - shake, bang and hang

- ✓ Shake and bang the basket vigorously twice and hang for at least 20 seconds to drain off excess fat.
- ✓ Remove extra oil from food by placing fried foods on absorbent kitchen paper.

Avoid pre-frying or reheating in oil

- ✓ Try to avoid pre-frying double or triple cooking food in oil, as this increases the amount of fat in the dish. You will also use less oil.
- if you need to pre-prepare, then try parboiling meat and chicken first and flash frying to finish it off.

Fry at 175 degrees celsius

- ✓ Heating oil to 175 degrees celsius or 350 degrees fahrenheit before you start frying, gives you crispier chips that absorb less fat and use less oil.
- ✓ Make sure the temperature range on your equipment is accurate, by regular servicing or by using a catering thermometer.

Rice and Noodles

- ✓ Offer boiled rice and noodles instead of fried. To make boiled rice more appealing offer variations with added vegetables.

Service

Portion Size

- ✓ Reduce portion sizes, this will also help cut waste.
- ✓ Offer small or half portions and make them available to everyone.
- ✓ Ask your staff to stick to these portions as this provides consistency for your customers. Train staff or highlight on menu that customers can ask for food to be steamed, boiled, grilled instead of fried.



GLASGOW CITY COUNCIL

Healthier Fish and Chip Shop takeaway advice



Healthier eating is becoming more important to consumers.



Environmental Health - Sustainability and Environment
Land and Environmental Services
Glasgow City Council, 231 George Street, Glasgow, G1 1RX
Environmental Health Officer **Eilidh Meechan**
Phone 0141 287 6623
Email eilidh.meechan@glasgow.gov.uk

www.glasgow.gov.uk

Healthier Fish and Chip Shop takeaway advice



There are a number of ways you can provide healthier choices for your customers.

Chips

Use plain, uncoated, medium or thick cut chips

- ✓ These absorb less fat, so you use less oil and are healthier for your customers.

Size of chips

- ✓ To reduce the amount of fat absorbed by chips during the frying process the cut the chips to 1.4 centimetres wide.

Meats and Fish

Meat

- ✓ Offer sausages, pies, burgers with the least fat content.
- ✓ A higher meat content of greater than 65% means less fat.

Fish coating

- ✓ Offer fish coated in breadcrumbs over fish coated in batter as it absorbs less fat.

Cooking (including frying)

Use oleic or high oleic rapeseed oil

- ✓ High oleic sunflower oil or high oleic rapeseed oil contains less saturated fat.

Maintain oil levels in the fryer

- ✓ Keep frying oil topped up – the food must be immersed during cooking.
- ✓ Foods only partly covered will take longer to cook and will absorb more fat.



Healthier Fish and Chip Shop takeaway advice



Avoid water in the oil

- ✓ Do not allow cook from frozen foods to thaw before frying, for example, frozen chips. This will add water in the frying oil and lower its temperature. These foods will take longer to cook and will absorb more fat.
- ✓ Dry hand cut chips thoroughly before frying.

Do not overload the fryer

- ✓ Never fill the frying basket by more than half. This will cause the temperature of the oil to drop, meaning food will take longer to cook and absorb more fat.
- ✓ As a guide you should use no more than 500 grammes of chips for every 10 litres of frying oil.

Fry at 175 degrees celsius

- ✓ Heat oil to 175 degrees celsius or 350 degrees fahrenheit before you start frying. This will give you crispier chips that absorb less fat and use less oil.
- ✓ Make sure the temperature range on your equipment is accurate, by regular servicing or by using a catering thermometer.

Shake basket during cooking

- ✓ Shake the fryer basket a few times during cooking to make sure the oil circulates and the food is cooked properly.

Don't overcook food

- ✓ Always follow cooking instructions on product packaging.
- ✓ Avoid par-frying, double or triple cooking and reheating foods in oil, as this will increase the fat content of the food. You will use less oil.

Drain deep fried food well before serving- shake, bang and hang

- ✓ Shake and bang the basket vigorously twice and hang for at least 20 seconds to drain off excess fat.
- ✓ Remove extra oil from food by placing fried foods on absorbent kitchen paper.



Healthier Fish and Chip Shop takeaway advice



Maintain oil quality

- ✓ Continually skim debris from oil after use, filter every day and change oil before it foams or smokes.
- ✓ Excessive foaming, smoking, increased thickness or a change in odour, colour or flavour are all signs of oil breakdown and signal that the oil should be replaced.

Renewing frying oil

- ✓ When you renew your oil, clean and dry the fryer.
- ✓ Change your oil after every 12 uses

Turn fryers off when not in use

- ✓ Turn fryers down or off when they are not needed to maintain the quality of the oil.
- ✓ Cover the oil when not in use.

Service

Portion Size

- ✓ Reduce portion sizes, this will also help cut waste.
- ✓ Offer small or half portions and make them available to everyone.
- ✓ Ask your staff to stick to these portions as this provides consistency for your customers.



GLASGOW CITY COUNCIL

Healthier Indian takeaway advice



Healthier eating is
becoming more important
to consumers.



Environmental Health - Sustainability and Environment
Land and Environmental Services
Glasgow City Council, 231 George Street, Glasgow, G1 1RX
Environmental Health Officer **Eilidh Meechan**
Phone 0141 287 6623
Email eilidh.meechan@glasgow.gov.uk

www.glasgow.gov.uk

Healthier Indian takeaway advice



There are a number of ways you can provide healthier choices for your customers.

Chips

Use plain, uncoated thick cut chips

- ✓ These absorb less fat, so you use less oil and are healthier for your customers.

Size of chips

- ✓ To reduce the amount of fat absorbed by chips during the frying process the cut the chips to 1.4 centimetres wide.

Ingredients

Use low fat yoghurt

- ✓ Use low fat yoghurt in curry sauces instead of cream. If creamed coconut is used in recipes replace with reduced fat coconut milk.
- ✓ Use less butter or ghee.

Meat

- ✓ Remove skin and excess fat from before cooking or ask your supplier do this for you.
- ✓ Make your own spice blends and sauces and reduce the levels of oil. Some bought in curry pastes and sauces can contain high levels of oil.
- ✓ Use a monounsaturated or polyunsaturated oil for stock curry sauce for curries. Make sure you reduce the amount of oil in the recipe.

Oils

Reuse of oil

- ✓ Discard old oil through a reputable waste oil company.
- ✓ Do not use old oil in deep fat fryers should for shallow frying. This oil is higher in saturated fat.



Healthier Indian takeaway advice



Use liquid oil

- ✓ High oleic sunflower oil or high oleic rapeseed oil contains less saturated fat. These oils are some of the most stable for use when frying at high temperatures.

Fry at 175 degrees celsius

- ✓ Heating oil to 175 degrees Celsius or 350 degrees Fahrenheit gives you crispier chips that absorb less fat and use less oil.
- ✓ Make sure the temperature range on your equipment is accurate, by regular servicing or by using a catering thermometer.

Keep your oil fresh

- ✓ Never fill the basket by more than half.

Avoid pre-frying or reheating in oil

- ✓ Avoid par-frying double or triple cooking food in oil. This increases the amount of fat in the dish. You will also use less oil.
- ✓ If you need to pre-prepare; parboil meat and chicken first and flash fry to finish it off.

Fry foods according to manufacturer's instructions

- ✓ Do not fry frozen foods until they are thawed.

Frozen chips will add water in the frying oil and lower its temperature. Frozen foods will take longer to cook and will absorb more fat.

Drain deep fried food well before serving: shake, bang and hang

- ✓ Shake and bang the basket twice and hang for at least 20 seconds to drain off excess fat.
- ✓ Remove extra oil from food by placing fried foods on absorbent kitchen paper.

Maintain oil quality

- ✓ Skim debris from oil, after use; filter daily and change oil before it foams or smokes.
- ✓ Excessive foaming, smoking, increased thickness or a change in smell, colour or flavour are all signs of oil breakdown and signal that the oil should be replaced.



Healthier Indian takeaway advice



Renewing frying oil

- ✓ When renewing your oil, clean and dry the fryer.
- ✓ Change your oil after every 12 uses.

Turn fryers off when not in use

- ✓ Turn fryers down or off when they are not needed to maintain the quality of the oil.
- ✓ Cover the oil when not in use.

Cooking

Cooking method

- ✓ Grill, barbecue, bake, steam or shallow fry using a small amount of monounsaturated or polyunsaturated oil. Skim off fat oil floating on top of curries.

Rice

- ✓ Offer boiled or steamed rice instead of fried or pilau rice. To make boiled rice more appealing add vegetables.

Service

Portion Size

- ✓ Reduce portion sizes, this will also help cut waste.
- ✓ Offer small or half portions and make them available to everyone.
- ✓ Ask your staff to stick to these portions as this provides consistency for your customers.
- ✓ Train staff or highlight on menu that customers can ask for food to be steamed, boiled, grilled instead of fried.

