Scoping paper:
Cooking practices and types of oils used in fast food restaurants

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November 2014

1. Background

a. Fat consumption, fast-food consumption and disease risk

- It is well established that high levels of consumption of saturated fat and trans fat are linked to heart disease, an increased risk of developing obesity and other diet related non-communicable diseases (NCDs) (WHO 2014 (a), WHO 2014 (b), Jaworowska et al. 2013). Furthermore, replacement of saturated fats with polyunsaturated vegetable oils is known to lower coronary heart disease risk and reduce the risk of type 2 diabetes (WHO 2014 (b)).
- Frequent consumption of fried foods has been associated with an increased risk of both type-two diabetes and cardiovascular disease, and several studies have reported an association between fast-food consumption and weight gain (Cahill et al. 2014). Fast-foods often have a higher caloric and fat content which is largely due to the high saturated and/or trans-fat content of the cooking oil used (Mehta and Swinburn 2001), as well as other cooking practices adopted.

b. Increases in fast-food consumption

- It is becoming more frequent that meals are eaten outside the home with take-away and fast-food consumption steadily increasing around the world (Jaworowska et al. 2013). Australians are spending more of their weekly food expenditure on meals out of the home compared to ten years ago, including take-away and fast-foods (ABS 2011) and more than half the Australian population eats at a fast-food chain once a month (IPSOS 2014).
- Amongst Australians, hot chips are a very popular food item: the average Australian buys >20 serves of hot chips a year. They are Australian's second most popular lunch choice after sandwiches. Globally, hot chips are also a growing item with Euromonitor reporting hot chips to have a third of the global snack food market
- Hot chips are a high calorie product ranging up to around 18% fat. The Australian National Nutrition Survey shows potato in the top contributors to saturated fat intake. For 12-18 year olds, it is the second highest source of saturated fat

c. Trans fats

- Trans fats occur naturally in small amounts in dairy and meat products, but a large proportion of the trans fats in the Australian food supply are created by food manufacturers via hydrogenation. Hydrogenation is an industrial process that turns liquid oils into solid fats, for use in highly-processed foods such as biscuits, pastries, fast food and some margarines. The industry advantages of hydrogenated oils are that they're cheap, have a long shelf life, and withstand repeated heating.
- In Australia, there's little up-to-date data on the level of trans fats in the food supply, and on how much of it is consumed. In 2009, Food Standards Australia New Zealand estimated average intake of trans fats to be between 0.5% and 0.6% of total energy intake. This is below the WHO's recommended maximum level of 1%.

- Australia lags behind many countries, including India, by not mandating that levels of trans fats be shown on food labels. What this means is that it's nearly impossible to know whether Australian packaged food contains trans fats unless the manufacturer voluntarily includes it on the label. For foods that aren't labelled, such as fast-food and baked goods, there's really no certain way for Australians to know the level of trans fat they're eating.

d. Potential to improve fast-food cooking practices

Improvements in the lipid profile of hot chips and other deep-fried foods resulting in a healthier product with less saturated fat and trans-fat content could be achieved through improving certain cooking practices used in fast-food outlets (Mehta and Swinburn 2001, Mellema 2003, Zialifar et al. 2008). These methods include:

- Using a cooking oil which has less than 20% saturated fat and less than 3% linoleic acid
- Using chips or fries which are at least 12mm thick and are straight cut
- Ensuring the oil to product ratio is at least 6:1
- Cooking the product at a high temperature (although the precise minimum and maximum range of recommended temperature is contentious)
- Vigorously shaking the product after frying and draining the fat for a sufficient time to allow for oil to drain off
- Filtering the oil regularly (at least once every two days)
- Cleaning the frying equipment regularly

Given the high fat content of fried-foods sold in fast-food and take-away outlets and the large proportion of the Australian population that consume foods at these outlets it is hypothesised that improvements to cooking practices have the potential to have a positive impact on the total fat and saturated fat intake of Australians. This, in turn, could result in improvements in cardiovascular disease, overweight and obesity levels and other diet-related NCDs.

2. Current policy status

a. International

- Reduction of saturated fats is included as one of the 25 indicators of the WHO's Global Monitoring Framework of NCDs ("adoption of national policies that limit saturated fatty acids and virtually eliminate partially hydrogenated vegetable oils (trans fats) in the food supply").
- Most of the policy action in this area globally has focused on trans fat reduction
    - Almost all regulatory moves aimed at decreasing trans fats around the world have been effective (Downs et al 2014). The most effective interventions were national and local policies that ban the use of trans-fat in the cooking oil that was most commonly used in the population.
    - Many countries have mandatory labelling of trans fats – this typically only applies to packaged foods (not fast-foods). In 2006, for instance, the US mandated trans fat labelling for all packaged foods. The measure coincided with a 58% decline in consumption, most likely because of increased consumer awareness and product reformulation by manufacturers (CDC, 2012).
    - The US Food and Drug Administration (FDA) has proposed regulations to classify partially hydrogenated oils (the major source of trans fats in the United States) as generally not safe to include in food. This means US food manufacturers will soon need permission to include trans fats in their products.

- There has been very limited policy action globally to address the saturated fat content of foods, particularly fast foods. Non-regulatory initiatives to improve the nutrient profile of the food supply, such as the UK Responsibility Deal, focus mostly on packaged foods and salt reduction.

b. Australia

- In Australia, the government generally favours non-regulatory approaches, such as industry self-regulation, unless these approaches are shown to be less effective than other options. The government has no explicit targets for saturated fat / trans fat reduction.
- The food industry has stated they are working hard to remove trans fat from their products (AFGC, 2013). Only two of the top five largest fast-food chains have a policy to reduce saturated fat / trans fat, and it is not clear what actions they have taken in this area (Sacks 2014)
- There is no mandatory labelling of trans fat in Australia.
- Besides basic food safety regulations, there are no regulations around the types of cooking oils used by fast-food restaurants or schemes in place to address this at a national or state level. Some local governments / communities may have schemes in place to encourage healthy cooking practices, but we are not aware of such schemes.

3. Evidence of efficacy/effectiveness

There is only a small number of published studies on the implementation and evaluation of interventions targeting the cooking practices of fast-food outlets to improve the lipid profile of food products. Five studies have been identified that specifically reported on interventions for improving cooking practices in fast-food outlets with the aim of reducing saturated fat, trans-fat or the total fat content of foods (refer to Appendix for details of these studies).

Three of the studies involved an education and training intervention whereby the project staff aimed to improve the knowledge of outlet staff of best practice cooking methods and to demonstrate how food items could be prepared in a healthier way or with healthier ingredients. This was done in a variety of ways, but, in general, outlets were provided with face to face training, as well as assistance implementing changes to cooking practices at the outlet. The amount, frequency and type of assistance varied between interventions as did the method of providing incentives and recognition of the positive changes made by the food outlets. Incentives for the outlets highlighting participation in the intervention through media exposure and outlet signage were key components in all three of these studies.

Two of the interventions took a regulatory and policy approach whereby government stipulated changes to either the trans-fat content of foods or the main ingredient commonly used in cooking oil, both which would impact on the lipid profile of a wide range of food products.

a. Evidence of changes in health outcomes

Only one study (Uusitalo et al. 1996) included a health outcome as a part of the evaluation. This study assessed the impact of a regulation introduced by the Mauritius government to limit the use of palm oil (high in saturated fat, and previously the most commonly used oil). The regulation resulted in soya bean oil (a polyunsaturated oil) being used as a replacement. Over a period of five years, the authors reported a significant reduction in cholesterol concentration in men of 0.79mmol/l ($p>0.001$) and in women of 0.82mmol/l ($p>0.001$). This was in addition to a reduction in saturated fatty acid intake of 3.5% in men and 3.6% in women, and an increase of polyunsaturated fatty acid intake of 5.5% in men and 5.6% in women.

b. Evidence of change in lipid profile

Three studies (Angell et al. 2012, Al-alawy and Kitchen 2014, and Azadi et al. 2004) included lipid profile as an outcome measure.

- Angell et al. (2012) conducted a repeated cross-sectional study to investigate the impact of the New York City (NYC) trans-fat ban on the trans-fat, saturated fat and saturated fat plus trans-fat content of lunchtime purchases at fast-food outlets. This ban went into effect in 2006 and restricted all food service outlets from using, storing or serving food that contained partially hydrogenised vegetable oil or had a trans-fat content of 0.5 grams or more. The aim of this ban was to reduce the trans-fat content of foods available in NYC.
    - The authors reported a significant mean trans-fat reduction of 2.4 grams (95% CI, -2.8 grams to -2.0 grams; p=<0.001), a mean saturated fat increase of 0.6% (95% CI, 0.1 grams to 1.0 grams; p=0.011) and a mean trans-fat plus saturated fat reduction of 1.9 grams (95% CI, p=<0.001). It was also reported that the maximum trans-fat content of a single purchase was reduced from 28 grams to 5 grams, the trans-fat plus saturated fat content of a single purchase was reduced from 96 grams to 60 grams and purchases with a zero trans-fat content increased from 32% to 59%.
    - Although this study reported positive changes to the lipid profile of foods, it only included chain outlets and only lunchtime purchases. As a result, the data may not be representative of the whole food environment of this setting.
- Choice Chips, a small non-randomised, non-controlled pre-post intervention study (n=7), targeted fast-food outlets in a rural town in Victoria, with the aim of improving the total fat content and saturated fat content of deep-fried chips.
    - Seven outlets were recruited out of a possible sixteen outlets in the area.
    - Participating outlets were provided with training emphasising the use of oil with a lower saturated fat content, using chips with a diameter of at least 12mm, draining the oil after cooking the chips (shake, bang, hang technique), cooking the chips for the recommended time (not specified) and cooking the chips at the recommended temperature (not specified).
    - Incentives for participating included two drums of lower saturated fat cooking oil, media promotion in local newspapers and identification of their participation in the program via signage on their shop-front stating that they sell 'choice chips'.
    - A social marketing campaign promoted 'Choice Chip' outlets and highlighted the health benefits of these types of chips compared to regular chips. A medal system was also introduced whereby chips outlets could achieve a 'Gold', 'Silver' or 'Bronze' standard according to a set of criteria related to the best practice cooking practices.
    - The authors found that after being provided with education and training on best practice cooking techniques of deep-fried chips, all seven outlets participating in this intervention reduced the total fat content of their chips from a mean of 12.4% to 9.6% post intervention and a reduction of saturated fat content of between 3 and 3.5% was reported across all outlets.
- Another non-randomised, non-controlled pre-post intervention study (n=12) (Al-alawy and Kitchen 2014), investigated the changes in total fat and saturated fat of hot chips in fast-food outlets in London. The aim of this intervention was to encourage the adoption of healthier cooking practices, to decrease portion weight, total fat, saturated fat, total energy per portion and salt and to improve the attitudes and behaviours towards healthier cooking practices.

- The strategy to recruit outlets for this intervention varied between boroughs. Environmental Health Officers were involved in the recruitment and implementation of the intervention so the already existing relationships with most outlets were beneficial in this process. Barriers to recruitment included the outlets' fear that making changes will deter customers and threaten business profits, the additional administration burden on the business and/or that the changes would undermine traditional recipes. Some outlets were recruited based on their geographical location, the type of food that they sold or the size of the outlet. Twenty three fast-food outlets were recruited across fourteen boroughs.
- Project staff took a sample of chips from each participating outlet and analysed it to determine total fat and saturated fat content among other indicators. A report of the findings from this sample were then provided to the outlet which also received education and training on how to modify cooking practices in order to improve the lipid profile of the chips. The training was based on the 'Tips on Chips' guidelines developed by the Food Standards Authority (FSA) which include recommendations related to thickness of chips, temperature of oil, type of cooking oil used, oil maintenance, cooking time and post-cooking techniques, all of which can impact on the amount of oil absorbed by the chip and therefore its lipid profile.
- Project staff telephoned the outlets to assess progress after 3 months and again purchased another portion of chips, which was tested and the findings reported back to the outlets. The results from the follow up analysis demonstrated an average total fat decrease of 15% and an average saturated fat decrease of 36% and all outlets reduced both the total fat and the saturated fat content of their chips.

c. Evidence of changes in cooking practices

- The Cities Institute (London Metropolitan University 2012) conducted an evaluation of a non-randomised, non-controlled pre-post intervention which was implemented across fourteen boroughs in London in a range of different food service and catering outlets.
  - The fast-food category of this intervention (23 outlets) aimed to encourage food outlets to reduce the saturated fat, sugar and salt content of foods and offer healthier options, smaller portion sizes and adopt healthier cooking practices. The intervention was designed as an award scheme whereby outlets would need to meet eight of a possible twenty two criteria, and to do so, encouraged to make changes related to the use of fats, oils, sugars salt and availability of lower sugar drinks, snacks and fruit and vegetables. Once the outlet met a minimum of eight criteria, they were identified as being a part of the scheme and received accreditation via signage on their outlet. These criteria included:
    - Polyunsaturated or monounsaturated fat or oil used for cooking
    - Cooking oil heated to optimal temperature (temperature not specified)
    - Excess fat drained from food before serving
    - Oil in fryer is properly maintained (not specified what constitutes 'properly maintained')
    - Chips are thick cut (size of chip to be deemed as 'thick cut' not specified)
    - If chips are served, there is always a healthier starchy alternative
  - Most outlets were already using a polyunsaturated or monounsaturated cooking oil, heated oil at optimal temperature, drained excess oil from food before serving, maintained cooking oil appropriately and used thick cut chips. Only two outlets changed the type of cooking oil used during the intervention, five outlets adjusted their cooking

oil to the optimal temperature, three began draining excess fat from the food before serving, four improved their cooking oil maintenance and no outlets changed their chips to thicker cut varieties. On average, 3.6 changes were made by businesses and one business did not need to make any changes to secure the award. The study did not specify if the changes were made were related to the criteria above.

- Al-alawy and Kitchen (2014) reported that seven of the twelve participating outlets claimed to have improved their cooking practices and Azadi et al. (2004) reported that all participating outlets changed to an oil lower in saturated fat, despite the higher price. Both studies cited that the outlets expressed intention to continue using the healthier oil and best practice cooking techniques; however this was not measured in the studies and would be difficult to ascertain if the outlets did in fact continue to use these improved practices.

4. Potential to use evidence as the basis for modelling

- The evidence of effectiveness of interventions in this area, while limited, is nevertheless promising. However, the effectiveness studies (described in the section above) are generally of low quality as the intervention stores were not randomised and no control groups were used. The interventions also had very small samples sizes, and follow-up durations were short. While the evidence is weak, it could provide a basis for making assumptions around intervention effectiveness.
- There is no direct evidence of cost of these interventions, or the cost of compliance with new regulations; however, this could be obtained from other similar types of interventions in other areas
- Very limited data on effect of changing cooking practices on the profitability of individual fast-food outlets, or on prices to consumers
- Very little data on how consumers might respond to changes in cooking practices, although changes in consumer behaviour are likely to be minor
- No evidence on the type of fast-food outlets that are likely to change practices e.g. big chains versus individual stores
- There is no data on the reach of these interventions (ie. number of stores that would adopt measures); however regulations would apply to all relevant fast-food outlets

5. Potential specification of an intervention in this area

- Could take the form of changes to local government regulations around food licences for fast-food outlets that specify types of oil / cooking practices to be used
- Could take the form of incentive programs run by local councils
- Unlikely to be state or federal government policy

6. Feasibility of intervention's implementation in the Australian context

- Likely to be implemented as part of other broader community programs e.g. Healthy Together Victoria or other community-based interventions
- Some local councils likely to act, but unlikely to see universal uptake of a particular regulation or scheme

7. Stakeholders

a. Policy makers/regulators

- State government Departments of Health
- Local governments

b. Industry

- Big fast food chains
- Smaller fast food outlets
- Oil manufacturers

c. Public health

- Heart Foundation Australia

8. Issues specific to this intervention

a. Modelling

- Potential benefits to health are likely to relate more to changes in saturated fat / trans fat intake rather than just obesity. Does this intervention meet the selection criteria for the project (must have an impact on obesity)?
- Will need to make many assumptions around uptake, sustainability of intervention effect, effect on consumers, costs etc.

b. Other issues

- The benefits from changes to cooking practices / oils used are likely to be even greater for people in lower socioeconomic groups because their fast food consumption can be disproportionally high. Products containing less healthy oils tend to be cheaper than healthier alternatives.

c. Relevance to current policy decision making

- Not currently on the radar of Federal / State governments, but may be relevant to local governments. Need to tie in to Stream 3 (impact of system-wide interventions), and Healthy Together Victoria evaluations

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Appendix: Studies that report on interventions for improving cooking practices in fast-food outlets with the aim of reducing saturated fat, trans-fat or the total fat content of foods

Table 1 *Summary of studies in included review*

Author/s	Year	Study design	Location	Type of outlet	Sample size	Description of intervention/study	Outcomes measured	Results
Uusitalo, U., Feskens, E., Tuomilehto, J., Dowse, G., Haw, U., Fareed, D., Hemraj, F., Gareeboo, H., Alberti, K. and Zimmet, P.	1996	Repeated cross-sectional	Mauritius	All outlets and homes using ration oil.	10,242	Investigated the extent to which reducing the saturated fat composition of a commonly used cooking oil influenced changes in cholesterol concentration in the Mauritius population. The government limited content of palm oil in the most commonly used cooking oil , replaced with wholly soya bean oil.	Fatty acid composition of phospholipids in pooled serum samples from men and women from the two surveys; measured and predicted change in serum cholesterol concentration.	Saturated fatty acids: reduced by 3.5% in men, 3.6% in women. Polyunsaturated fatty acids: increased by 5.5% in men and 5.6% in women. Total cholesterol concentration: reduced by 0.79mmol/l in men and 0.82mmol/l in women.
Azadi, L., Brennan, M. and Swinburn, B.	2004	Cohort	Australia	Independent fish and chip shops and general stores.	7	Aimed to reduce levels of saturated fat and offer healthier options. Outlets encouraged to adopt healthier cooking practices in order to meet a set of criteria making outlets eligibale for recognition.	Total fat of chips at baseline and follow up, saturated fat of chips at pre-intervention, post training and 12 months post intervention. Outlet operators attitudes. Consumer attitudes and knowledge.	Mean total fat reduction: 12.4% to 9.6%. Saturated fat reduced among outlets on average between 3-3.5%.
Al-alawy, Khamis & Kitchen, Fiona	2014	Cohort	London, UK	Fish and chip outlets	12	Aimed to train outlets in healthier cooking practices to address total fat, saturated fat and other components of food. A portion of chips was purchased and analysed for fat content. Environmental Health Officer trained outlet in best practice cooking practices, testing conducted again after 3 months.	Portion weight (grams), total energy per portion (kcals), total fat per portion (grams), total saturated fat per person (grams) and total salt per portion.	Average total fat decreased by 15% and average saturated fat decrease by 36% (95& CI, p<0.05). Improvements were made by all outlets.
Angell, S., Cobb, L., Curtis, C., Konty, K. and Silver, L.	2012	Repeated cross-sectional	New York City, USA.	Chain fast food outlets.	168	Aimed to assess the effect of the regulation to limit trans-fat by comparing the trans-fat, saturated fat and trans- plus saturated fat content in lunchtime purchases before and after the ban. Receipts were collected from customers at fast food chains within 3 months of the ban being phased in and again within one year after the implementation of the ban.	Change in mean grams of trans-fat, change in mean grams of saturated fat, change in mean grams of trans-fat plus saturated fat, trans-fat per 1000/kcal purchase.	Mean trans-fat reduced by 2.4gin 2 years (95% CI, p=<0.001). Mean saturated fat increased by 0.6g (95% CI, p=0.011). Mean trans-fat plus saturated fat reduced by 1.9g (95% CI, p=<0.001).
Cities Institute - London Metropolitan University.	2012	Cohort	London, UK	Fast food outlets	23	Aimed to reduce levels of saturated fat and offer healthier options. Outlets encouraged to adopt healthier cooking practices in order to meet a set of criteria making outlets eligibale for recognition.	a) Criteria fulfilled before intervention. b) Criteria fulfilled after intervention. c) Criteria the business does not want to address. d) Number of changes made.	Between 0 & 6 changes made, average 3.6 changes, 1 business did not need to make any changes to secure the award.