

## Extended Abstract

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<b>Paper/Poster Title</b>	<b>Could foods high in fat, sugar and salt (HFSS) taxes improve climate health and nutrition?</b>
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<b>Abstract</b>	<b>200 words max</b>
<p>Tackling Scotland's diet and obesity problems require stringent measures across the whole food supply chain. Foods that are high in fat, sugar and salt are a major contributor to weight and weight-related problems in Scotland. However, these foods are constantly under different forms of price promotions. As such it is critical to ascertain how price changes in these food groups could help improve health and the cascading effect on climate health. This study applied the Exact Affine Stone Index demand model to Kantar Worldpanel data comprising 3260 households and purchases of eighteen food categories consumed in Scotland to assess the impact of HFSS tax on food purchases, nutrition, GHG emission and consumer welfare. The simulation framework uses demand elasticities to estimate revenue-neutral tax and uncompensated tax scenarios. Results from the analysis indicate that imposing taxes on HFSS would reduce their purchases due to price effects. Subsidizing fruits and vegetables with revenues from the tax promotes nutritious dietary options. Households' GHG emissions and welfare decreased under the uncompensated tax scenario but increased when fruits and vegetables were subsidized. Our results suggest a trade-off between climate and nutrition goals when HFSS are taxed without a subsidy policy in place.</p>	
<b>Keywords</b>	Welfare analysis, GHGe, EASI Demand, Fiscal policy
<b>JEL Code</b>	Q18; D12 see <a href="http://www.aeaweb.org/jel/guide/jel.php?class=Q">www.aeaweb.org/jel/guide/jel.php?class=Q</a> )
<b>Introduction</b>	<b>100 – 250 words</b>
<p>The consumption of foods high in fat, sugar, and salt (HFSS) is one of the leading causes of non-communicable diseases (NCDs) such as ischaemic heart disease (IHD), stroke, some cancers, and type 2 diabetes (Rayner, 2005). Hypertension, a risk factor for cardiovascular disease, is caused by a high intake of salt (Strazzullo, D'Elia, Kandala, &amp; Cappuccio, 2009). In addition, excess sugar intake is one of the major causes of being overweight, a significant risk factor for diabetes and many cancers (Lauby-Secretan et al., 2016; Te Morenga, Mallard and Mann, 2012). In the same vein, high-fat diets are reported to increase oxidative stress in tissues in the human body. The impact of food choices does not only affect personal health but climate health and goals. Positive shifts in dietary patterns can be potentially beneficial for both the environment and health. Ludbrook (2019) suggests that taxes, food campaigns and pledges, and subsidy interventions could be an economic voyage in promoting healthy food consumption across the globe. As such, the goal of the present study is to model the impact of an excise tax on the purchases of seven types of HFSS purchased in</p>	

Scotland and the cascading effect on nutrition and CO<sub>2</sub>-equivalent emissions from food purchases.

### **Methodology**

**100 – 250 words**

The study relied on secondary data obtained from Kantar Worldpanel (KWP). The data was collected by KWP field officers across 3260 households in Scotland from January to December 2017 and 2018. Household purchase data of 18 food aggregates (which are prices and quantities of purchases) were collected over 52 weeks. HFSS foods in the data include take-home confectionery, biscuits, take-home savouries, cakes pastries and sugar morning goods, total puddings and desserts, take-home sugary drinks, edible ices and ice cream. The emission estimates for this research study were obtained from the SHARP indicator Database (Mertens et al., 2019). The study used the Exact Affine Stone Index (EASI) demand model comprising real total expenditures, demographic characteristics, and budget shares to estimate price and expenditure elasticities. The goal of the present study is to estimate the impact of a 10 per cent price increase on the purchases of HFSS considering both own and cross-price elasticities. Two policy scenarios were considered: 1) imposing a 10 per cent excise tax on all HFSS whilst the prices of the remaining food categories were unchanged, and 2) imposing the 10 per cent VAT on all HFSS but subsidised the purchases of fruits and vegetables using the revenue generated from HFSS taxes.

### **Results**

**100 – 250 words**

A 10% tax on HFSS food groups (whilst prices of all other foods remain unchanged) resulted in a 6-10% reduction in HFSS purchases for the average household in Scotland. However, this had unintended effects on non-taxed foods. For instance, the consumption of fruits and vegetables was reduced by 2 and 5 per cent respectively. Taxing HFSS whilst subsidising the price of fruits and vegetables with the revenue generated led to a significant increase in fruits (11%) and vegetables (7%) purchases. Dairy products, meat and fish, grains, fats and eggs, and alcoholic beverages also experienced higher demand. A food policy where all HFSS food groups are taxed would be more effective in cutting down CO<sub>2</sub>e emission (-3%) than when taxes are used to subsidise fruits and vegetables (+2%). Consumers are worse off when all HFSS are taxed and there are no subsidies – welfare loss of 16 per cent compared with 6 per cent when both taxes and subsidies are used.

### **Discussion and Conclusion**

**100 – 250 words**

This study calculated the impact of introducing an HFSS excise tax on food purchases while considering two policy scenarios: a 10% tax on HFSS and zero tax on non-discretionary food groups; and a 10% excise tax on HFSS and a revenue-neutral subsidy on fruits and vegetables. Taxing HFSS without any subsidies in place could reduce the purchases of both unhealthy and healthy foods i.e. fruits and vegetables. The policy is likely to distort the diet of the average Scottish. However, implementing both tax and subsidy policies at the same time could improve the purchases of fruits and vegetables and also reduce the purchases of HFSS – a win-win situation. On the negative side, though diets will improve, this will deteriorate climate health in Scotland. The welfare impact of the tax was estimated using the log of living cost index which indicates that consumers would require a 16 per cent increase in food expenditure to meet previous household food consumption when only excise tax is imposed on HFSS. However, households would require about a 6% increase in their initial expenditure

when both excise tax and subsidies are applied. This study contributes to the HFSS discussion in the UK by showing that there is no straightforward solution to the problem. Our results suggest that Government must consider the unintended consequences of the HFSS policy before going ahead to implementing it.