

Health and Place

The impact of school exclusion zone planning guidance on the number and type of food outlets in an English local authority: A longitudinal analysis --Manuscript Draft--

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Abstract:	<p>The use of planning policy to manage and create a healthy food environment has become a popular policy tool for local governments in England. To date there has been no evaluation on their short-term impact on the built environment. We assess if planning guidance restricting new fast food outlets within 400 metres of a secondary school, influences the food environment in the local authority of Newcastle Upon Tyne, UK. We have administrative data on all food outlets in Newcastle 3 years pre-intervention 2012-2015, the intervention year 2016, and three years' post-intervention 2016-2019. We employ a difference-in-difference approach comparing postcodes within the school fast food outlet exclusion zone to those outside the fast-food exclusion zones. In the short term (3 years), planning guidance to limit the number of new fast-food outlets in a school exclusion zone did not have a statistically significant impact on the food environment when compared with a control zone.</p>
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Opposed Reviewers:	
Response to Reviewers:	

13 May 2021

Dear Professor Pearce,

Thank you for giving us the opportunity to further revise the manuscript, 'The impact of school exclusion zone planning guidance on the number and type of food outlets in an English local authority: A longitudinal analysis'.

We hope that we have now addressed all the reviewers' comments.

Your Sincerely,

Heather Brown, PhD (on behalf of all the co-authors)

Response to reviewers:

We want to thank the reviewers for taking the time to read our paper again and provide useful feedback to further improve the manuscript. We hope that we have adequately addressed all your points. We also want to thank the editor for giving us the opportunity to revise the manuscript.

Reviewer 1:	Response
<p>General Point 4. Your response: "We have added additional notes to the table to make them easier to follow so we have left the caption above the table to accommodate these additional notes."</p> <p>Whilst I would prefer for the figure caption to be moved to below the figure, I am happy to defer this point to the editor for final judgement.</p>	<p>We have not made any additional changes at this stage</p>
<p>Highlights Thank you for revising the study highlights, I agree they are much clearer. However, I believe highlight number three should read "fast-food outlets" - please consider revising. I also believe that this should be consistent with the manuscript, where hot food takeaway outlets are used more frequently.</p>	<p>We have changed this to fast-food outlet in the highlight and have revised the manuscript to consistently refer to fast-food outlets throughout to make it easier for an international audience.</p>
<p>Methods Point 3. "We clarify on the bottom of page 3, that this means that restrictions in the planning guidance regarding restricting planning permission based solely upon the fact that they are a takeaway do not apply. 'Importantly, the refusal of planning permission to takeaway outlets in exclusion zones does not apply where the premises also lies in designated retail centres (zones prioritised by the local authority for retail growth). Planning permission in theory may still be denied for other reasons in the planning guidance. But these will be based upon the individual premises and the same judgements and decisions around granting planning permission may not apply to all premises."</p> <p>Your final point "Planning permission in theory may still be denied for other reasons in the planning guidance. But these will be based upon the individual premises and the same judgements and decisions around granting</p>	<p>We have added the following to the bottom of page 2 to address this point:</p> <p>'Planning permission in theory may still be denied for other reasons in the planning guidance such as for environmental reasons. But these will be based upon the individual premises and the same judgements and decisions around granting planning permission may not apply to all premises'</p>

<p>planning permission may not apply to all premises" is important as it shows that other considerations are made by the Local Authority in addition to the exclusion zone - as such, planning permission may have been refused for another reason not related to the exclusion zone.</p> <p>I believe this additional information would be useful to the reader. Please consider adding it to your revised version.</p>	
<p>Results</p> <p>Thank you for your efforts revising your manuscript based on my previous comments - I believe that the Results and new figures are much improved.</p> <p>Whilst some aspects of the figures may continue to be unconventional, such as the position of the Northing Arrow and the style of the Scale, I will defer any further amendments to the editorial team as I appreciate they may purely be down to personal preference.</p>	<p>Thank you for this positive comment. We leave the comment about the Northing arrow and scale up to the editorial team to decide if it needs to be changed</p>
<p>Discussion</p> <p>Point 3. "This sentence in the strengths and limitation is used to highlight the strength of our study using longitudinal data compared to other studies evaluating the food environment which have used cross-sectional data."</p> <p>I appreciate that use of longitudinal data is a strength, and should be commended. However, I disagree that it is fair to compare your research with these previous studies, given your second highlight "This is the first evaluation of planning guidance limiting fast-food outlets in England". Please consider revising this point.</p>	<p>We have removed the following sentence from the discussion to address this point:</p> <p>'To date the majority of studies have been cross-sectional (Burgoine et al. 2014; Wilsher et al. 2016; Lytle & Sokol 2017; Diez et al. 2019), which limits our understanding on how the food environment changes due to both interventions and other economic factors.'</p>
<p>Reviewer 2</p>	
<p>(4) I had asked about the dip in locations in 2018 and expressed a need for some speculation/explanation. The new figure (Figure 3) is great, I would like the original question posed addressed: "4. It seems (Figure 3) that there was a dip in establishments opening in 2018. Is this true? If so, why?"</p>	<p>There was a decrease in new establishments opening up in 2018. It is not clear why this is. It may just be part of the normal business cycle. As from looking across all years it seems to go in peaks and troughs.</p> <p>To address this point in the text we have added the following sentence to the top of page 9: 'In Figure 4, there appears to be peaks (e.g. 2014, 2017) and troughs (2015 and 2018) in the opening of new outlets.'</p>

<p>(8) Your new edit is a bit confusing in that I don't know what "high streets" are. Are these commercial avenues/spaces? Downtowns? A specific location? Please edit or clarify.</p>	<p>Sorry for the confusion we have added the following in parentheses after high street on page 11 (main shopping streets)</p>
<p>(10) This comment has not been addressed. My concern was that these two examples seem to be cherry-picked and random. Are there more systematic papers or similar that talk about these types of ordinances? Please justify the decision to show these two specific examples.</p>	<p>After doing a further search of the literature we could not identify any systematic reviews on international planning guidance to limit fast-food outlets</p> <p>We had chosen these two examples by using the following search types: Planning guidance, ordinance, fast-food, takeaways</p> <p>The results we got were the two examples used in the paper. After reading about these two examples of planning guidance from Ireland and Los Angeles we had decided that they were similar to what we were evaluating and could be used as a comparison. We hope this this addressed your concern.</p> <p>To make this clearer in the text we have added the following to the middle paragraph on page 2: 'There is limited evidence available from similar research investigating impact of planning guidance worldwide; however we did identify two studies using planning guidance to manage the food environment in Ireland and the USA (Health Service Executive, Ireland (N.D); Los Angeles City Planning 2007).'</p>

Highlights

- 50% of local authorities in England use planning guidance to restrict new fast-food outlets
- This is the first evaluation of planning guidance limiting fast-food outlets in England
- We evaluate planning guidance restricting fast-food outlets within 400 metres of a school exclusion zone in Newcastle Upon Tyne, UK
- We find no statistical difference in ~~the food environment~~ fast-food outlets in exclusion zones compared to a control
- Lack of change in the food environment may partially explain our findings

Title: The impact of school exclusion zone planning guidance on the number and type of food outlets in an English local authority: A longitudinal analysis

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The impact of school exclusion zone planning guidance on the number and type of food outlets in an English local authority: A longitudinal analysis

Abstract:

The use of planning policy to manage and create a healthy food environment has become a popular policy tool for local governments in England. To date there has been no evaluation on their short-term impact on the built environment. We assess if -planning guidance restricting new [takeaway-fast food](#) outlets within 400 metres of a secondary school, influences the food environment in the local authority of Newcastle Upon Tyne, UK. We have administrative data on all food outlets in Newcastle 3 years pre-intervention 2012-2015, the intervention year 2016, and three years' post-intervention 2016-2019. We employ a difference-in-difference approach comparing postcodes within the school [takeaway-fast food outlet](#) exclusion zone to those outside the [takeaway-fast-food](#) exclusion zones. In the short term (3 years), planning guidance to limit the number of new [takeaways-fast-food outlets](#) in a school exclusion zone did not have a statistically significant impact on the food environment when compared with a control zone.

Keywords: planning guidance; evaluation; food environment; difference-in-difference; UK

Introduction:

The UK Government has recently re-committed its pledge to tackle obesity aiming to half childhood obesity by 2030 and reduce adult obesity rates (Department of Health and Social Care 2020). Obesity is a complex multifaceted condition (Greater London Authority 2012; Frood et al. 2013). However, there is international consensus that the environment in which we live and work influences the food that we eat and subsequently our health (Vanderlee et al. 2017; Public Health Association Australia 2019; Centre for Disease Control 2021). In particular, there is a strong association between eating fast food and overweight and obesity (Burns et al. 2002; Prentice et al. 2003; Smith et al. 2009; Lachat et al. 2012), with some evidence of a causal influence of fast food intake on obesity and overweight (Currie et al. 2010). In England, as is the case in many high-income countries, takeaway outlets selling fast food tend to cluster in lower socioeconomic areas, potentially contributing to widening health inequalities (Hurvitz et al. 2009; Greater London Authority 2012; Keeble et al. 2019).

There are 343 local authorities in England (local government administrative bodies) (Gov.UK 2016). Since 2013, Local Authorities in England have responsibility for tackling the causes of poor health which include the built environment (Department of Health 2011). To meet this objective, local authorities have increasingly amended their planning guidance to promote 'healthy weight environments' (Public Health England 2020). Because of the evidence finding a link between foods sold at [takeaways-fast food outlets](#) and being overweight or obese (Burns et al. 2002; Prentice et al. 2003; Smith et al. 2009; Currie et al. 2010; Lachat et al. 2012), policy has focused on restricting these type of food outlets. We define [takeaway-fast food](#) outlets as those that sell food (~~which can be fast food~~) to be consumed off the premises. The use of planning guidance to promote a 'healthy weight' environment is based upon the assumptions of 'nudge' theory (Thaler & Sunstein 2009). Specifically, around the concept of choice architecture or how the environment influences people's food choices (Mikic 2020). Planning decisions around the type and availability of different food outlets will influence the design and use of the built environment which will then 'nudge' people by making it easier to make healthier food choices and/or removing the temptation of more unhealthy food choices subsequently improving health. However, as acknowledged by Public Health England, the retail

environment is complex (Keeble et al. 2019) and restricting the number of ~~takeaways-fast food outlets~~ may not effectively limit the offer of unhealthy food. For example, competition theory in economics (Salvatore 2008) suggests that if there is demand in the local area for the type of food being offered by ~~takeawaysfast food outlets~~, other types of food outlets such as restaurants, cafes or pubs which are not restricted by planning guidance may fill the gap. In other words, an unintended consequence of this type of policy may be an increase in the number of other types of food outlets in the local authority. At the same time, since this type of planning guidance only restricts the opening of new food outlets and does not impact existing outlets, it is unclear how long might be required before a significant shift to a healthier food environment could be observed.

Waltham Forest Borough Council was the first local authority in England to introduce planning guidance to restrict new ~~takeaways-fast-food outlets~~ within 400 metres of secondary schools in 2009 (London Borough of Waltham Forest 2009). To date approximately 50% of local authorities in England have planning guidance in place to promote a healthy food environment (Keeble et al. 2019). National guidance informs planning guidance at the local authority level and is usually contained within the local plan and core strategies (planning policies based upon the needs, priorities or strategic objectives of the local authority). Further details and clarifications regarding the restrictions in place are outlined in supplementary planning documents (Keeble et al. 2019). Together these documents outline the decision-making process for determining the acceptability of planning applications (Keeble et al. 2019). In England, there are three types of planning guidance used to limit the number of ~~takeaway fast-food~~ outlets. Firstly, school exclusion zones are planning guidance that restrict the granting of planning permission for new ~~takeaway (fast-food)-fast-food~~ outlets around places frequented by children (such as near secondary schools). A second option for planning guidance is limiting the density of outlets by restricting the granting of planning permission for new ~~takeaway-fast-food~~ outlets if a certain threshold number of outlets (between 5-20% of retail space) has been exceeded. The third option is restricting the granting of planning permission for new outlets where the percentage of population classified as overweight or obese (15% of children in final year of primary school for example) has been exceeded (Keeble et al. 2019). ~~Internationally, similar measures to manage the food environment~~ There is limited evidence available from similar research investigating impact of planning guidance worldwide; however we did identify two studies using planning guidance to manage the food environment ~~have been used~~ in Ireland and the USA (Health Service Executive, Ireland (N.D); Los Angeles City Planning 2007)

The Metropolitan District of Newcastle upon Tyne is in the North East of England. By population size, it is the 17th largest city in the UK with a population of 302,800 in 2019. 72.8% of the population is economically active compared to 79% nationally (Nomis Official Labour Market Statistics 2019). Life expectancy at birth is approximately 2 years lower than the national average. An estimated 60% of adults and a quarter of children aged 10 to 11 years in Newcastle are overweight or obese, the latter 4 percentage points higher than the national average (Public Health England 2019) Thus, compared to other cities in the UK, Newcastle is more deprived and has worse health. Newcastle Upon Tyne's planning guidance (Newcastle City Council 2016) grants the local authority the power to refuse planning permission for the change of use of premises (or building of a new premises) if the primary business is for the sale of hot food for consumption off the premise, and the proposed business is within a school exclusion zone (within a 10 minute walk/approximately 400 metres of a secondary school via the street network). It came into effect in October 2016. Importantly, the refusal of planning permission to ~~takeaway-fast-food~~ outlets in exclusion zones does not apply where the premises also lies in designated retail centres (zones prioritised by the local authority for retail growth). Planning permission in theory may still be denied for other reasons in the planning guidance such as for

environmental reasons. But these will be based upon the individual premises and the same judgements and decisions around granting planning permission may not apply to all premises

New ~~takeaway-fast-food~~ businesses opening in a premise with existing permission to sell ~~takeawayfast-~~ food do not require planning permission, as this does not imply a change of use requiring planning permission.

To date, there has been no empirical investigation of how using planning guidance to manage and manipulate the food environment has impacted the type and number of food outlets in a local authority in England. To understand the impact of planning guidance on the local food environment, is a fundamentally important question, going forward, to not only promote a healthy environment, but also to help the government reach their obesity reduction target (Department of Health and Social Care 2020). It is essential to understand the time frames needed to identify a significant change to the food environment.

The aim of this paper is to evaluate the impact of planning guidance on the number and type of food businesses in a local authority in England (Newcastle Upon Tyne) 3 years after the implementation of planning guidance creating school exclusion zones around secondary schools. To operationalise this aim, we employed a quasi-experimental estimation approach to assess changes in the number and types of business premises before and after the implementation of planning guidance in Newcastle Upon Tyne. We hypothesise that the planning guidance may change the number and type of food outlets in postcodes in the exclusion zone compared to the control zone. Specifically, we would expect that the number of new ~~takeaways-fast-food~~ opening in postcodes within the exclusion zones should decrease post guidance. However, the number of non-~~takeaway-fast-ff~~ food outlets may increase within exclusion zone postcodes, should businesses decide to open as restaurants for example in order to circumvent the guidance We also look at the impact of the planning guidance on existing outlets as – if/when outlets close - if new ~~takeaways-fast-food outlets~~ cannot open, this may impact the likelihood of other types of food businesses operating. It may lead to changes in the food environment of the exclusion zone relative to the control. This may be another mechanism by which the planning guidance influences the food environment.

Methods

Setting:

We used data covering all postcodes in the local authority of Newcastle upon Tyne between 2012 and 2019. Data pre-intervention was from January 2012-September 2016 and data post-intervention is from October 2016-December 2019. Because of the Covid-19 pandemic and temporary changes to planning legislation which came into force in March 2020 (The Town and Country Planning 2020B), we did not use data from 2020 in the analysis.

Data Sources:

The data on food outlets comes from the Food Standards Agency - Food Hygiene Rating Scheme (FSA FHRS) (Food Standards Agency N.D), an administrative source which records all food outlets inspected by environmental health officers¹. It is a statutory requirement that the data on food outlets obtained by the environmental health officers during their inspections are uploaded within 28 days of an inspection (Food Standards Agency N.D) The data has been validity tested and was shown to offer a

¹ Environmental health officers are employed by local authorities to inspect businesses for health and safety, food hygiene, and food standards.

clearer picture of the food environment than information from commercial sources (Kirkman et al. 2020). Although updated regularly, some archived cross-sections of the FHS data are publicly available, allowing us to view annual records on all food outlets in the study area over the sample period. The food outlet data contains the postcode for each outlet. This postcode is matched to data from the National Statistics Postcode Lookup (Office for National Statistics 2020), which contains the latitude and longitude coordinates for each postcode. For each postcode and year, we know the number of food outlets, the latitude and longitude coordinates, and also the breakdown by outlet type as recorded in the FHS data.

Outcome:

Our primary outcome was the number and type of food outlets in each postcode in the local authority of Newcastle Upon Tyne. The type of food outlet is classified by a local authority environmental health officer when delivering a food safety inspection. The environmental health officer classifies premises based upon their main business. The classification categories are:

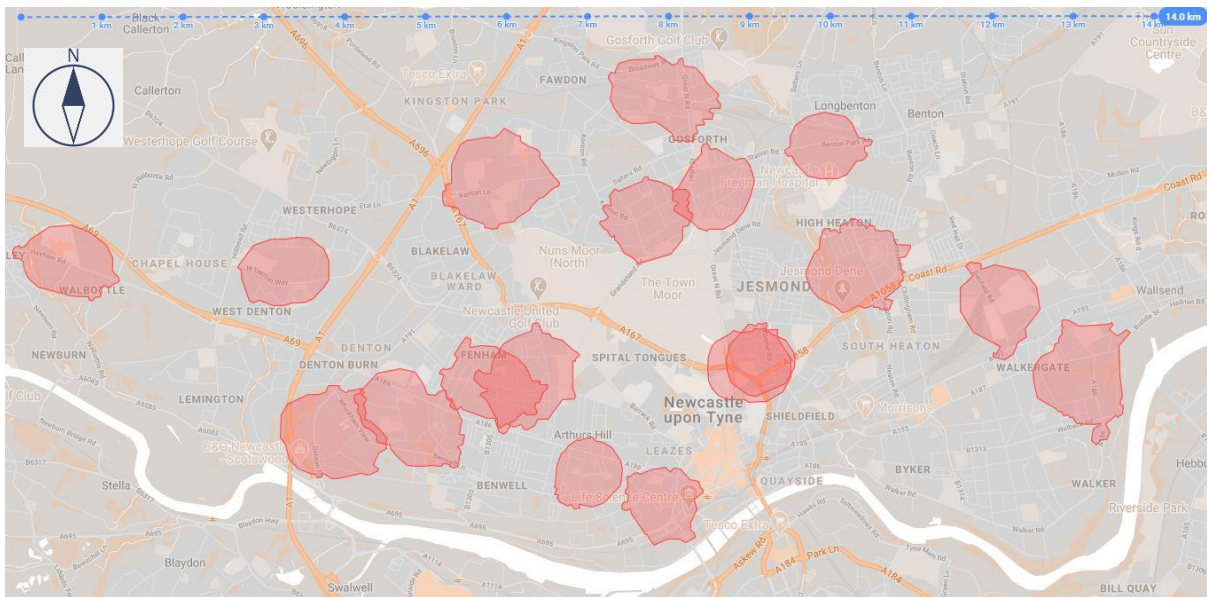
- Restaurant/Café/Canteen
- Retail
- School/College/Universities
- Supermarkets
- Distributors/Transporters
- Hospital/Childcare/Caring
- Manufacturing/Packing
- Mobile Caterer
- ~~Fast-food~~Takeaways/Sandwich shops
- Import/Export
- Hotel/B&B/Guest House
- Other Catering
- Pub/Night Club/Bar

It is important to note that the classification used by the environmental health officer may differ to the classification of a premise used by planning inspectors. For example, a mixed-use restaurant and ~~takeaway-food to take away and eat at home~~ may be classified as a ~~takeaway~~fast-food outlet by an environmental health officer, whereas a planner may classify it as a mixed-use premise. To reduce this type of bias arising from potential misclassification, we used the local authorities' annual planning policy monitoring reports (Newcastle City Council (N.D).) to corroborate the data on new ~~takeaways~~fast-food outlet granted planning permission with FHS data as reported by the environmental health officer on new ~~takeaways~~fast-food.

Exposure-Exclusion Zone

We identified postcodes in the exclusion zones using the supplementary planning guidance outlining the exclusion zone (Newcastle City Council 2016). Latitude and longitude coordinates were used to map exclusion zone postcodes and retail zones. A map of the exclusion zones is presented in Figure 1. There are 18 exclusion zones with 8 of the zones overlapping. There are 8 designated retail centres which contain 786 postcodes that are excluded from the analysis. We have data on 2003 postcodes in the exclusion zone.

Figure 1: Map of the school exclusion zones in Newcastle upon Tyne, England



Note: The red polygons show the exclusion zones around secondary schools in Newcastle Upon Tyne, whilst the distance between the blue circles along the top line indicate one kilometre.

Controls

Control postcodes are those that lie outside of the exclusion zones but within 250 metres of an exclusion zone. There are no secondary schools within the control zones. However, the proximity of the control postcodes to the treated ones, should ensure that prior to the intervention, the density of outlets per group is comparable. It is unlikely, given the close proximity to the exclusion zones, that these control areas would experience different trends over time compared to the exclusion zones. Thus, we can use the control group as a counterfactual (what would have happened in the absence of planning guidance) in our statistical model. We have data on 5278 postcodes that are within 250 metres of the 18 exclusion zones.

Analysis

This study followed the STROBE reporting guidelines which can be viewed in the online Appendix. All analysis was undertaken using Stata v.16 (Stata Corp 2019). First, we presented the number and type of outlets in the exclusion and control zone over the study period. Next, we plotted the number of restaurants and ~~takeaways-fast-food outlets~~ in each exclusion zone and control zone before the planning guidance came into force to assess the comparability of the zones. Thus, we could determine if the data before the introduction of the legislation followed similar trends so that we could employ a quasi-experimental statistical model.

Then we graphically show the number of new restaurants and ~~takeaways-fast-food outlets~~ opening in the exclusion and control zone over the study period. Finally, we employed a linear difference-in-difference model (see supplementary Appendix 1 for model formula) to estimate the change in the number and type of food outlets in postcodes in the exclusion zone compared to the control zone, after the introduction of the planning guidance. We included dummies for years with 2012 as the base year. All models also control for time constant factors by using post code fixed effects. We estimated the impact of the changing in planning guidance on existing and new outlets in the exclusion zone compared to the control zone.

Sensitivity Analysis

As a sensitivity analysis we compare the number and type of outlets in each postcode in the exclusion zone to the immediate area (within 250 metres) of an exclusion zone and a wider control zone of postcodes between 250-500 metres of the exclusion zone.

Results

The number of different types of food outlets are presented in Table 1 for the control and exclusion zones. There is an increase in the number of restaurants over this period in both the exclusion zone and control zone. In both zones, the number of takeaways-fast-food outlets is fairly constant. All takeaways-fast-food outlets identified in the annual monitoring review for Newcastle City Council (Newcastle City Council 2020) were identified in the dataset as takeawaysfast-food outlets.

Table 1: Number of outlets by type and year for control and exclusion zones

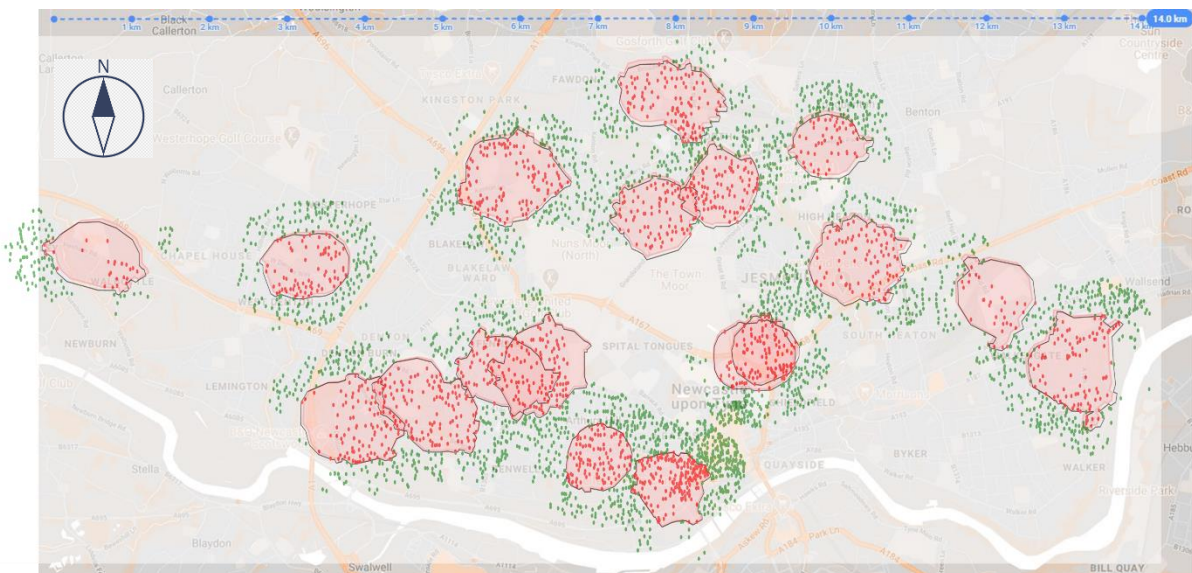
	2012	2013	2014	2015	2016	2017	2018	2019
Control Postcodes								
Restaurants	134	143	150	153	154	176	178	182
<u>TakeawaysFast Food</u>	99	101	96	95	98	103	103	98
Pubs	99	101	96	95	98	103	103	98
Hotels	13	13	13	13	19	17	16	17
Supermarkets	15	15	18	20	22	23	23	22
Retail	113	121	116	115	115	111	112	108
Schools	34	36	35	35	35	36	36	36
Hospitals/Care homes	42	42	43	43	42	41	41	38
Distribution/Transport	4	4	4	2	1	1	2	2
Import/ Export	0	0	0	0	0	0	1	1
Manufacturing	2	3	2	2	1	2	2	4
Small Caterers	22	21	18	20	26	26	28	26
Mobile Caterers	0	0	0	0	1	0	0	1
Exclusion Postcodes								
Restaurants	45	42	52	54	59	66	66	63

<u>TakeawaysFast Food</u>	29	30	31	31	29	29	28	29
Pubs	29	31	31	31	32	33	33	29
Hotels	4	4	4	4	4	3	3	1
Supermarkets	5	6	6	7	7	6	6	6
Retail	47	45	45	46	45	48	47	42
Schools	35	34	34	34	35	35	35	36
Hospitals/Care homes	24	25	26	26	26	25	25	23
Distribution/ Transport	2	2	2	2	2	3	4	4
Import/ Export	1	0	0	0	0	0	0	0
Manufacturing	2	2	2	2	3	1	1	2
Small Caterers	16	19	18	19	22	13	14	13
Mobile Caterers	0	0	0	1	1	2	2	1

Density of Food outlets in Newcastle Upon Tyne

Figure 2 shows the number of outlets in the exclusion zone (red) and control zone (green) before the implementation of planning guidance in October 2016. Some exclusion zones such as the two in the bottom middle have a higher concentration of outlets. For most control and exclusion zones there are a similar number of postcodes with outlets in the zones.

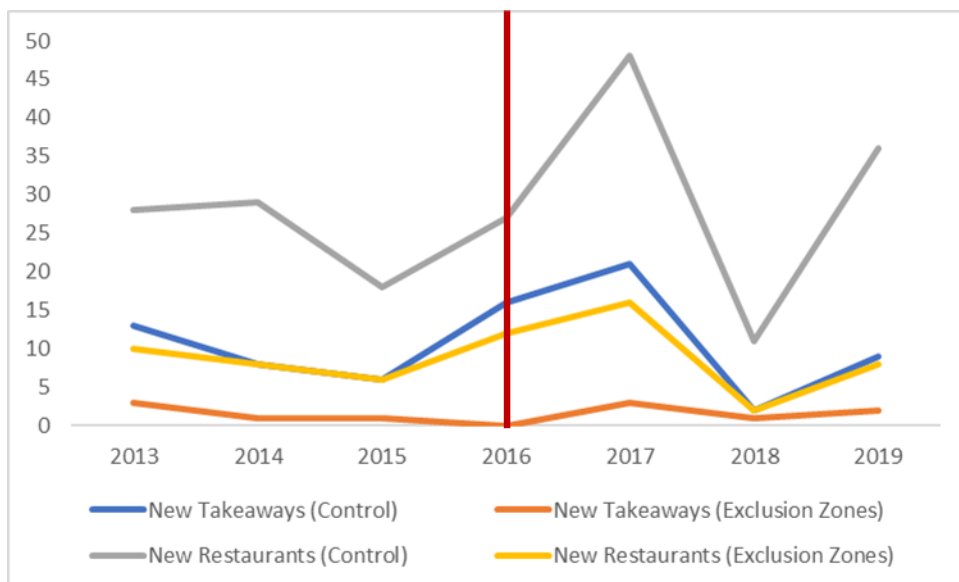
Figure 2: Location of restaurants and takeaways-fast-food outlets in Newcastle Upon Tyne. Green: control zone; Red: exclusion zone over the period 2012-2015



New Takeaway-Fast-Food and Restaurant Outlets in Newcastle Upon Tyne

Figure 3 shows the number of new takeaways-fast-food outlets and restaurants opening in the control and exclusion zones between 2013-2019. There are fewer outlets opening in the exclusion zone. In both zones more restaurants open each year than takeaways-fast-food outlets. There is no clear visual change in new outlets with the introduction of planning guidance in 2016. The mean number of takeaways-fast-food outlets opening in the control zone was 10 with a minimum of 2 in 2018 and a maximum of 21 in 2017. The mean number of new takeaways-fast-food outlets opening in the exclusion zones is 1.5 with a minimum of 0 in 2016 and a maximum of 3 in 2013 and 2017. The mean number of restaurants opening in the control zone is 28 with a minimum of 11 in 2018 and a maximum of 48 in 2017. The mean number of restaurants opening in the exclusion zone is 8.9 with a minimum of 5 in 2015 and a maximum of 8 in 2017.

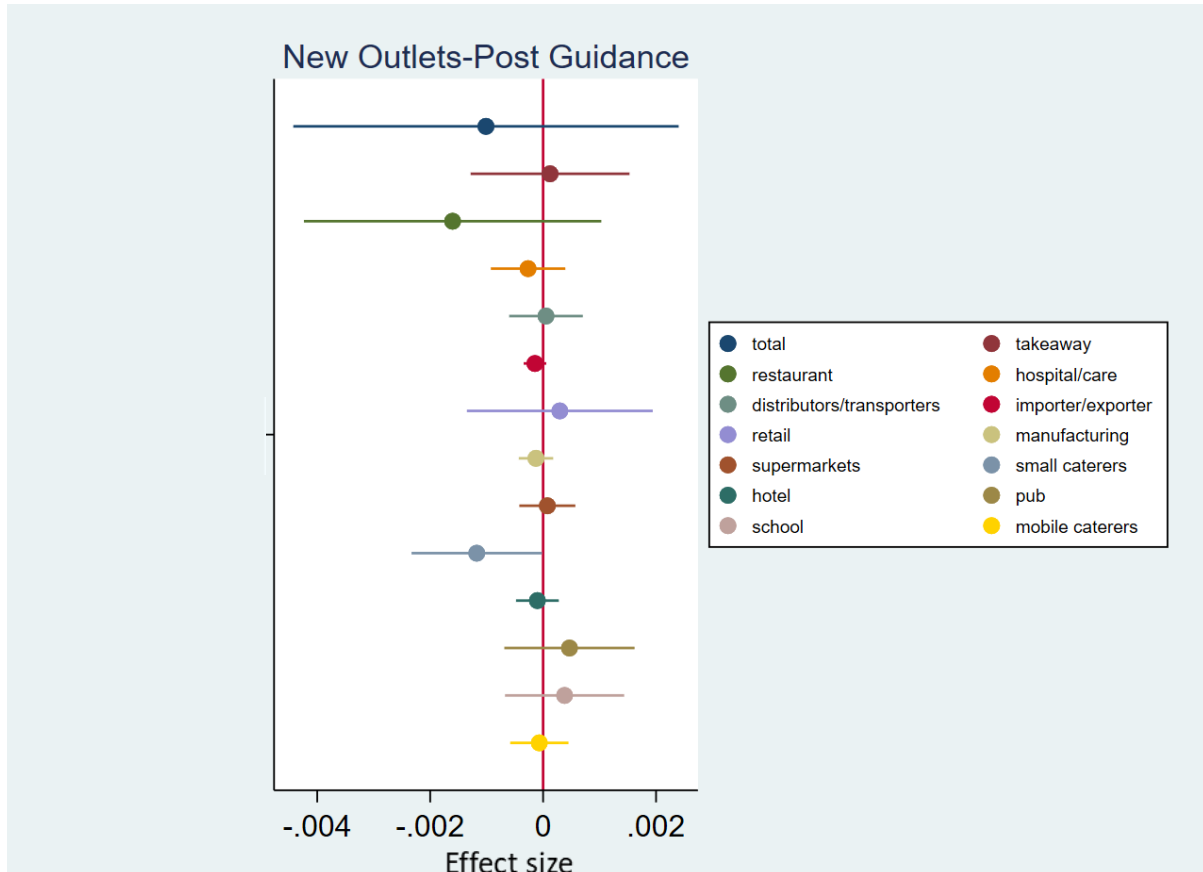
Figure 3: Number of new takeawayfast-food/sandwich shop or restaurant/café/canteen in the control and exclusion zones. Policy introduction marked by red vertical line.



The impact of planning guidance on food outlets in Newcastle Upon Tyne

Figure 4 shows the results of the statistical model of the number of new outlets in the exclusion zone compared to the control zone. There was no statistically significant change in the number and type of new outlets opening in postcodes in the exclusion zone post planning guidance compared to the control zones. In Figure 4, there appears to be peaks (e.g. 2014, 2017) and troughs (2015 and 2018) in the opening of new outlets.

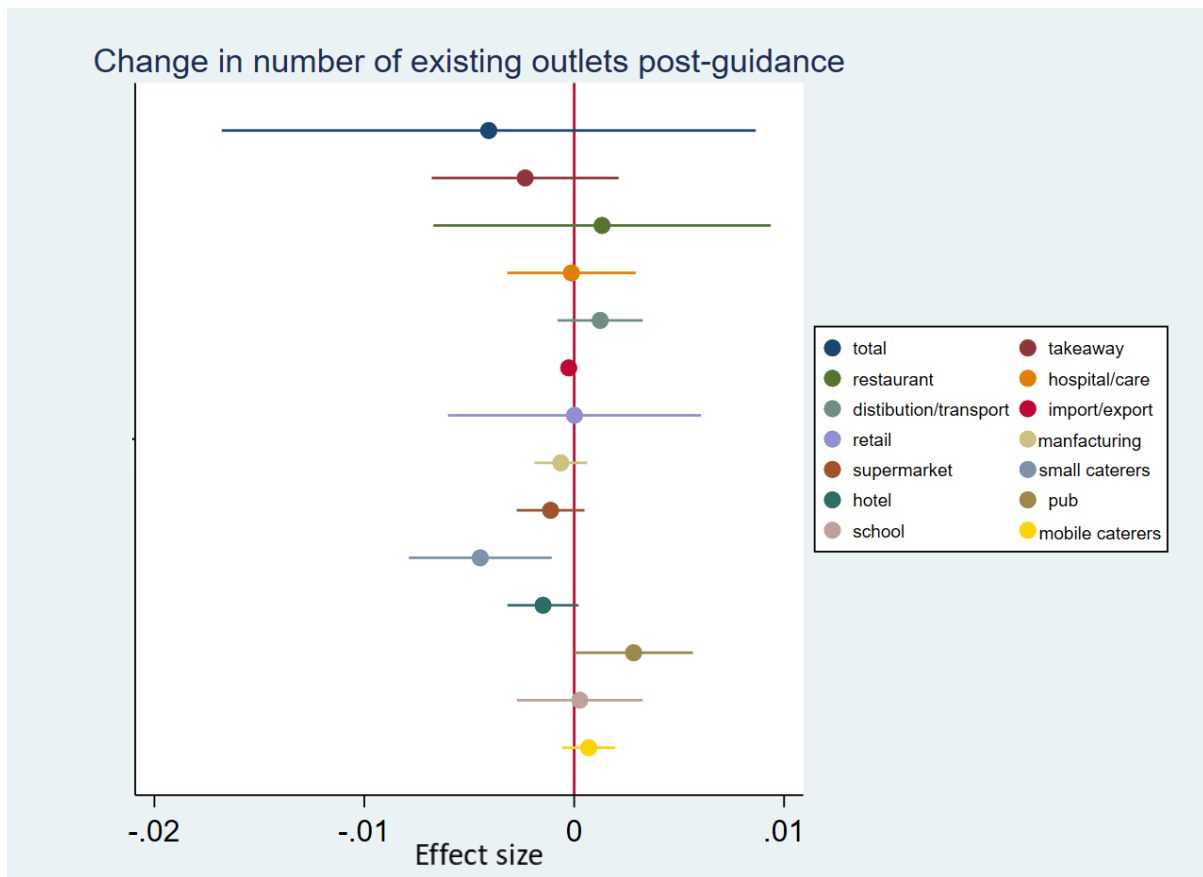
Figure 4: Number of new food outlets within Exclusion zone postcodes in Newcastle Upon Tyne after the implementation of planning guidance in October 2016



Note: The legend is truncated. The complete classification of outlet type is: Restaurant/Café/Canteen; Retail; School/College/Universities; Supermarkets; Distributors/Transporters; Hospital/Childcare/Caring; Manufacturing/Packing; Mobile Caterer; TakeawaysFast-Food/Sandwich shops; Import/Export; Hotel/B&B/Guest House; Other Catering; Pub/Night Club/Bar.

Figure 5 focuses on existing outlets to understand if the planning guidance has impacted on the number and type of outlets that had already been operating in postcodes in the exclusion and control zones. There was no significant change in the number and type of outlets in exclusion zone postcodes compared to control zone postcodes with the exception of a reduction of -0.004 (95% CI: [-0.008- -0.007]) in the number of small caterers.

Figure 5: Change in number of existing food outlets within Exclusion zone postcodes in Newcastle Upon Tyne after the implementation of planning guidance in October 2016



Note: The legend is truncated. The complete classification of outlet type is: Restaurant/Café/Canteen; Retail; School/College/Universities; Supermarkets; Distributors/Transporters; Hospital/Childcare/Caring; Manufacturing/Packing; Mobile Caterer; TakeawaysFast-Food/Sandwich shops; Import/Export; Hotel/B&B/Guest House; Other Catering; Pub/Night Club/Bar.

Sensitivity Analysis:

Results from the sensitivity analysis in which we compare postcodes in the exclusion zone, postcodes 250 metres from the exclusion zone to a further control zone of 250 metres are presented in Appendix 2 and 3. We found that there was no change in the number and type of food outlets in postcodes in exclusion zones and in postcodes immediately adjacent to the exclusion zones compared to a control zone between 250-500 metres of the exclusion zones.

Discussion

Our study has shown that the implementation of planning guidance to restrict planning permission for ~~new hot food takeaways~~fast-food outlets within a 10 minute walk (400 metre) exclusion zone of secondary schools did not lead to a statistically significant change in the number and type of food outlets in the exclusion zones compared to control zones within 3 years. We also explored potential spillover effects, i.e. whether businesses were tempted to open just outside the exclusion zone. Thus, it is possible that the postcodes immediately adjacent to the exclusion zone differ in the type and density of new and existing outlets post guidance. By comparing with a control zone further afield (between 250 to 500 metres) we could understand if and how business location is motivated by the planning guidance as well as acting as a robustness check on our findings. However, this did not change the statistically insignificant differences between the exclusion and control zones.

Our findings may partially be explained by the fact that each year there are very few new outlets opening anywhere in Newcastle upon Tyne. Thus, the statistical approach we use may not be able to detect a statistically significant difference because of small numbers. In the analysis, we have also excluded designated retail zones within the exclusion zones which are not subject to the same restrictions in planning. Therefore, if businesses choose to open in these retail zones this may have an impact on the food environment which we are not able to detect in this analysis~~as the postcodes in the retail zones are excluded~~. Many of these retail zones are located on high streets (main shopping streets) which are desirable locations for businesses.

Our findings illustrate that the food environment of Newcastle upon Tyne was slow to change pre-Covid-19 pandemic. Thus, restricting ~~takeaways~~fast-food outlets in certain areas may have a long-term impact on the food environment but we are not able to detect any change in the short term (3 years).

To date there has been no evaluation of using planning guidance to promote a healthy food environment in the UK. However, evidence from a similar type of planning guidance in Los Angeles also found no impact of the zoning legislation on the composition of food outlets in the impacted areas three years after implementation (Strum and Hattori, 2015). In South Los Angeles, which had been subject to the zoning ban, there were 17 applications for larger fast-food outlets over the period 2008-2013. This was not statistically significantly different from other areas of Los Angeles. There was no statistically significant difference between South Los Angeles and other parts of the city in terms of the share of new restaurants belonging to a fast-food chain, large grocery stores, or smaller restaurants (Strum and Hattori 2015). This suggests that even in a large city such as Los Angeles it is difficult to change the underlying food environment in the short term and a longer term of study is required.

Using planning to improve population health is likely to be a long-term policy plan to create a healthy food environment. Local authorities and the central government need to be realistic about what can be achieved with planning guidance in the short term. In the long term, restrictions on new businesses may help to shift consumer spending away from ~~takeaways~~fast-food outlets if different types of businesses fill the gap. However, if the central government is serious about trying to reduce obesity rates then this pledge will need to be accompanied by additional funding to local authorities to support this long-term objective and help to reduce existing geographical inequalities in the built environment. Our results support the idea that it is very hard to change the underlying food environment in the short term.

Local authorities need to have the resources available to proactively work with existing businesses. It may be more cost-effective to focus limited resources of local authorities on helping business owners make existing food outlets healthier (Hiller-Brown et al. 2017; Goffe et al. 2018; Goffe et al. 2019A;

Goffe et al. 2019B). There is also a need to engage with stakeholders at all points of the supply chain including food ordering platforms (Goffe et al. 2018). There is a clear evidence base that food consumed outside of the home is more energy dense than food consumed in the home (Lachat et al 2012). Thus, by focusing on making existing food outlets healthier this will help to reduce the calorie load for those eating food prepared out of the home. These strategies align with the need for local areas to protect existing businesses and jobs in a post Covid-19 economic recovery whilst also promoting the health of the population.

Central government and local authorities may also want to consider more restrictive licensing requirements, where continuation of licenses are tied to health criteria as well as hygiene. In Philadelphia, USA, the city government enacted 4 different measures to reduce the number of outlets licenced to sell tobacco products including a density cap, tobacco free school zones, increased tobacco permit fees, and strict permit penalty fees for selling tobacco products to children. In combination, these measures led to a 20.3% decline in retail density 3 years after the implementation of these measures (Lawman et al. 2020). This suggests that multiple planning elements or a whole systems approach focusing on numerous factors related to both food options may be required to significantly change the environment in the short term.

Our results have important implications for current and future policy given the impact of the Covid-19 pandemic on health and the economy. Because of the containment measures associated with Covid-19 pandemic, the UK food environment is currently in a period of flux and change. The survival of the hospitality sector and high streets is a politically hot topic in the UK (Chang et al. 2020; UK Hospitality 2020). To support food businesses, planning guidance has been relaxed to allow all food outlets to act as takeaways until March 2022 (Town and Country Planning 2020). Additionally, nationally a dramatic change in how food businesses are classified for planning purposes has recently been implemented (Town and Country Planning 2020 B) granting blanket permission for new restaurants and refusing permission for all new ~~takeaways~~fast-food outlets. Given that there are likely to be changes to the underlying food environment driven by the Covid-19 pandemic, it is important to understand going forward how planning can shape the built environment for health and economic sustainability. Our findings suggest that planning guidance may have more scope to make a difference if the food environment is more volatile in the short term. Planners and public health teams should have a clear vision of what they want the underlying food environment to look like if this period of volatility is short lived. Our findings suggest that after this period of flux, there may be little change in the food environment from year to year which will limit the scope of planners and public health teams to make significant changes to the food environment in the short term if they rely on a single element of planning policy.

Strengths and Limitations

There are several strengths in our analysis which enhance its validity. We have used longitudinal data on food outlets in a local authority to look at changes over time (2012 – 2019) in the food environment. ~~To date the majority of studies have been cross-sectional (Burgoiné et al. 2014; Wilsher et al. 2016; Lytle & Sokol 2017; Diez et al. 2019), which limits our understanding on how the food environment changes due to both interventions and other economic factors.~~ We employ a robust quasi-experimental approach to attempt to estimate a causal impact of the policy on the food environment. Thus, provided useful insights into the scope for planning on influencing the food environment and promoting population health. We also utilise a unique dataset on the food environment, the FSA FHRS which has been externally validated for this type of evaluation work in the North East of England (Kirkman et al. 2020)

However, limitations remain. We cannot rule out that this legislation may have an influence on the food environment over a longer time period. Changes to the built environment in the late 19th century/early 20th century have directly impacted on the risks of non-communicable disease in the 21st century suggesting a very long lag on impacts (Pinter-Wollman & Wells 2018). The fact that the opening of new and closing of existing food outlets in a postcode is a rare event suggest that there will be a long time lag before we are able to see any impacts on the food environment. Additionally, we conduct the analysis for a local authority in the North East of England. It is possible that these findings may not be the same for other local authorities with similar planning guidance creating exclusion zones around schools. The North East of England on average has higher rates of deprivation which may impact on the type and number of food outlets. However, our results are similar to the findings of an evaluation in Los Angeles (Sturm & Hattori, 2015) suggesting that in the short term this type of guidance may have little impact on changing the composition of the food environment. Future analysis should replicate this study for other local authorities with similar planning guidance to cement the evidence of planning guidance on food environments across different local contexts.

Conclusions:

This study employed a quasi-experimental approach to evaluate the impact of planning guidance on the number and type of food outlets. Our study found that in the short term of three years, planning guidance restricting planning permission for new takeaway-fast-food outlets within a 10-minute walk (400 metres) of a secondary school exclusion zone did not lead to significant changes in the food environment between control zones. This suggests that alternative/complementary strategies will need to be introduced to help create an environment which promotes a healthy weight. Evaluation of different types of planning guidance over different time periods is important to better understand how this policy tool impacts on the food environment.

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Competing Interests:

“All authors have completed the Unified Competing Interest form (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work.”

Data Sharing:

All data used in this study is publicly available to download from:

<https://data.food.gov.uk/catalog/datasets/38dd8d6a-5ab1-4f50-b753-ab33288e3200>

Ethical Approval:

This data ~~used data is~~ on businesses which is not subject to GDPR legislation and therefore does not require ethical approval for their use.

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STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1	The impact of school exclusion zone planning guidance on the number and type of food outlets in an English local authority: A longitudinal analysis
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1	The use of planning policy to manage and create a healthy food environment has become a popular policy tool for local governments in England. To date there has been no evaluation on their short-term impact on the built environment. We assess if planning guidance restricting new takeaway outlets within 400 metres of a secondary school, influences the food environment in the local authority of Newcastle Upon Tyne, UK. We have administrative data on all food outlets in Newcastle 3 years pre-intervention 2012-2015, the intervention year 2016, and three years post-intervention 2016-2019. We employ a difference-in-difference approach comparing postcodes within the school takeaway exclusion zone to those outside the takeaway exclusion zones. In the short term (3 years), planning guidance to limit the number of new takeaways in a school exclusion zone did not have a statistically significant impact on the food environment when compared with a control zone.
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2-3	To date, there has been no empirical investigation of how using planning guidance to manage and manipulate the food environment has impacted on the type and number of food outlets in a local authority in England. To understand the impact of planning guidance on the local food environment, is a fundamentally important question, going forward, to not only promote a healthy environment, but also to help the government reach their obesity reduction target (Department of Health and Social Care 2020). It is essential to understand the time frames needed to notice a significant change to the food environment.
Objectives	3	State specific objectives, including any prespecified hypotheses	3	The aim of this paper is to evaluate the impact of planning guidance on the number and type of food businesses in a local authority in England (Newcastle Upon Tyne) 3 years after the implementation of planning guidance creating school exclusion zones around secondary schools. To operationalise this aim, we employed a quasi-experimental estimation approach to assess changes in the number and types of business premises before and after the implementation of planning guidance in Newcastle Upon Tyne. We hypothesise that the

planning guidance may change the number and type of food outlets in postcodes in the exclusion zone compared to the control zone. We hypothesise that the number of new takeaways opening up in postcodes in the exclusion zones should decrease post guidance. However, the number of new restaurants opening up in postcodes in the exclusion zone may increase post guidance if businesses decide to open as restaurants rather than takeaways to circumvent the guidance. We also look at the impact of the planning guidance on existing outlets as – if/when outlets close - if new takeaways cannot open, this may impact on the likelihood of other types of food businesses operating. It may lead to changes in the food environment of the exclusion zone relative to the control. This may be another mechanism by which the planning guidance influences the food environment.

Methods

Study design	4	Present key elements of study design early in the paper	3	The longitudinal data and quasi-experimental approach is mentioned in the aims and objectives (see specific text in section above)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4	We used data covering all postcodes in the local authority of Newcastle upon Tyne between 2012 and 2019. Data pre-intervention was from January 2012-September 2016 and data post-intervention is from October 2016-December 2019.
Participants	6	<p><i>(a) Cohort study</i>—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up</p> <p><i>Case-control study</i>—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls</p> <p><i>Cross-sectional study</i>—Give the eligibility criteria, and the sources and methods of selection of participants</p>	4	<p>Treatment group- e identified postcodes in the exclusion zones using the supplementary planning guidance. Latitude and longitude coordinates were used to map exclusion zone postcodes and retail zones were obtained from the supplementary planning guidance.</p> <p>Control group- Control postcodes are those that outside of the exclusions zones but within 250 metres of an exclusion zone. There are no secondary schools within the control zones.</p>

		<p>(b) <i>Cohort study</i>—For matched studies, give matching criteria and number of exposed and unexposed</p> <p><i>Case-control study</i>—For matched studies, give matching criteria and the number of controls per case</p>	4-5	<p>Treatment- This gives us information on 2003 postcodes.</p> <p>Control- We have data on 5278 postcodes which are within 250 metres of the 18 exclusion zones.</p>
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4-5	<p>Outcome: Our primary outcome was the number and type of food outlets in each postcode in the LA of Newcastle Upon Tyne. The type of food outlet is classified by a LA environmental health officer when delivering a food safety inspection. The environmental health officer classifies premises based upon their main business. The classification categories are:</p> <ul style="list-style-type: none"> ○ Restaurant/Café/Canteen ○ Retail ○ School/College/Universities ○ Supermarkets ○ Distributors/Transporters ○ Hospital/Childcare/Caring ○ Manufacturing/Packing ○ Mobile Caterer ○ Takeaways/Sandwich shops ○ Import/Export ○ Hotel/B&B/Guest House ○ Other Catering ○ Pub/Night Club/Bar <p>It is important to note that the classification used by the environmental health officer may differ to the classification of a premise used by planning inspectors. For example, a mixed-use restaurant and takeaway may be classified as a takeaway by an environmental health officer, whereas a planner would may classify it as a mixed-use premises. To reduce this type of bias arising from potential misclassification, we use the LA’s annual planning policy monitoring reports²⁷ to corroborate the data on new takeaways granted planning permission with FSA data as reported by the environmental health officer on new takeaways.</p> <p>Exposure: We identified postcodes in the exclusion zones using the supplementary planning guidance.²⁸ Latitude and longitude coordinates were used to map exclusion zone postcodes and retail zones were obtained from the supplementary planning guidance. A map of the exclusion zones is presented in Figure 1. There are 18 exclusion zones with 8 of the zones overlapping. This gives us information on 2003 postcodes.</p> <p>Control: Control postcodes are those that outside of the exclusions zones but within 250 metres of an exclusion zone. There are no secondary schools within the control zones.</p>

However, the proximity of the control postcodes to the treated ones, should ensure that prior to the intervention the density of outlets per group is comparable as it is unlikely, given the short distances covered, that these areas would experience different trends over time compared to the exclusion zones. Thus, we can use the control group as a counterfactual (what would have otherwise happened without planning guidance) in our statistical model. We have data on 5278 postcodes which are within 250 metres of the 18 exclusion zones.

Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	3	The data on food outlets comes from the Food Standards Agency - Food Hygiene Rating Scheme (FSA FHRS) (Food Standards Agency N.D), an administrative source which records all food outlets inspected by environmental health officers ² . It is a statutory requirement that the data on food outlets obtained by the environmental health officers during their inspections are uploaded within 28 days of an inspection (Food Standards Agency N.D) The data has been validity tested and was shown to offer a clearer picture of the food environment than information from commercial sources (Kirkman et al. 2020). Although updated regularly, some archived cross-sections of the FHRS data are publicly available, allowing us to view yearly records on all food outlets in the study area over the sample period. The food outlet data contains the postcode for each outlet. This postcode is matched to data from the National Statistics Postcode Lookup (Office for National Statistics 2020), which contains the latitude and longitude coordinates for each postcode. For each postcode and year, we know the number of food outlets, the latitude and longitude coordinates, and also the breakdown by outlet type as recorded in the FHRS data.
Bias	9	Describe any efforts to address potential sources of bias	N/A	
Study size	10	Explain how the study size was arrived at	N/A	

Continued on next page

² Environmental health officers are employed by LA to inspect businesses for health and safety, food hygiene, and food standards.

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4-5	See description of outcome, exposure, control
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	5	<p>First, we plot the number of outlets in each exclusion zone and control zone to assess the comparability of the zones. Thus, we can determine if the data before the introduction of the legislation followed similar trends so that we can employ a quasi-experimental statistical model.</p> <p>Next, we employ a linear difference-in-difference model (see supplementary Appendix 1 for model formula) to estimate the change in the number and type of food outlets in postcodes in the exclusion zone compared to the control zone, after the introduction of the planning guidance. We include dummies for years with 2012 as the base year. All models also control for time constant factors by using post code fixed effects. We look at the impact on postcodes with existing and new outlets.</p>
		(b) Describe any methods used to examine subgroups and interactions		
		(c) Explain how missing data were addressed		N/A-there is no missing data
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed	5	Control postcodes are those that outside of the exclusions zones but within 250 metres of an exclusion

		<i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy		zone. There are no secondary schools within the control zones. However, the proximity of the control postcodes to the treated ones, should ensure that prior to the intervention the density of outlets per group is comparable as it is unlikely, given the short distances covered, that these areas would experience different trends over time compared to the exclusion zones
		(e) Describe any sensitivity analyses	5	As a sensitivity analysis on our findings we compare the number and type of outlets in each postcode in the exclusion zone, to the immediate area (within 250 metres) of an exclusion zone and a wider control zone of postcodes between 250-500 metres of the exclusion zone.
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	N/A	This study used administrative data on businesses
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	N/A	This study used administrative data on businesses. The different types of businesses are described in the outcome measure

		(b) Indicate number of participants with missing data for each variable of interest	N/A	As this is an administrative dataset, there is no missing data
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)		
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time		
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	6-7	Numbers of different types of outlets over time are presented in Table 1. Figure 2 shows the number and location of restaurants and takeaways
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures		
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9-10	The results are presented in Figures 4 and 5 with 95% CIs
		(b) Report category boundaries when continuous variables were categorized		
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period		

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10	Results from the sensitivity analysis in which we compare postcodes in the exclusion zone, postcodes 250 metres from the exclusion zone to a further control zone of 250 metres are presented in Appendix 2 and 3. We find that there is no change in the number and type of food outlets in postcodes in exclusion zones and in postcodes immediately adjacent to the exclusion zones compared to a control zone between 250-500 metres of the exclusion zones.
Discussion				
Key results	18	Summarise key results with reference to study objectives	10	Our study has shown that the implementation of planning guidance to restrict planning permission for new hot food takeaways within a 10 minute walk (400 metre) exclusion zone of secondary schools did not lead to a statistically significant change in the number and type of food outlets in the exclusion zones compared to control zones within 3 years.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	12-13	However, limitations remain. We cannot rule out that this legislation may have an influence on the food environment over a longer time

period. Changes to the built environment in the late 19th century/early 20th century have directly impacted on the risks of non-communicable disease in the 21st century suggesting a very long lag on impacts. The fact that the opening of new and closing of existing food outlets in a postcode is a rare event suggest that there will be a long-time lag before we are able to see any impacts on the food environment. Additionally, we conduct the analysis for a local authority in the North East of England. It is possible that these findings may not be the same for other local authorities with similar planning guidance creating exclusion zones around schools. The North East of England on average has higher rates of deprivation which may impact on the type and number of food outlets. However, our results are similar to the findings of an evaluation in Los Angeles suggesting our findings may be of relevance for the rest of the UK. Future analysis should replicate this study for other local authorities with similar planning guidance to

				<p>cement the evidence of planning guidance on food environments across different local contexts.</p>
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13	<p>Our study found that in the short term of three years, planning guidance restricting planning permission for new takeaway outlets within a 10-minute walk (400 metres) of a secondary school exclusion zone did not lead to significant changes in the food environment between control zones. This suggests that alternative/complementary strategies will need to be introduced to help create an environment which promotes a healthy weight. Evaluation of different types of planning guidance over different time periods is important to better understand how this policy tool impacts on the food environment.</p>
Generalisability	21	Discuss the generalisability (external validity) of the study results	12-13	<p>Additionally, we conduct the analysis for a local authority in the North East of England. It is possible that these findings may not be the same for other local authorities with similar planning guidance creating exclusion zones around schools. The North East of England on average has higher rates of</p>

				deprivation which may impact on the type and number of food outlets.
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	13	This article presents independent research funded by the NIHR School for Public Health Research (SPHR). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

Appendix 1: Model Formula

The model specification is given by:

$$O_{p,t} = \alpha_p + \delta_t + \tau(\textit{treated}_t * \textit{postguidance}_p) + \varepsilon_{p,t}$$

Where:

$O_{p,t}$ is the number of outlets in that postcode p at time t

α_p are postcode fixed effects

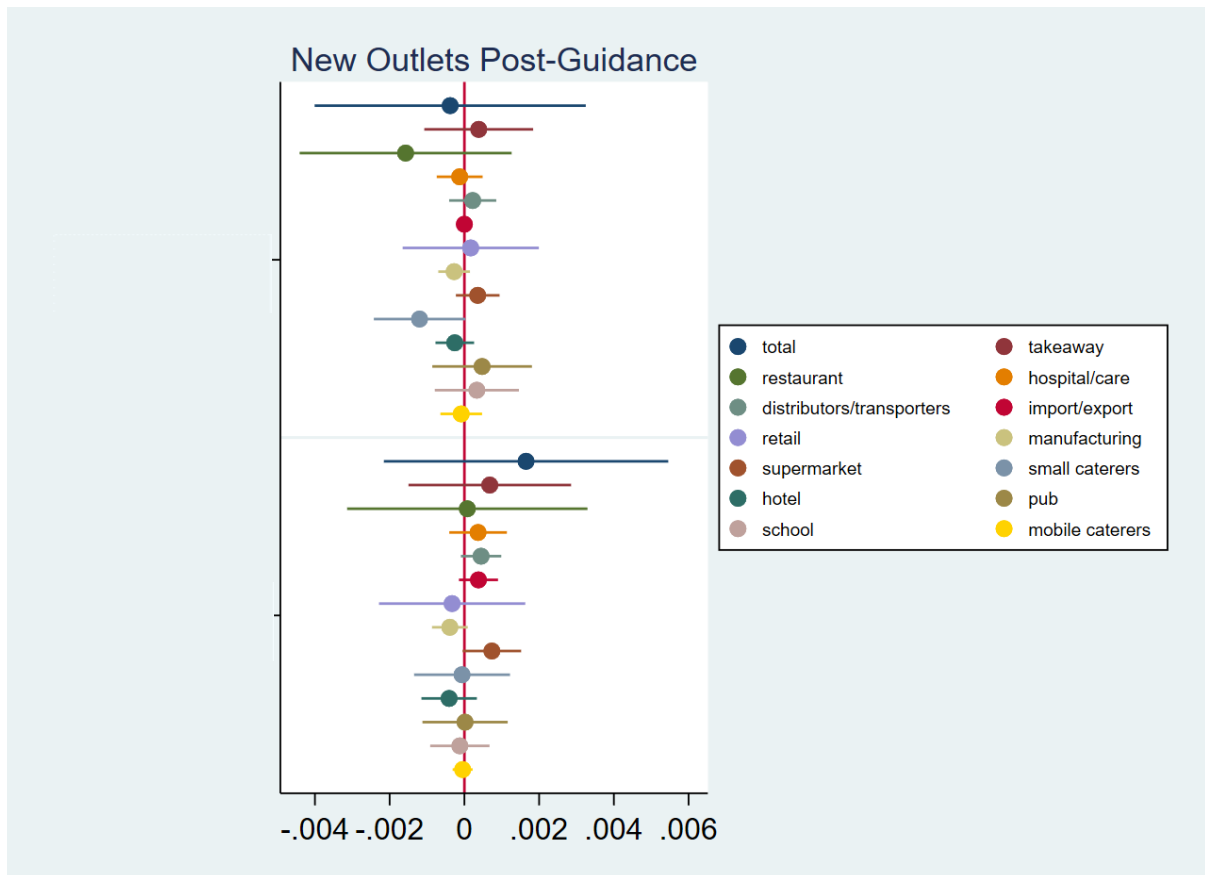
δ_t are year dummies

τ is the treatment effect for postcode in the exclusion zone

$\textit{postguidance}_t$ is an indicator of time after implementation of the policy

$\textit{treated}_p$ identifies postcodes in the treatment area.

Appendix 2: Number new food outlets in Newcastle Upon Tyne after the implementation of planning guidance comparing postcodes in the exclusion zone and 250 metres outside the exclusion zone to postcodes within 250-500 metres of the exclusion zone.



Appendix 3: Number of existing food outlets in Newcastle Upon Tyne after the implementation of planning guidance comparing postcodes in the exclusion zone and 250 metres outside the exclusion zone to postcodes within 250-500 metres of the exclusion zone.

