

Exploring relationships between exposure to fast food outlets and childhood obesity at differing spatial resolutions: results from the Born in Bradford cohort study

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Background

Several local authorities in England have introduced planning policies banning fast-food outlets (FFOs) in certain locations to tackle increasing childhood obesity. Exposure to FFOs is thought to relate to childhood obesity, but evidence is mixed and might be explained by imprecision in exposure measurement. We explored the effect of these differences by using novel geospatial analysis methods to study obesity rates of children living in a multi-ethnic, deprived location in the north of England.

Methodology

We included 6260 children enrolled in the Born in Bradford cohort study who had participated in the most recent follow-up (2017–20), aged 6–12 years, and had BMI measurements (n=6260), body fat percentage (BFP; n=5004), and geolocation data for their home address. Informed consent was obtained from parents, and assent from children.

Secondary points of interest data were used to classify and geolocate FFOs. We calculated proximity to FFOs using four contrasting methods including street network distance incorporating distance decay.

We used linear regressions controlling for socioeconomic characteristics, including sex, age, ethnicity, mother's physical health, perceived financial difficulties, with area-level deprivation and built environment characteristics as controls; complete data were available for 2883 children with BMI measurements, and 2013 with BFP.

Findings

We introduced improved spatial precision in the quantification of exposure to FFOs from children's home addresses, but this did not lead to substantial differences in associations with BMI, or BFP, when comparing unadjusted associations of BFP and postcode buffers ($\beta=0.08$ [95% CI 0.05–0.11]) to BFP and address-based street network distance measurements ($\beta=0.11$ [90% CI 0.07–0.15]).

After adjusting for confounders, exposure to FFOs close to home was not associated with an increase in BMI or BFP. Higher BMI was associated with increased maternal BMI ($\beta=0.19$ [95% CI 0.17–0.21]), and female sex ($\beta=0.46$ [0.22–0.70]); and comparable associations were observed for higher BFP, with an increased maternal BMI ($\beta=0.40$ [95% CI 0.34–0.46]), Pakistani ethnicity ($\beta=2.89$ [1.98–3.80]; reference white British), and female sex ($\beta=2.90$ [2.24–3.57]).

Interpretation

We found no association between proximity to FFOs and obesity in children. Maternal predisposition, and behavioural and sociocultural factors have a more important role in the development of childhood obesity. More research is required into the effectiveness of policies that ban FFOs.



Figure 1. Fast-food outlets in Bradford; (left) Manningham Lane, (right) Great Horton Rd

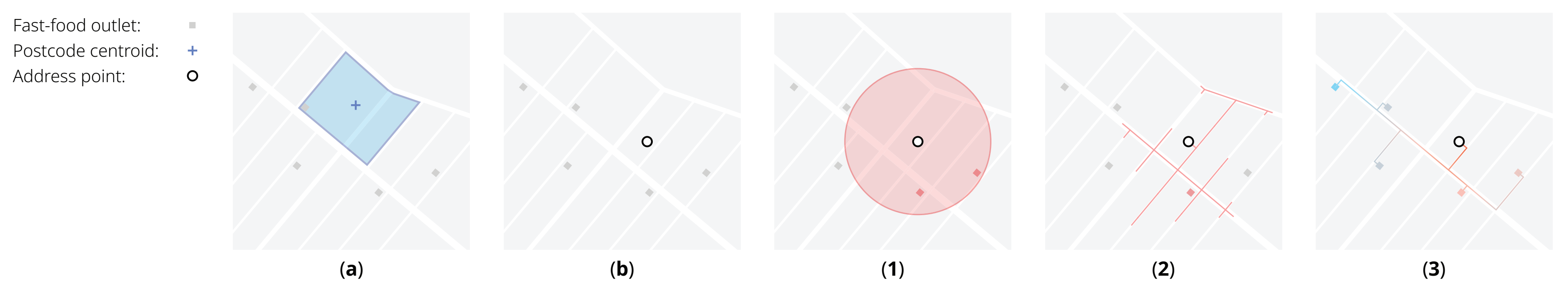


Figure 2. Different location information: (a) postcode centroid, (b) home address; and (1) Euclidean buffer, (2) street network, and (3) decay weighted distances

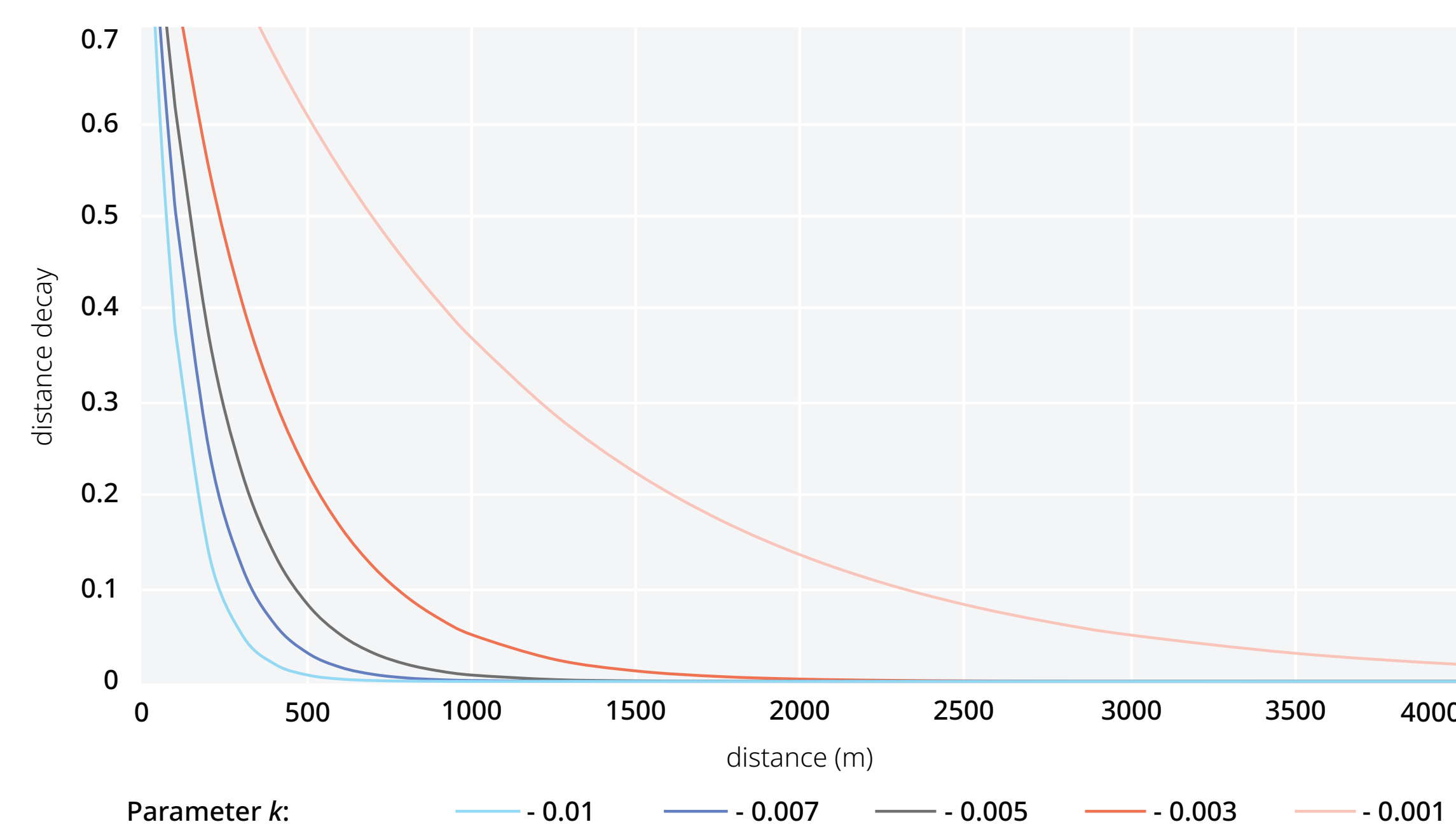


Figure 3. Distance decay parameter k , representing different walking types.

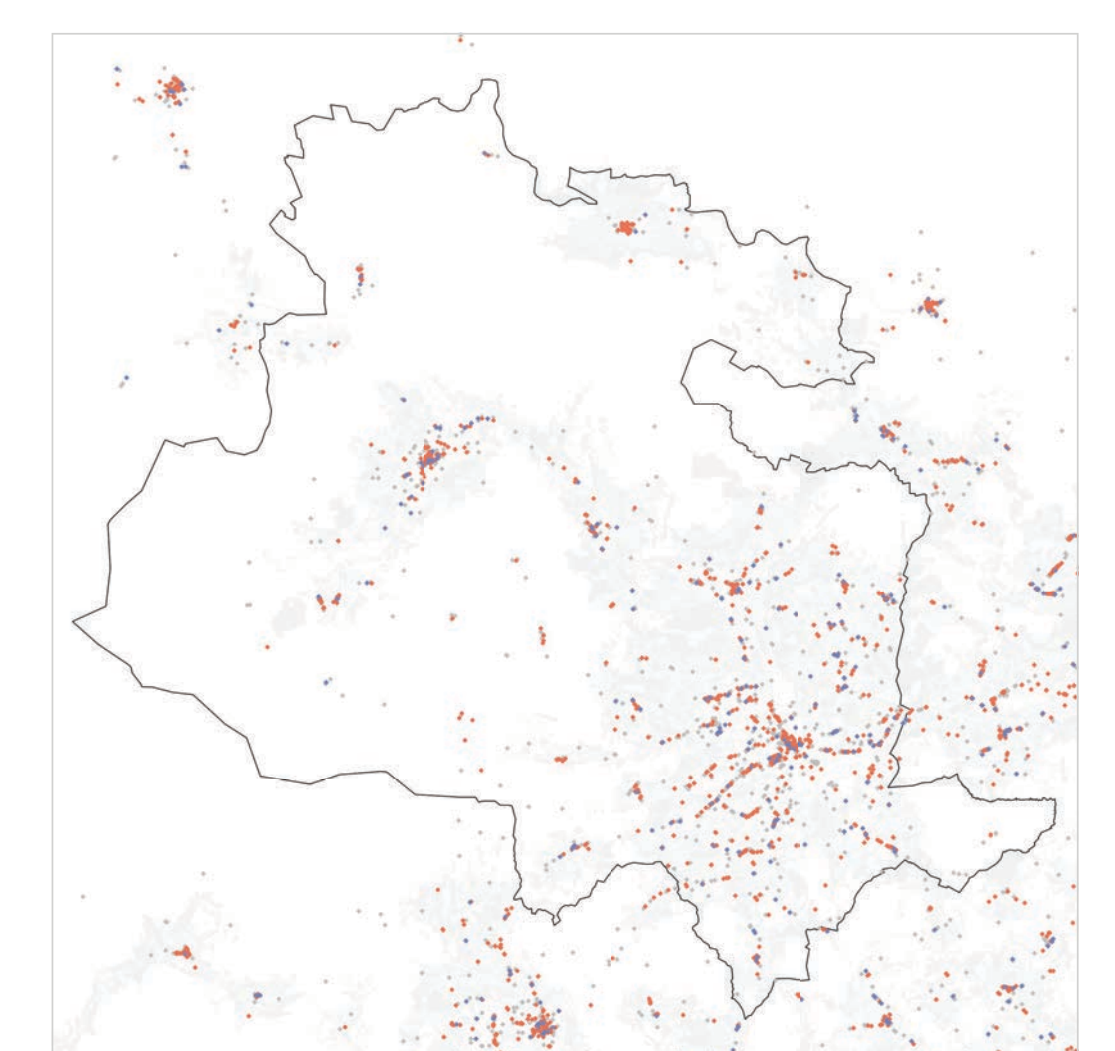


Figure 4. Distribution of FFO classifications.

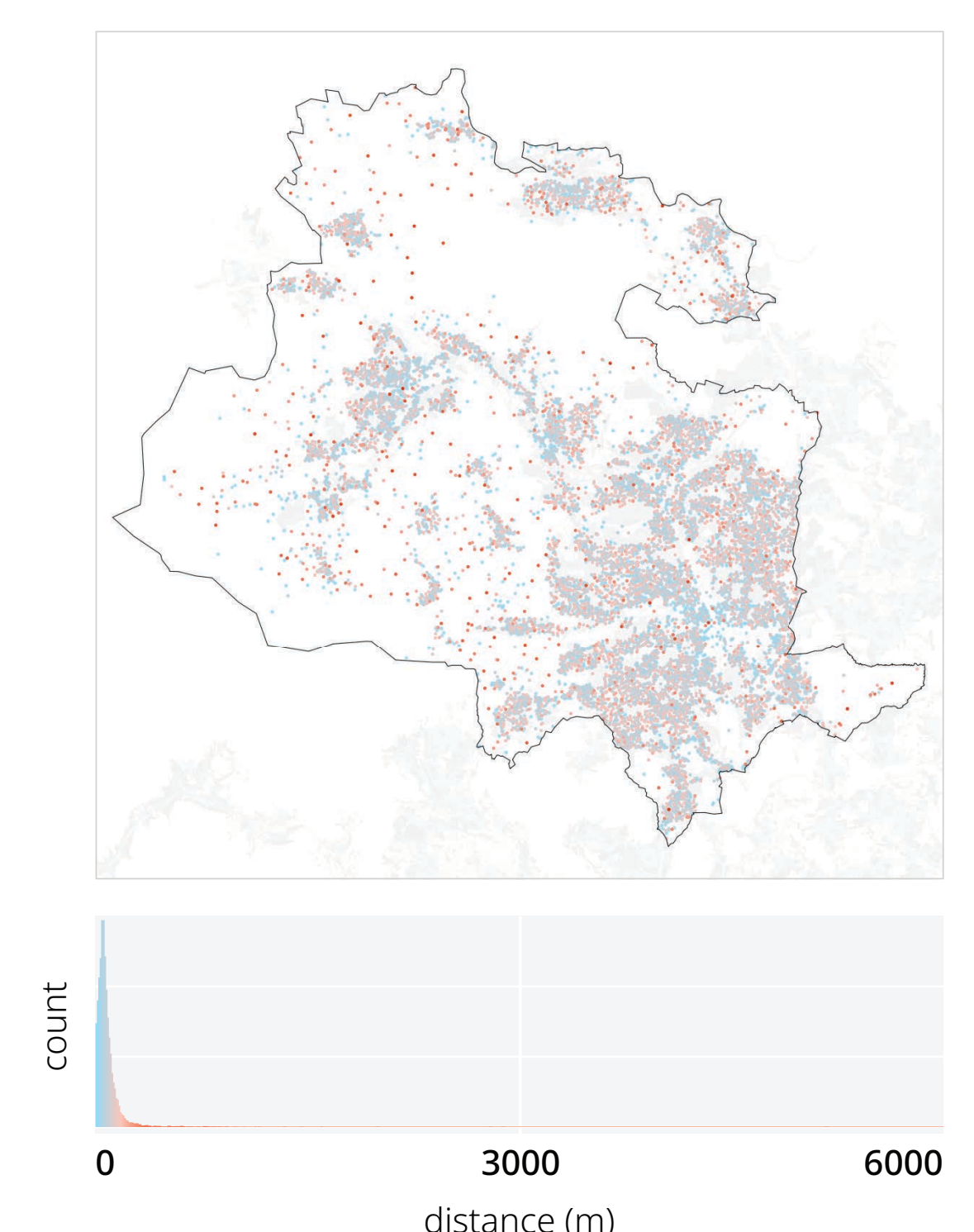
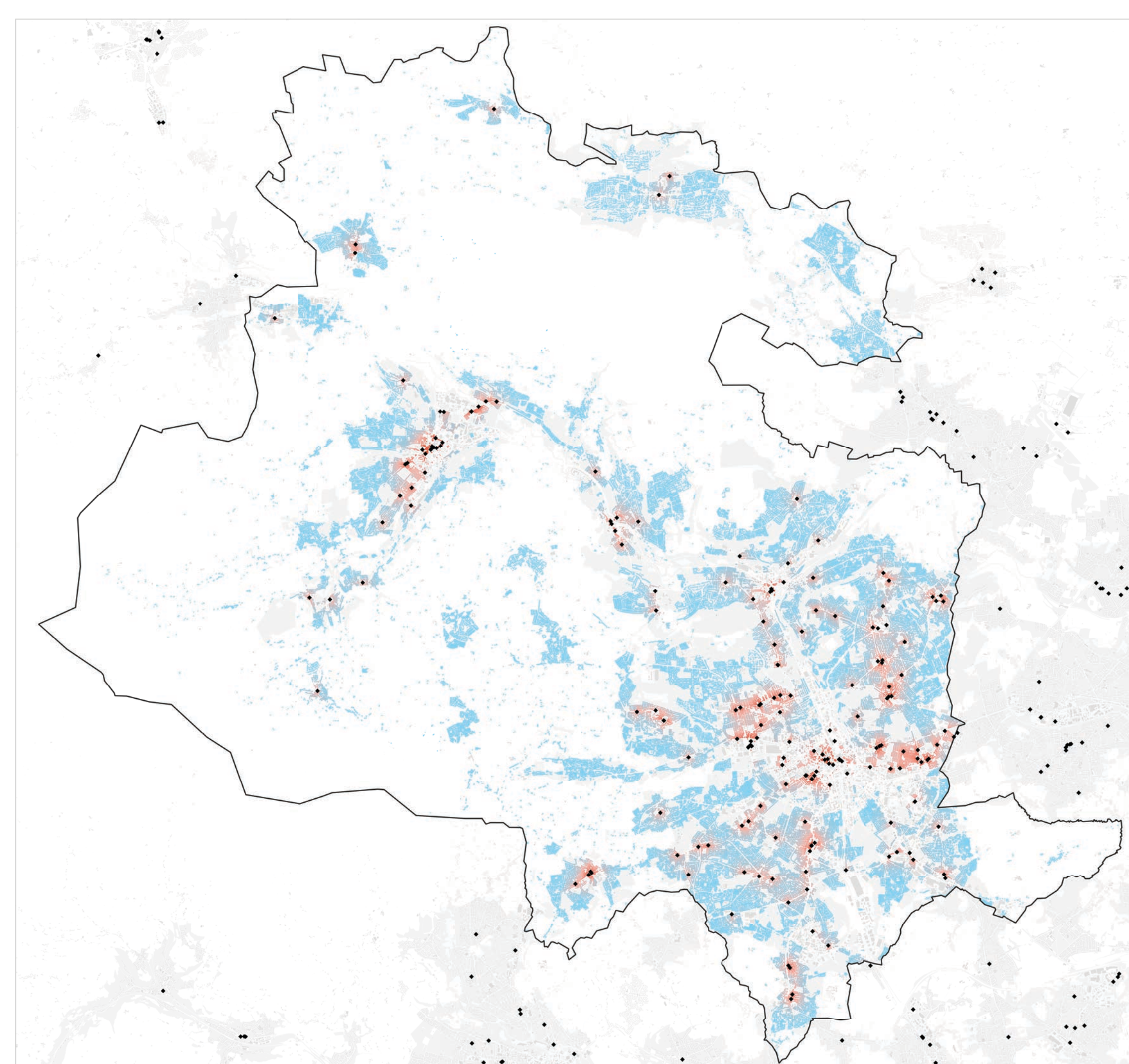


Figure 5. (top) Maximum distance deviation from address points and their postcode centroid; (bottom) histogram of maximum distances between postcode centroids and their addresses.



Figure 6. Exposure to fast-food. Address-level distance decay weighted counts of fast-food outlets in (a) Bradford, and (b) detail zoom in on Toller ward; (c) detail zoom in on Toller ward, showing counts of fast-food outlets within 500m walking distance from postcode centroid.