

# Using circuitry analysis to explore pedestrian access to healthcare services in York

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## 1 Introduction

Carlos Moreno first proposed the 15-minute city concept in 2016. The focus of the concept is that access to essential services and amenities, such as healthcare and greenspace should be within a 15-minute walk or cycle from a persons home (Moreno et al., 2021). The COVID-19 pandemic then highlighted the importance of local access to essential services, because lockdowns and other restrictions on movement limited the ability to travel beyond ones immediate neighbourhood. The 15-minute city concept has gained traction more recently within the disciplines of urban planning and sustainable development. It also provided a new perspective on “chrono-urbanism”, in which there is an inversely proportional relationship between peoples quality of life and the time people invest in transportation (which is especially true in the use of motor vehicles) (Logan et al., 2022).

Active travel modes such as walking and cycling are better for peoples health outcomes by enabling better fitness levels and reducing inactivity. Benefits to the economy can be measured through healthier, and fewer people needing the NHS, therefore saving it money. The environment benefits through increased active travel because it is emission-free, which reduces particulate matter, increasing air quality in towns and cities (DfT, 2023).

However, time is an important factor when it comes to peoples decisions around mode choice, and the study by Ralph et al. (2020) highlights this very well. Pertinent to the study in this report, it was discovered that people were more likely to overestimate the length of the route, and therefore the time it would take to walk/cycle, along routes where there were barriers to overcome and many turns to take. Other reasons for choosing against walking in their study were fears of crime, and getting lost,

and importantly in the context of this study, carrying something heavy. They found that people were more likely to lower their estimations with experience and familiarity of the route(s).

Through urban design, it should be possible to increase active travel, and reduce (private) vehicle use, but in order to achieve these goals, understanding the current situation in terms of accessibility is important. This study looks to contribute to this understanding, using the City of York Local Authority District (York LAD), which includes the City of York and the surrounding villages and by analysing people's access to essential services (healthcare provision in this case), through circuitry of walking route measurements.

## 2 Scope

The primary aim of this study is to analyse ease of pedestrian access to basic essential amenities. Access will be measured through defining a reasonable travel time based on 20 minutes average walking distance. Twenty minutes was chosen, because the average distance walked in around fifteen to twenty minutes is one mile (Foundation, n.d.).

## 3 Area of study

The York LAD was chosen because the makeup of the city is such that surrounding the tightly packed walled center, lies less dense suburban areas, which in turn are surrounded at the periphery by smaller more isolated villages. This provides a variety of scenarios to analyse.

## **4 Datasets**

## **5 Pre-Processing**

## **6 Understanding**

## **7 Preparation**

## **8 Exploratory data analysis**

## **9 Methodology**

## **10 Make the hex grid**

## **11 Convert the hex grid to points and centroids**

### **11.1 Clip the hex points/centroids**

### **11.2 HCARE HEXCENTROIDS - Calculate walking routes to hcare points**

Make sure to point out limitations of the method Could have used a crossings file to make routes shorter for people

### 11.3 HCARE HEXPOINTS - Calculate walking routes to hcare points

#### 11.4 hcare\_points index

#### 11.5 hcare\_point circuitry

## 12 OAS

## 13 What does circuitry look like?

## 14 Results

## 15 Where is circuitry best/worst?

## 16 What are the demographics of the best areas?

## 17 What does car ownership look like in these areas?

## 18 Discussion

## 19 References

DfT 2023. The second cycling and walking investment strategy (CWIS2). *GOV.UK*. [Online]. Available from: <https://www.gov.uk/government/publications/the-second-cycling-and-walking-investment-strategy/the-second-cycling-and-walking-investment-strategy-cwis2>.

Foundation, B.H. n.d. Walks and treks FAQs. *British Heart Foundation*. [Online]. Available from: <https://www.bhf.org.uk/how-you-can-help/events/training-zone/walking-training-zone/walking-faqs>.

- Logan, T.M., Hobbs, M.H., Conrow, L.C., Reid, N.L., Young, R.A. and Anderson, M.J. 2022. [The x-minute city: Measuring the 10, 15, 20-minute city and an evaluation of its use for sustainable urban design](#). *Cities*. **131**, p.103924.
- Moreno, C., Allam, Z., Chabaud, D., Gall, C. and Pratlong, F. 2021. [Introducing the '15-minute city': Sustainability, resilience and place identity in future post-pandemic cities](#). *Smart Cities*. **4**(1), pp.93–111.
- Ralph, K.M., Smart, M.J., Noland, R.B., Wang, S. and Cintron, L. 2020. [Is it really too far? Overestimating walk time and distance reduces walking](#). *Transportation Research Part F: Traffic Psychology and Behaviour*. **74**, pp.522–535.

## 20 Appendix