

Born in Bradford Breathes: evaluating the health, air quality and economic impact of a city wide intervention to improve air quality

Submission date 13/05/2020	Recruitment status No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered <input checked="" type="checkbox"/> Protocol
Registration date 06/07/2020	Overall study status Ongoing	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
Last Edited 09/01/2026	Condition category Respiratory	<input type="checkbox"/> Individual participant data

Plain English summary of protocol

Background and study aims

The UK has high levels of air pollution, which costs the NHS and society around £20 billion a year. Poor air quality is a major cause of early death and illness. It has been linked to lung and heart disease in children and adults and low birth weight. During periods of poor air quality, health gets worse, leading to more hospital admissions and deaths. Children and the elderly are particularly affected by pollution. Poorer areas of the country have worse air quality and this increases inequalities in health. Thirty three local councils with high pollution levels have to put in place air quality plans which include Clean Air Zones. Bradford will introduce a Clean Air Zone in 2021 in order to reduce pollution using policies such as charging people for driving polluting vehicles. However, there is little evidence whether these policies improve air quality and health and what effect they might have on health inequalities.

The aim of the study is to evaluate the impact of a Clean Air Zone on air quality, health and health inequalities in the city of Bradford.

Who can participate?

People living within Bradford District.

What does the study involve?

We will explore changes in air quality in the city using regularly collected data that is already available on air pollution and will also collect additional data from 12 schools throughout the city. In addition, 240 children in these schools will help us collect data by using mobile air sensors for three months before the Clean Air Zone is put in place and for three months in the year after. The impact on lung, heart health and birth weight will be measured by comparing the health of over 500,000 Bradford residents in the three years before and three years after the Clean Air Zone is in place. The research will examine whether the impact is different for people from more deprived areas or different ethnic groups. This will use detailed information collected on 13,500 children who are part of the Born in Bradford study. We will look at whether the policy changes the way people choose to travel by conducting a survey with 4000 families. We will also conduct group discussions and interviews with key groups of people including businesses, transport

companies, families, and pedestrians. These discussions will explore what may have helped or hindered the success of the policy and any unexpected effects. We will also explore if the Clean Air Zone is good value for money, e.g. do any improvements in health justify the costs.

What are the possible benefits and risks of participating?

This study will use anonymised routinely collected health data from residents living in Bradford collected before and after the B-CAP is implemented. As such there are no direct risks of taking part. To explore the impact of the B-CAP on air quality Primary school children will also be asked to carry portable air quality sensors in the year prior, and year following B-CAP implementation. We do not foresee any risks with taking part in this part of the study. In return we will work with participating schools to develop curriculum based air quality research materials which we hope will inspire learning in science related subjects.

Patient/Public Involvement

100 community members and two schools have been involved in developing our proposal and thinking about how to test if the policy will work and what effect it will have on the residents of Bradford. We have also worked closely with Bradford council and the UK Government department responsible for air quality nationally (DEFRA). Community, school and local authority representatives are part of our study team. They will be actively involved in the development and management of our research. **DISSEMINATION:** We will share our findings widely using a range of approaches depending on the audience. Researchers, policy and decision makers will receive academic papers, policy briefings, and be invited to events. We will communicate our research with communities through a series of short 'in a nutshell' reports publicised widely through social media channels, local media links, and engagement events. We will also develop materials for schools based on our findings to inspire and inform the next generation of researchers.

Where is the study run from?

Bradford Institute for Health Research (UK)

When is the study starting and how long is it expected to run for?

July 2020 to June 2026

Who is funding the study?

National Institute for Health Research (NIHR) (UK)

Who is the main contact?

Prof. Rosie McEachan (scientific), rosie.mceachan@bthft.nhs.uk

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Contact information

Type(s)

Scientific

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Additional identifiers

Integrated Research Application System (IRAS)

281405

Study information

Scientific Title

Evaluating the life-course health impact of a city-wide system approach to improve air quality in Bradford, UK: A quasi-experimental study with implementation and process evaluation

Acronym

BiB Breathes

Study objectives

Aims and research questions:

We aim to assess the impact of the Bradford Clean Air Plan (B-CAP, including a charging Clean Air Zone) on attitudinal, behavioural, air pollution and health outcomes, and its cost-effectiveness, using a multi-outcome, multi-sector approach. We also aim to explore the factors influencing any impact (or lack of) and explore unintended or unanticipated outcomes. The impact of the B-CAP on health inequalities amongst different socio-economic and ethnic groups will be assessed across all outcomes.

Research Questions:

1. What are the key barriers and enablers to implementation of the B-CAP (including acceptability), and are there unintended consequences of the B-CAP for different stakeholder groups (e.g., increased health and economic inequalities)?
2. Does the B-CAP affect travel choice behaviour and attitudes amongst Bradford residents at 12 months post implementation?
3. Does the B-CAP reduce exposure to pollution amongst primary school age children up to 12 months post implementation?
4. What is the impact of the B-CAP 3 years post-implementation on:
 - 4.1. Respiratory health (primary outcome, as assessed by weekly counts of respiratory disease related emergency hospital or General Practice [GP] attendance) of children (aged <18), adults (aged 18-64) and older adults (aged 65+)
 - 4.2. Cardiovascular health (as assessed by weekly counts of cardiovascular disease related emergency hospital/GP attendance) of adults and older adults
 - 4.3. Birth outcomes such as low birth weight and preterm birth (assessed by monthly counts)
5. How does the B-CAP impact on health inequalities up to three years post implementation?
6. What is the value for money of the B-CAP three years post-implementation and longer term?

Ethics approval required

Old ethics approval format

Ethics approval(s)

Approved 30/06/2020, Bradford Leeds (Yorkshire and the Humber) NHS Research Ethics committee (The Old Chapel, Royal Standard Place, Nottingham, NG1 6FS, UK; +44 (0)207 104 8018; bradfordleeds.rec@hra.nhs.uk), ref: 281405

Study design

Quasi-experimental interrupted time series design

Primary study design

Other

Study type(s)

Prevention

Health condition(s) or problem(s) studied

Respiratory health, cardiovascular health, birth outcomes

Interventions

The Bradford Clean Air Plan

In order to address illegal levels of pollution within the City, Bradford Council have been directed by the UK Government to develop and implement the Bradford 'Clean Air Plan' (B-CAP). With a planned implementation date in late 2021, the plan includes a range of activities designed to reduce concentrations of nitrogen dioxide within the city to legal levels as soon as possible.

The B-CAP will include a charging clean air zone (CAZ) class 'C' (targeting non-compliant taxis, buses, heavy goods vehicles [HGVs], and light goods vehicles [LGVs]) Daily charges will be £12.50 for taxis, £9 for LGVs and £50 for HGVs. Exemptions will be provided for local small/medium

enterprises (SMEs), schools and charities. The Bradford ambition is for the CAZ to be supported by a range of other activities/components including: Electric bus routes in key parts of the city with road space allocation to prioritise buses and reduce journey times; grants to retrofit polluting buses to CAZ standards; introduction of clean air standards for all Taxis registered in Bradford so only compliant vehicles can operate; grants and incentive schemes to encourage i) taxi drivers to upgrade to minimum CAZ standards (hackney carriages), petrol/hybrid (private hire vehicles), or electric (both), ii) HGV, LGV, Coach and minibus owners to upgrade to minimum CAZ standard; new park and ride facilities for up to 1000 vehicles /day; installation of alternative energy centre providing cost effective green refuelling/recharging facilities; travel planning with businesses to promote car sharing, active travel and public transport use amongst employees); and an engagement programme to encourage a reduction in polluting heating sources with the CAZ boundary.

We will explore changes in air quality in the city using regularly collected data that is already available on air pollution and will also collect additional data from 12 schools throughout the city. In addition, 240 children in these schools will help us collect data by using mobile air sensors for three months before the Clean Air Zone is put in place and for three months in the year after. The impact on lung, heart health and birth weight will be measured by comparing the health of over 500,000 Bradford residents in the three years before and three years after the Clean Air Zone is in place. The research will examine whether the impact is different for people from more deprived areas or different ethnic groups. This will use detailed information collected on 13,500 children who are part of the Born in Bradford study. We will look at whether the policy changes the way people choose to travel by conducting a survey with 4,000 families. We will also conduct group discussions and interviews with key groups of people including businesses, transport companies, families, and pedestrians. These discussions will explore what may have helped or hindered the success of the policy and any unexpected effects. We will also explore if the Clean Air Zone is good value for money, e.g. do any improvements in health justify the costs.

Intervention Type

Other

Primary outcome(s)

Respiratory health of Bradford residents (as assessed by weekly counts of respiratory disease related emergency hospital or General Practice [GP] attendance) of children (aged <18), adults (aged 18-64) and older adults (aged 65+) at three years post implementation of the B-CAP

Key secondary outcome(s)

1. Cardiovascular health of Bradford residents (as assessed by weekly counts of cardiovascular disease related emergency hospital/GP attendance) of adults (aged 18-64) and older adults (aged 65+) assessed three years post implementation
2. Birth outcomes of babies born within Bradford such as low birth weight and preterm birth (assessed by monthly counts) assessed three years post implementation
3. Air quality (Nitrogen Dioxide, Particulate matter) collected using routine and bespoke monitoring assessed one year post implementation.

From the process and implementation evaluation:

4. Intervention fidelity, adaptations, barriers and enablers to implementation, acceptability, adverse/unintended consequences, travel mode behaviour and attitudes assessed one year post implementation

From the economic evaluation:

5. Key economic outcomes include healthcare resource use and costs, quality adjusted life years, distributional effects assessed 3 years post implementation

Completion date

30/06/2026

Eligibility

Key inclusion criteria

Living within Bradford District

Participant type(s)

All

Healthy volunteers allowed

No

Age group

All

Sex

All

Total final enrolment

0

Key exclusion criteria

Participants who move out of Bradford district during duration of the study.

Date of first enrolment

15/03/2021

Date of final enrolment

20/01/2025

Locations

Countries of recruitment

United Kingdom

England

Study participating centre

Bradford Institute for Health Research

Bradford Teaching Hospitals NHS Foundation Trust

Duckworth Lane

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Sponsor information

Organisation

Bradford Teaching Hospitals NHS Foundation Trust

ROR

<https://ror.org/05gekvn04>

Funder(s)

Funder type

Government

Funder Name

Public Health Research Programme

Alternative Name(s)

NIHR Public Health Research Programme, The Public Health Research (PHR), PHR

Funding Body Type

Government organisation

Funding Body Subtype

National government

Location

United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Data sharing statement to be made available at a later date

Study outputs

Date	Date	Peer	Patient-
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Output type	Details	created	added	reviewed?	facing?
Results article		28/06/2023	14/08/2023	Yes	No
Results article		01/07/2023	14/08/2023	Yes	No
Results article	Health and nitrogen dioxide	28/01/2025	19/02/2025	Yes	No
Results article	Process and implementation evaluation	15/11/2024	19/02/2025	Yes	No
Protocol article		05/12/2022	05/12/2022	Yes	No
Other publications	Qualitative study	25/05/2024	30/10/2024	Yes	No
Other publications	A qualitative study relating to the process and implementation evaluation work-package	29/11/2025	09/01/2026	Yes	No