Project Details	
Project Code	MRCPHS25Ex Wheeler
Title	Building the evidence around risks and actions on thunderstorm asthma
Research Theme	Population Health Sciences
Summary	This project will focus on strengthening evidence to inform action on the emergent phenomenon of thunderstorm asthma. This refers to episodes of increased incidence of asthma exacerbations during thunderstorms, which has been observed internationally. The research will focus on strengthening understanding of the current and likely future epidemiology of thunderstorm asthma under climate change scenarios, build understanding of the links to thunderstorm events, and the role of other potential exacerbating factors. It will inform development of public health advice to reduce risks.
Description	**Background** Thunderstorm asthma refers to episodes of increased incidence of asthma events during thunderstorms, which has been observed internationally. One of the best known cases was in Melbourne, Australia on 21st November 2016. This event is estimated to have resulted in >3000 excess attendances for respiratory symptoms at emergency departments (ED), and almost 500 additional admissions (Thien et al, 2018). Notably only around a quarter of ED attendances had current doctor-diagnosed asthma, meaning the impacts can occur across the general population. Around 12% of the UK population has asthma and risks for those with this condition can be significant. UKHSA-led research showed a 5- to 6-fold increase in emergency department attendances for asthma linked to thunderstorm activity in summer 2021. Mechanisms leading to asthma attacks during these periods are not well understood, but likely include a mix of meteorological, environmental, and physiological factors. The occurrence of thunderstorms in the UK is likely to significantly increase under climate change. **Aim** This PhD project will focus on strengthening our understanding of the current and likely future epidemiology of thunderstorm asthma under UKCP18 climate change scenarios, build understanding of the links to thunderstorm events, and the role of other potential exacerbating factors. It will inform development of public health advice to reduce risks. **Research question & objectives** The overarching research question is "What is the current and likely future epidemiology of thunderstorm asthma in the UK under climate scenarios, and how can public health systems and services respond and prepare?" Objectives build sequentially from evidence review, through empirical and modelling studies to work on public health implications: 1. Synthesise and evaluate the existing international evidence on thunderstorm asthma epidemiology, including descriptive data and explanatory mechanisms. 2. Evaluate potential data resources to study thunderstorm asthma and its determinants in the UK, including future scenarios from very high-resolution (2km) simulations performed as part of UKCP18.

3.   Develop and carry out secondary data analyses to build on the empirical and explanatory evidence base for the UK.

4.   Integrate findings with high-resolution climate projections to estimate likely futures for thunderstorm asthma under different scenarios.

5.   Work with public health services to develop appropriate responses and plans for future risk management and mitigation.

Methods

Objective 1 will be met through an appropriate, substantive evidence review, for example using one of the family of review and evidence synthesis methods.

Objective 2-3 will involve working with supervisors, topic experts and the results of the evidence review to identify candidate data resources for empirical study in the UK. These may involve data such as:

-    NHS Hospital Episode Statistics
-    Environmental Public Health Tracking data held by UKHSA
-    Met Office pollen count data
-    Historic weather data resources
-    Spatial environmental and socio-demographic data
-    Future climate data at high spatial resolution

The student will be supported to design and gain ethical approval for analyses using selected data resources. These empirical studies are likely to include data integration using Geographic Information Systems, time-series analyses and related statistical approaches.

Objective 4 will involve integrating findings from empirical analyses with climate and socio-economic projections to model potential future thunderstorm asthma risks for UK populations under different climate change scenarios.

Objective 5 will involve working with UKHSA colleagues to consider how the findings from the research can be used to inform public health policy and action, and producing relevant briefings or guidance.

Student role

The student will be encouraged to take ownership of the project from outset, with appropriate support from supervisors. Dependent on existing expertise/experience they will be steered to a greater extent during the earlier stages of the PhD, but will be encouraged and supported to gradually take on project leadership. They will be encouraged to explore opportunities around the objectives and to consider refinements and evolution of the approach and methods according to their own development of skills, knowledge and capabilities during the studentship.

References

Thien et al. (2018) The Melbourne epidemic thunderstorm asthma event 2016: an investigation of environmental triggers, effect on health services, and patient risk factors. The Lancet Planetary Health 2: 6, e255-e263. https://doi.org/10.1016/S2542-5196(18)30120-7

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