International Journal of Population Data Science

Journal Website: www.ijpds.org

Using data to improve the health of coastal communities: the coda network

Martyn Patel[1,2], Elizabeth Ford[3*], Emily Murray[4], and Phil Ward[5]

Submission History

Submitted:	30/06/2025
Accepted:	29/09/2025
Published:	xx/xx/20xx

[1] Norfolk and Norwich University Hospital, Norwich, UK
[2] Norwich Medical School, University of East Anglia, Norwich, UK
[3] Department of Primary Care and Public Health, Brighton and Sussex Medical School, Brighton, UK
[4] Centre for Coastal Communities, School of Health and Social Care, University of Essex, Colchester, UK
[5] Eastern Academic Research Consortium (EARC)

Abstract

Background
Since 2021, the discrepancy in healthy life expectancies between coastal and in-land towns in the United Kingdom has been highlighted, with several recommendations around using health data to identify and address potential health improvements. We describe both the processes and the lessons learned in building a new regional network with a critical mass of stakeholders to tackle a well-recognised infrastructural health problem, in a relatively under-resourced area.

Methods
In 2022 the Coastal Data Network (Coda) was formed as part of the Eastern Academic Research Collaboration in the Eastern and Southeastern coastal regions of England, UK. A range of stakeholders from local authorities, national health service and universities have come together to share best practice and expertise to tackle coastal health inequalities using routinely collected health and administrative data. We have hosted a series of workshops and a conference as well as online meetings.

Results
Two case studies are presented showing how Coda has responded to system needs or shared best practice in response to emergency situations. We are currently working to sustain the network beyond its initiation phase and to seek external funding for collaborative research activity in the region.

Conclusion
The Coda Network has been established to enhance capacity for understanding and improving the health and lives of coastal populations. Key to retention and growth of the membership has been an early and vigorous commitment to sharing "best practice" examples. This network approach enlarges the pool of data available to Coda members allowing us to plan future population data science projects.

Keywords
Coastal Health, Inequalities, Health Data, Network, Collaboration

*Corresponding Author:
Email Address: e.m.ford@bsms.ac.uk (Elizabeth Ford)

https://doi.org/10.23889/ijpds.v6i1.3087

Introduction

In 2021, the Chief Medical Officer's (CMO) annual report addressed the health of coastal communities and highlighted the paucity of available data on health and wellbeing at a granular level in these communities [1]. The report put forward a number of recommendations, including that, 'given the commonality of interest between coastal areas, learning networks of those leading population health in these areas should be encouraged, linked to academic institutions with an interest in building the knowledge base on health improvements' (recommendation 3.7).

In direct response to this, the Eastern Arc Coastal Data (or 'Coda') Network was established. The Eastern Academic Research Consortium (Eastern Arc) is a regional research consortium comprising the universities of East Anglia, Essex, Kent and Sussex [2]. It exists to encourage collaboration, to support a positive research culture, and to advocate on behalf of the universities and the wider region.

In terms of collaboration, it is active in developing and facilitating links between and beyond the four universities, and particularly with regional stakeholders in addressing the challenges and opportunities in four priority areas: coast, food, heritage and sanctuary [2].

The Eastern coast of England is a natural focus for the consortium. Of the 43 districts covered by Eastern Arc in Norfolk, Suffolk, Essex, Kent and East Sussex, 24 are coastal [3]: spanning from Kings Lynn and West Norfolk in the North to Chichester in the South, include a population of over 3.3 million people [3] and contain some of the most deprived areas in the country (e.g., Great Yarmouth, Waveney, Jaywick, Swale and Hastings) [4]. As well, these coastal districts tend to have lower average pay, lower levels of skills and education and experience lower life expectancy than their inland equivalents in the Eastern Arc geographies [5].

The social determinants of health (SDOH), namely education, poverty indices, employment opportunities and access to healthy food choices can cluster in many geographic areas, not just the coast, but when these indices are set to the lowest parameters, health inequalities often arise. The challenge for those wishing to address health inequalities (either by addressing root causes of SDOH, or moving resources to tackle health inequalities directly) is that there are multiple definitions of health inequalities, and individual units of health and social care agencies (Integrated Care Boards) often create their own working definitions in line with regional priorities [6]. Where a network approach, like Coda, can help, is to encourage the use of validated frameworks for identifying and addressing health inequalities such as the Place-Based Approaches for Reducing Health Inequalities framework by Public Health England [7].

The establishment of the Coda Network enabled those responsible for collecting, analysing and using health data to learn from each other, to develop relationships of trust, and to begin working together to address the CMO's other data-related recommendations, namely: to review the availability, access and applicability of data on health and wellbeing outcomes and their determinants at lower geographical levels (3.1); to undertake research to understand the multiple drivers of poor health and test effective interventions (3.2); to assess service-level challenges (3.3); to encourage research on coastal health by coastal universities (3.4); to understand the impact of migration patterns on local communities (3.5); and to improve joint working between local authorities and academic institutions in data-sharing arrangements (3.6) [1]. The lack of granular data at lower geographical levels is not limited to the coast and is a nationwide problem [8]. Furthermore, the problem of health inequality is not unique to the coastal areas of the UK, but we aim our focus on the coast as that is the population we serve. The CMO report highlighted a number of reasons why health outcomes are worse in coastal areas than other similarly deprived, inland areas. While social and material deprivation play a large role in coastal health outcomes, there are additional drivers in coastal towns such as: high unemployment and part-time employment, often driven by seasonal, tourism-based economies, poor transport connections to larger employers, poorer access to higher education, poor quality and cheap housing which attracts vulnerable and transitory populations, a concentration of older populations seeking the coast for retirement, and deficits in medical infrastructure and workforce [1].

The Coda Network acts as a forum for sharing knowledge and insights on the use of data to inform public health, particularly where those data arise from unexpected sources, or identify surprising connections. Based on the IJPDS Four Categories of Population Data Science, this first phase of Coda has had most relevance to "Data Use for Positive Impact" which we shall outline via Case studies below. In the future, Coda aims to develop direct research capability to allow us to contribute to the category "Identifying population level insights".

Developing a network

The EARC region comprises six counties and three unitary authorities: Norfolk, Suffolk, Essex, Southend, Thurrock, Medway, Kent, East and West Sussex, and Brighton and Hove. All of these have a coastline; Thurrock and Medway are estuarine but share many of the characteristics common to coastal communities facing the sea. Together, they have a population of 9.3m (2021 census), with approximately 30-40% (or, in coastal unitary authorities (Southend and Brighton and Hove), 100%) living on the coast, amounting to 3-4m people [9].

In addition, the region is covered by six NHS integrated care boards (Norfolk and Waveney, Suffolk and North East Essex, Mid and South Essex, Kent and Medway, and Sussex), and 36 separate NHS trusts. Despite this complex picture of responsibility for health and wellbeing, many of the issues faced by local authorities, integrated care boards (ICBs) and NHS trusts in addressing health in coastal communities are shared: an ageing population, poor transport and infrastructure, isolation, substandard housing, lack of skills and work opportunities, and seasonality.

As such, the development of the Coda Network was welcomed as an opportunity to share knowledge and insights, understanding how different regions, different local authorities, ICBs and NHS trusts, are tackling the same issues in differing ways.

Established in 2022, the Network has developed slowly. Its starting point was twofold: the first was a broad response to the CMO's recommendations; the second was a more specific drive to explore the opportunity to bid for funding from the Economic and Social Research Council (ESRC) for a local policy innovation partnership (LPIP) [10]. The latter provided a focus for the former, but it was the former that ultimately provided the longevity and inclusivity that has helped develop the Network's critical mass.

Central to its work is providing the space and opportunity for a diverse range of data specialists, clinician scientists and public health experts to meet. In its first year, the Network hosted two workshops, one online and one in-person. These sought to identify the barriers to data collection, analysis and use. Approximately 50 participants took part from over 20 different organisations, identifying a range of issues, including: risk-averse data owners, the proliferation of agencies involved, a lack of integration, and inaccurate metadata.

A small working group was established that began building on and exploring these issues, and it contributed to a broad conference at the University of Essex in September 2022 that focussed on 'The Collaborative Coast' [11]. This provided space for both academics and stakeholders (n = ∼140) to explore issues as diverse as art and culture as drivers for place-making, sustainable coastal ecosystems, mental health and wellbeing in seldom-heard communities, and offshore wind development. This conference had a more general focus that included, but was not exclusive to, data. The core themes outlined specific health challenges for this population, particularly in coastal areas and speakers identified the ways in which robust data collection and analysis would play an important part in ensuring better access to care and improving quality of care, focusing on all four categories of population data science (as mentioned above).

The conference finished with a recorded address by the CMO outlining the findings of his report, and a panel discussion looking at how to address them, involving the Director of Public Health for Essex County Council, the Chair of Suffolk and NE Essex ICB, and a public health consultant with Kent County Council.

A further workshop was held in May 2024, building on the first two workshops and on the conference, and focussed on understanding how local authorities had met the challenge of data-sharing, particularly in light of the Covid-19 pandemic, and how the data were being used by district councils with communities on the ground. It also heard about the latest research on youth mental health in coastal communities, and on a proposal to recalibrate the indices of multiple deprivation to help identify deprivation prevalent in non-metropolitan areas.

This work has led to a broad and growing membership (n=155, representing 54 organisations), that has collaborated on grant submissions (n=3, with discussions about 2 others that were not taken further). As well as the organised workshops (n=3) and co-hosted conferences (n=2), the Network has delivered a workshop on behalf of a regional ICB (Norfolk and Waveney, case study 2), and has established a seminar series (launched in February 2025, with 3 open events having already taken place, and 3 more lined up in the next 4 months).

Challenges and opportunities in setting up Coda

There were several challenges in setting up Coda, some of which are inherent in the way that the existing research infrastructure of the East and Southeast of England has a natural bias towards the large in-land university towns (including the Cambridge, London, Oxford "golden triangle"). The lower levels of health research infrastructure across the coastal areas (including the lack of any biomedical research centres) has to an extent been ameliorated by the engagement with NIHR Applied Research Collaborations (ARCs), as well as good leadership from within local authorities (LAs). The latter communicated that despite there being no funding for research time, they could see the potential synergistic benefits from staff engaging with like-minded peers across this new network [12].

This ground-up approach to building a collaboration led to a snowball recruitment style, with recommendations cascading within the existing LAs and then outwards towards university and NHS partners. We aimed to set up Coda with a maximally inclusive membership policy, and little or no restrictions on who could join, aside from working for either a provider of Health, Public Health or Social Care, or a University, allied with the coastal region.

Pre-pandemic, the concept of hosting a recurring multi-agency meeting in a virtual space would have been unheard of, and Coda was able to take advantage of the flexible approach to meetings that emerged due to pandemic lockdowns and remote working [13].

Case studies: sharing knowledge and increasing awareness of how to use population-level data

Case study 1: mapping data on floods against public health incidents

As discussed above the Coda Network acts as a forum for sharing knowledge and insights on the use of data to inform public health, particularly where those data were from unexpected sources, or identified surprising connections. One example was presented to the Network in 2023. Charles Blandy, a Public Health Officer for Norfolk County Council (NCC), outlined a project he had undertaken that mapped council data against that of the 36 members of the Norfolk Strategic Flooding Alliance, which brings together all agencies who have any responsibility for water and flood management in Norfolk. The aim of the project was to bring together data from all members of the alliance to give an overview for the whole of Norfolk. Norfolk County Council holds reported flood incidents data. In Norfolk, 90,000 homes are in the top 20% most vulnerable neighbourhoods from flooding (based on the Neighbourhood Flood Vulnerability Index for the whole of England), and there is a strong link between deprivation and flood vulnerability. The map showed a strong correlation between flooding and local health incidents, whether that be immediate and physical, or longer-term mental conditions such as post-traumatic stress disorder (PTSD) or depression. Such

an initiative allowed those working in other coastal or low-lying areas of the Eastern Arc region to consider the impact of weather events on their own populations, and ponder how best to use such data in the future. One idea included developing an online tool for public health professionals and academics.

Case study 2: Training for primary healthcare workers, Norfolk and Waveney Integrated Care Board

The third Coda Network workshop enabled academics and practitioners to learn from each other, to understand the way councils and integrated care boards (ICBs) were gathering and using data, and what research was being undertaken to address issues such as youth mental health. Following this, Coda was approached to design and develop a full-day training workshop for 30-40 clinical and non-clinical healthcare professionals in a range of organisations, including ICBs, local authorities, further education colleges, dental practices, primary care and community trusts. The workshop gave those who were at the start of their careers a grounding in the datasets that were available to them, how they were being used by others, and the existing analyses that had been undertaken by colleagues in the region. As such, they were able to better contextualise their own practice and identify the wider health determinants within their communities.

Future plans

Following the first workshop, the Network was formalised with terms of reference and broadening out of the membership. It currently stands at >150, with new members encouraged to join, with no plan to cap membership numbers. We intend for the network to be as broad and comprehensive as possible. We recognise that data is of value to those working in a wide range of disciplines, sectors and areas, and we are deliberately not limiting network membership to, for example, local authorities or ICBs. As such, we have members from organisations as diverse as Natural England and Community Voluntary Services, as well as universities, county council data offices, and NHS trusts, because we believe that the value and benefit of using population-level health data is relevant to a individuals and organisations that have historically not had access or opportunity to use these data sources.

The terms of reference were intended to be, in part, a manifesto for future work. Coda will continue to be an interdisciplinary and intersectoral research forum to facilitate knowledge exchange, joint working and sharing of best practice between universities and regional stakeholders, including local authorities (LAs), NHS trusts, ICBs, charities, businesses and others. This is done on both an individual basis and through collective workshops, online seminars and other events; examples of these have been given above. We are of the view that the form of dissemination and sharing should be appropriate to the needs of the participants and the purpose of interaction. Through the network, members can:

1. Build on the significant regional strengths that exist in data collection and analysis, and increase the connectivity of relationships that already exist between stakeholder organisations;
2. Explore the availability of data relating to coastal communities that is held by LAs, NHS trusts, ICBs, universities, charities and other organisations.
    a. Understand if and how these data can be shared and used;
3. Share examples of good practice in analysing the data and subsequent application of the findings;
    a. Through this, aim to develop reciprocal working to address common challenges, where appropriate;
4. Share information on training and events, making participation available (where appropriate) across the region;
5. Share concerns, queries, knowledge, and insights in a spirit of trust and confidentiality;
6. Develop collaborations with other members, which may lead to:
    a. Joint projects, particularly based on co-developed research questions.
    b. A 'test-bed' for translational research.
    c. Funding applications based on these.
    d. Events, including symposia, conferences and workshops
    e. Position statements and policy papers.

The terms of reference are operationalised by translating the stated objectives and scope into clear, actionable processes. This involves defining roles and responsibilities, setting timelines, identifying resources, and establishing reporting and monitoring mechanisms. In practice, this ensures that the terms of reference move from a guiding framework into measurable activities and outcomes.

What will success look like?

It is important to set measurable goals for any new organisation. The aim of Coda, as it approaches its third anniversary, is to both continue the collaborative knowledge sharing approach outlined above, but also to start to produce impact in more traditional research orientated goals. Namely, to publish annually in peer reviewed journals detailed case studies from the network, and to support this by achieving grant awards from national funding bodies to support research infrastructure.

We wish to move forwards from sharing sub-regional case studies, to conducting pan-regional research, taking advantage of upcoming plans for trusted data sharing networks across the region. Our ambition is to utilise existing evidence for reducing health inequalities from other areas and apply this learning to coastal areas [14].

We also recognise that there would be an opportunity, in time, to develop a platform for members to share and access

datasets (and metadata in particular), although we would need to be aware of the danger of duplicating work in this. We have a host website for Coda (https://easternarc.ac.uk/coda/), which includes our purpose, terms of reference, notes from our seminars, and details of other events, but we currently do not host a data-sharing platform. Current initiatives elsewhere (NHS Secure Data Environments, and the proposed UKRI/Wellcome Health Data Service) will, we hope, provide more of the structure for this; Coda, in its current iteration, is a way of stimulating and supporting the sharing of knowledge, best-practice, and the opportunity to learn from each other and work together.

Importantly, Coda is not intended to be an exclusive body. It recognises that the issues it is seeking to address are relevant across the UK, and it actively seeks to complement, support and work in partnership with other networks with which it may share geographic or thematic interests, such as the NIHR Research Delivery Networks, Health Data Research UK, and the Plymouth and Essex centres for coastal communities.

This joint working with other networks has been demonstrated in Coda's partnership with two networks for the recent NIHR Coastal Communities call. The first, led by the Lincoln Institute for Rural and Coastal Health (LIRCH), sought to address digital exclusion in communities along the Lincolnshire coast by establishing community data hubs; the other was led by Breaking Barriers Innovation (BBI), and would build on its Coastal Navigators Network to develop interventions on economically inactive residents furthest from the labour market, including those with long-term health conditions, mental health needs, disabilities, neurodiversity, or who are in disadvantaged age groups such as NEET young people and over-55s. The role of Coda in both of these cases is to act as an avenue for recruiting participants and sharing knowledge about the projects, disseminating the findings and advocating for policy change following the projects.

We believe that this broadening of connections across and beyond Coda has strengthened the work of its members, and that the network can act as a template for others working in the for the data linkage/usage community in general.

As a further example, we recently recruited colleagues working on the Marmot Places projects with Kent County Council and King's Lynn and West Norfolk Council. Their work explores how to address the social determinants of health, such as housing, employment, and education, through a whole-system, long-term approach to create a healthier and fairer society for everyone. The teams were introduced to each other through the Coda Network and will be presenting their work and their plans at a forthcoming Coda seminar. This will also be an opportunity for them to be questioned on it, and for Network members to explore how they can adopt or incorporate the Marmot principles, or equally how their work (and available data) can help to inform the work of the Marmot teams. Similarly, one of the paper authors, Dr Emily Murray, presented her research to the Network at its last meeting, which led to an invitation to talk to the All Party Parliamentary Group on Coastal Communities, the suggestion by one participant to use Freedom of Information requests to access more granular data relating to youth mental health, and the offer to share efforts to advocate legislative and regulatory changes with politicians and policymakers.

Challenges moving forward

Like all new organisations, there exists a risk of enthusiasm waning, and the main challenge in a new start-up venture like this can be maintaining momentum. Coda has sought to overcome this by moving to separate out the strategic/operational meetings from the educational, data-sharing and research-focussed activities.

We have also recognised the need to utilise this critical mass of expertise to start to bid for distinct funding to support core research tasks the group wishes to conduct. It is difficult otherwise to see how we can proceed, with the sparse health research funded time in this sector. To capitalise on our progress will take a step into dedicated projects, and dedicated funding for these.

The area is also covered by two of the incipient NHS sub-national secure data environments (East of England and Kent, Medway and Sussex), and Coda members are actively involved in the development of, and opportunities offered by, this new health data infrastructure [15].

Limitations so far

The most obvious limitation, and something that has been a struggle to overcome so far, is that the majority of Coda members clinical workload is increasing due the well documented increasing needs of Coastal Health populations [1]. Carving out time to prioritize research and research output has been a major struggle, and our stated aim above of applying for research infrastructure funding is one way to mitigate that going forwards.

Another limitation is one that is inherent in the size of the network. Whilst virtual meetings are productive, they are not a panacea, and the need to arrange opportunities for face to face meetings and more prolonged workshop events comes with costs of both time taken to organise, and material cost associated with putting on an event and travelling to it.

Conclusion

Following on directly from the call to action of the CMO report, the Coda Network has been established, to serve the need of enhanced capacity for understanding and improving the health and lives of coastal populations. Whilst its inception was triggered by the CMO report, it quickly became clear that there existed a critical mass of individuals from stakeholder organisations, which crucially already had sufficient trusted relationships, to allow Coda to grow rapidly. Key to retention within and growth of the membership has been an early and vigorous commitment to sharing "best practice" examples. The examples cited above are just two of the projects ongoing led by Coda members.

As described, the group has plans under its terms of reference to increase both the "ask" and the "offer" associated with membership. Formalising the "ask" - "best practice sharing" into the regular meeting group, and the "offer" - short life working groups to write up projects, and start to bid for national grant funding, will hopefully increase Coda's relevance going forwards.

We hope this article provides some generalisable learning for those in other coastal areas in the process of setting up similar networks. Not everything we have done will map exactly to different regions, and we acknowledge that we started from a fortuitous position of having an extant body with a reach that spanned the breadth of our coastal geography.

Starting from a single proposition, we have leveraged substantial interest and expertise from the Eastern Arc territory and put that into the creation of a body that already serves its members' interest. We have demonstrated how we have already carried out work that ties to one of IJPDS four Categories of Population Data Science, namely case studies that demonstrate our commitment to "Data Use for Positive Impact". We have stated an ambition to grow our abilities so that we can contribute to the category "Identifying population level insights". We have an ambition to reach outwards from here, and welcome new members who would like to be a part of our journey (Contact: p.ward@easternarc.ac.uk).

Ethics statement

No ethical approval was sought prior to writing this working paper, as it reports on activities which are available in the public domain.

Data availability statement

No new data was created or used in this study.

Conflict of interest statement

'None declared'

References

1. Department of Health and Social Care (2021). Chief Medical Officer's annual report 2021: health in coastal communities. Available at https://www.gov.uk/government/publications/chief-medical-officers-annual-report-2021-health-in-coastal-communities [accessed 01 June 2025]

2. The Coda Network - Eastern Arc. Available at https://easternarc.ac.uk/coda/ [accessed 01 June 2025]

3. Office for National Statistics - Estimates of the population for England and Wales – available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/estimatesofthepopulationforenglandandwales [accessed August 2025]

4. Ministry of Housing, Communities & Local Government, September 2019 - English indices of deprivation 2019. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019 [accessed August 2025]

5. Levelling up the Edges: The social/economic context for coastal towns and communities in the Eastern Arc region. Available at https://easternarc.ac.uk/news/earc-publishes-report-on-health-and-economic-inequalities-of-the-coast/ [accessed 01 June 2025]

6. Olivera JN, Ford J, Sowden S, Bambra C. Conceptualisation of health inequalities by local healthcare systems: A document analysis. Health & Social Care in the Community. 2022 Nov;30(6):e3977-84. https://doi.org/10.1111/hsc.13791

7. Public Health England. Place-based approaches for reducing health inequalities: main report. Guidance. 2021. Available from https://www.gov.uk/government/publications/health-inequalities-place-based-approaches-to-reduce-inequalities/place-based-approaches-for-reducing-health-inequalities-main-report [accessed 17th September 2025]

8. Murray E, Shelton N, Norman P, Head J (2022) Measuring the health of people in places: a scoping review of OECD member countries. Health & Place. https://doi.org/10.1016/j.healthplace.2021.102731

9. Office for National Statistics. 2021 Census Report. Available at https://www.ons.gov.uk/census [accessed 01 June 2025]

10. UK Research and Innovation, Developing Local Policy Innovation Partnerships. Available at https://www.ukri.org/opportunity/developing-local-policy-innovation-partnerships/ [accessed 01 June 2025]

11. The Collaborative Coast Conference, University of Essex, 22 Sept 2022. Available at https://easternarc.ac.uk/news/conference2022call/ [accessed 01 June 2025]

12. Zakaria S, Grant J, Luff J. Fundamental challenges in assessing the impact of research infrastructure. Health Research Policy and Systems. 2021 Dec;19:1-9. https://doi.org/10.1186/s12961-021-00769-z

13. Srivastava DS, Winter M, Gross LJ, Metzger JP, Baron JS, Mouquet N, Meagher TR, Halpern BS, Pillar VD. Maintaining momentum for collaborative working groups in a post-pandemic world. Nature Ecology & Evolution. 2021 Sep;5(9):1188-9. https://doi.org/10.1038/s41559-021-01521-0

14. Garzón-Orjuela N, Samacá-Samacá DF, Luque Angulo SC, Mendes Abdala CV, Reveiz L, Eslava-Schmalbach J. An overview of reviews on strategies to reduce health inequalities. International journal for equity in health. 2020 Oct 28;19(1):192. https://doi.org/10.1186/s12939-020-01299-w

15. NHS England, The NHS Research Secure Data Environment Network. Available at https://digital.nhs.uk/data-and-information/research-powered-by-data/sde-network [accessed 24 June 2025].