Data Insight

Exploring the complex relationship between legislation, policies and research: Built Environments And Child Health in WalEs and AuStralia (BEACHES)

Authors: Theodora Pouliou[1], Lucy J. Griffiths[1], Rowena Bailey[1], Sinead Brophy[1], Jo Davies[1], Richard Fry[1], Ronan A. Lyons[1], Amy Mizen[1], Rebecca Pedrick-Case[1], Alan Watkins[1] and Gareth Stratton[2]

[1] Population Data Science, Swansea University Medical School, Swansea, UK
[2] Research Centre in Applied Sports, Technology, Exercise and Medicine, Swansea University, Swansea, UK

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This Data Insight focuses on the work being carried out by the Built Environments And Child Health in WalEs and AuStralia (BEACHES) team in Swansea University. BEACHES is a joint initiative between Swansea University, the Telethon Kids Institute, and the University of Western Australia, with collaborators from Curtin University, Monash University, Queensland University of Technology, and University of Southern Denmark. It provides a summary of key Welsh legislation and policy areas on the built environment and child health. We describe the data used in the BEACHES project and present the statistical analysis to be conducted, as well as the dissemination process and engagement with stakeholders throughout the project.

This Data Insight has been produced by the ADR Wales Health and Well-being research team. It provides a snapshot of informative research currently underway at ADR Wales but is not intended to provide a complete picture of the work undertaken within this field or the ADR Wales programme of work. The information presented in this Data Insight has been reviewed by ADR Wales colleagues with expertise within this thematic area and is accepted to be accurate at the point of publication. Views expressed in this Data Insight are those of the researchers and not necessarily those of ADR Wales partner organisations.

Key definitions

Legislation [1]:

- Legislation is law which has been made (or 'enacted') by a legislature. A legislature is a body of persons, usually elected, which is empowered to make, change, or repeal the laws of a country or state.
- There are two legislatures which pass laws that apply to Wales – the UK Parliament and the Senedd.

Act [2]:

- An Act of Parliament creates a new law or changes an existing law. An Act is a Bill that has been approved by both the House of Commons and the House of Lords and been given Royal Assent by the Monarch. Taken together, Acts of Parliament make up what is known as Statute Law in the UK.
- In Wales, the Senedd is able to pass Acts on any matters that are not reserved to the UK Parliament by the Government of Wales Act 2006 (as amended by the Wales Act 2017). Once a Bill has been considered and passed by the Senedd and given Royal Assent by the Monarch, it becomes an 'Act of Senedd Cymru'.

Introduction

Unhealthy diets resulting in overweight/obesity and physical inactivity in children and young people are two of the most significant modifiable risk factors for non-communicable diseases (NCDs) [5]. Research demonstrates links between the built environment (BE) and aspects of urban design, transportation, land-use planning, and health outcomes in adults [6–8]. However, limited evidence exists on the role of the BE in promoting child health, and the opportunities it presents for increasing physical activity, encouraging a healthy diet, and reducing obesity [9].

Policy [3]:

- A set of ideas or a plan of what to do in particular situations that has been agreed to officially by a group of people, a business organization, a government, or a political party and/or,
- A document showing an agreement you have made with an insurance company.

Strategy [4]:

- The way in which a business, government, or other organization carefully plans its actions over a period of time to improve its position and achieve what it wants.

The BEACHES project is jointly funded by the Medical Research Council (UKRI-MRC), Australian National Health and Medical Research Council (NHMRC), and Economic and Social Research Council (ESRC). It is an innovative research project that examines the impact of the BE on risk factors for NCDs in children using existing UK and Australian longitudinal population level data.

This study aims to bring together five large cohort studies that have collected detailed longitudinal anthropometric, physical activity, and contextual data on more than one million children in Wales and Australia. High resolution spatial data and cutting-edge geospatial techniques are applied to construct a harmonised set of metrics (such as an index of walkability) that characterise the BEs that each child has inhabited throughout their childhood. These metrics are analysed to quantify the role that different BE characteristics have on healthy weight, physical activity, sedentary behaviour, and diet. Detailed information on this project can be found elsewhere [10].

The project includes:

- Identifying key policy areas that have been implemented in Wales and Australia
- Building on the interdisciplinary teams' expertise in GIS (Geographic Information Systems) developing child-centric models of the BE that incorporate relevant policy interventions at different time points and at different geographic scales
- Examining the influence of the BE on child NCDs through a series of statistical analyses
- Communicating evidence to policymakers to assist in the design of impactful policy that could modify the BE to reduce childhood obesity and ultimately NCDs

Public Health Wales has published a suite of documents to help inform and enable healthier future environments, including strategies to stem the rise in obesity in Wales [11]. The BEACHES project is complementing this drive for change, with a specific focus on children.

Legislation and policy review

Prior to the 2011 referendum on law-making powers of the National Assembly for Wales (hereafter referred to as the 2011 devolution referendum), the National Assembly for Wales (now known as the Senedd) had powers to make laws for Wales on some subjects (but not all) within devolved areas. These included health, education, social services, local government, and environment. The Assembly could gain further powers to make laws in devolved areas but needed the agreement of the UK Parliament first, on a case-by-case basis. The 2011 devolution referendum asked voters to decide whether the Assembly should be able to make laws on all matters in the 20 subject areas it has powers for. The result of the referendum was a 63.5% vote for yes.

Prior to the 2011 devolution referendum policy and legislation were limited with only a few Acts such as the 2006 Natural Environment and Rural Communities Act [12] and the 2008 Planning Act [13]. Little emphasis was placed on the influence of the environment on health and well-being, with less focus on children's health and

well-being. The only exception was the Play policy [14] launched in 2002 and implemented in 2006, making Wales the first country to introduce a policy emphasising the access of all children to rich, stimulating play experiences. This offered them the opportunity to explore both themselves and the world through freely chosen play.

Since the 2011 devolution referendum, the Welsh policy and legislative agenda includes the Active Travel (Wales) Act 2013 [15], the Well-being of Future Generations (Wales) Act 2015 [16], the Planning Wales Act (2015) [17], the Environment (Wales) Act 2016 [18] and the Public Health (Wales) Act 2017 [19], which all support the built and natural environment promoting health and well-being.

In 2018, Public Health Wales published the report 'Creating healthier places and spaces for our present and future generations' to support Public Services Boards, public bodies, cross sector organisations and individuals to enhance the health and well-being opportunities afforded by the natural and built environment [20]. The report was in response to the Well-being of Future Generations Act 2015, with input from Natural Resources Wales. The document focuses on six priority areas of the built and natural environment that can positively influence health and well-being.

Figure 1 – Priority areas of the built and natural environment that can positively influence health and wellbeing (Source: Public Health Wales, 2008 http://www.wales.nhs.uk/sitesplus/documents/888/Creating%20healthier%20places%20spaces.pdf)

For the purposes of this project, we adapted the aforementioned priority areas to identify the key legislation and policy areas that have been implemented in Wales, with particular emphasis on the BE and child health.

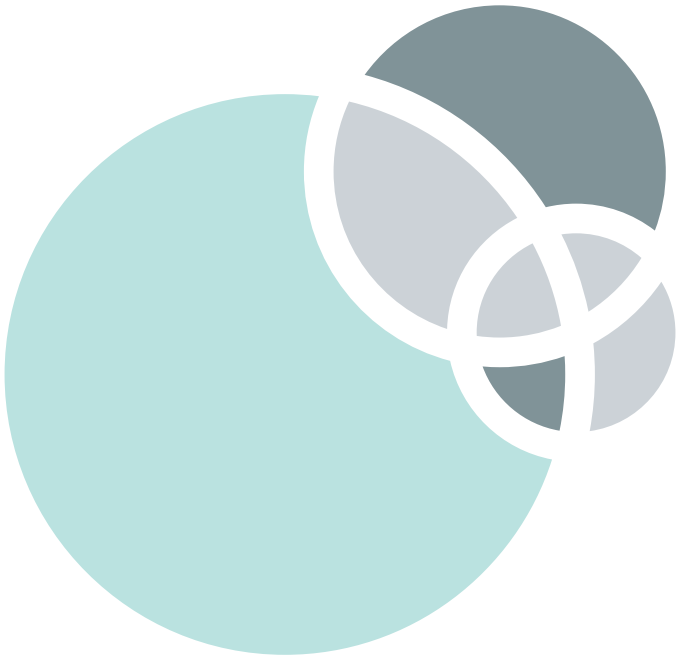


Table 1 – Priority themes based on Public Health Wales and the relevant legislation, policies, strategies, and programmes and inquiries.

	The walking and cycling infrastructure	Open green / blue spaces and green infrastructure	The food growing and retail environment	Health and social care services by local facilities	Low levels of air pollution	Building design
Legislation						
Active Travel Act (2013)	✓	✓			✓	✓
Planning Wales Act (2015)	✓	✓	✓	✓	✓	✓
Environment Act (2016)	✓	✓	✓		✓	✓
Public Health Wales Act (2017)	✓	✓	✓	✓	✓	✓
Well-being of Future Generations Act (2015)	✓	✓	✓	✓	✓	✓
Policies						
Planning Policy for Wales (2018)	✓	✓	✓	✓	✓	✓
Play policy (2022)		✓	✓	✓		
Active Travel Plan (2020)	✓	✓			✓	✓
Children and Families - Wales Measure (2010)		✓	✓	✓		
The Healthy Eating in Schools (2013)			✓			
Local Development plan (2016)	✓	✓	✓	✓	✓	✓
Key Strategies and programmes						
National Assemble of Wales (2019) Physical activity of Children and Young People	✓	✓		✓	✓	
New Curriculum of Wales (2022)	✓	✓	✓	✓	✓	
Sport Wales Strategy (2019)	✓	✓		✓		
Getting Wales Moving (2017)	✓	✓		✓		
Healthy weight - Healthy Wales (2020-2030)	✓	✓	✓	✓	✓	✓
Third Sector						
Sustrans (cycling, active travel to school, 20m/h zones)	✓	✓			✓	✓
Sustrans (air quality, 20mph zones, etc.)		✓			✓	✓
Sustrans (building design, housing growth)					✓	✓

The Acts included in Table 1 are relevant and important in terms of emphasising the complex relationship between the BE and health. For example, the Planning Wales Act is directly connected to the Active Travel Act and Public Health Wales Act (PHW), showing how planning may enable opportunities for active travel and therefore positively impact health and well-being. Few acts specifically emphasise the health and well-being of children and young people.

The 2015 Well-being of Future Generations (Wales) Act is one of the exceptions, as the act puts in place seven well-being goals. Four of these ('A prosperous Wales', 'A resilient Wales', 'A Wales of connected communities' and 'A globally responsible Wales') specifically mention the role of the environment in promoting well-being for future generations.

The Public Health (Wales) Act 2017 also places emphasis on child obesity and the BE. In particular, the PHW Act stresses the importance of how the environment helps people maintain a healthy weight.

The Active Travel Act (2013) also highlights the importance of supporting active travel as a measure of modifying the BE in order to see significant changes in lifestyle behaviour, therefore creating positive health impacts for both adults and children.

The Play policy stresses the importance of children having access to rich, stimulating play experiences, with safeguards from inappropriate risk. This offers them the opportunity to explore, through freely chosen play, both themselves and the world.

Additional policies on children's physical activity and nutrition opportunities include the 2010 Children and Families – Wales Measure [21] and the 2013 Healthy Eating in Schools [22] standards. The Children and Families – Wales Measure makes reference to play opportunities for children and states that "a local authority must assess the sufficiency of play opportunities in its area for children in accordance with regulations". In addition, it places emphasis on children needing extra support due to disability.

The Healthy Eating in Schools policy provides specific information on the requirements for local authorities to provide school breakfast and lunch in educational settings (i.e., maintained nursery, primary, and secondary schools). Finally, in education, the 2022 New Curriculum of Wales [23] provides support to schools, childcare settings and the wider education community to realise the benefits of learning and play in the natural environment, using new opportunities within the Curriculum for Wales framework.

More recently, several strategies and plans and inquiries on physical activity and obesity have been introduced, including the 2017 Getting Wales Moving [24], the 2019 National Assembly of Wales inquiry into the Physical activity of Children and Young People [25], and the Healthy weight - Healthy Wales (2020 - 2030) [26]. These strategies tap into the skills and knowledge of people in Wales to action and deliver change. Importantly, these strategies set out a range of agreed policy aspirations for increasing physical activity; establish desired outcomes for all participants at various levels and sectors; and ensure that planning, monitoring, and evaluation is in place at all levels.

Whilst there are some legislative acts, policy strategies, and plans that aim to provide better standards of living and reduce inequalities for children (such as the Future Generations Act), there is still uncertainty regarding the implementation of those policies and strategies. There is limited guidance around and few specific examples of how to modify the BE to specifically improve child health by improving diet and increasing opportunities for activity.

According to a 2007 landmark publication from Foresight, about 25% of all children under 16 were predicted to be obese by 2050, resulting in increases in the risk of a range of chronic diseases such as type 2 diabetes. This would have significant costs to the NHS and society in general [27]. While the rate of increase in obesity has noticeably slowed and estimates of the prevalence of obesity in 2030 are almost 10 percentage points lower than the report's estimated percentages, now feels a timely moment to reconsider what we could achieve in the next decade to improve public health [28]. Foresight's report clearly showed that "the causes of obesity are embedded in an extremely complex biological system, set within an equally complex societal

framework."

Significant and effective action to tackle obesity at a population level is therefore required through a whole system approach - from production and promotion of healthy diets, to redesigning the BE to promote walking and activity in general. This requires a broad set of integrated policies including both population and targeted measures. It must include action not only by government, but also action by industries, communities, families, and society.

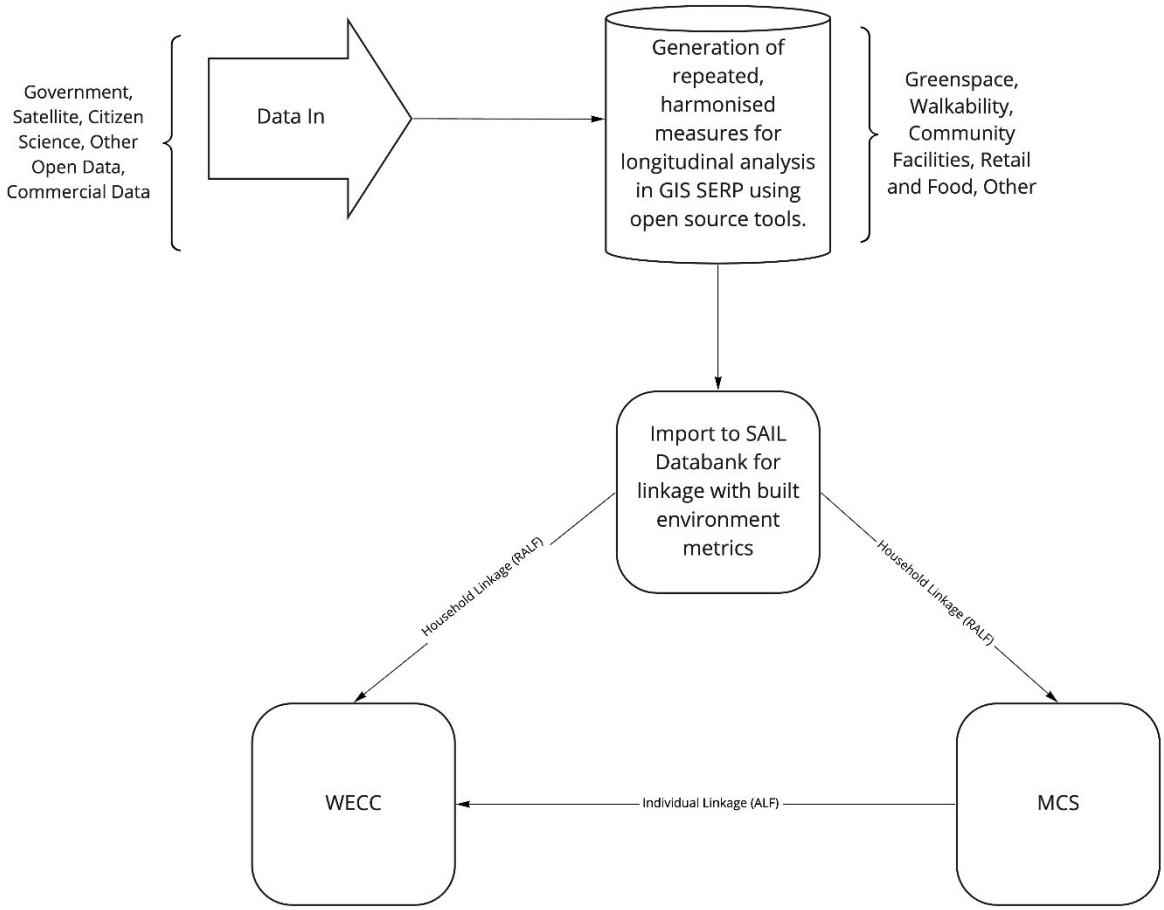
How are we using data held within the SAIL Databank to answer research questions?

Policy to date has failed to improve child health over the last two decades. Indeed, the opposite has occurred: childhood obesity rates are once again on the increase [29]. Childhood obesity is a complex issue not only influenced by individuals' behaviours [30,31] but by organisational and infrastructural factors. BEACHES provides a unique opportunity to approach this challenge in a way that has rarely been attempted before. It spans the disciplines of population data science, lifestyle and behaviours, geographic information, planning, and policy.

The project brings together routine administrative data and cohort data in the Secure Anonymised Information Linkage (SAIL) Databank:

- The Wales Electronic Cohort for Children (WECC) is a total population anonymised electronic cohort study of all children born and living in Wales since 1990. In Wales, there are approximately 35,000 births per year, and WECC includes children born: (a) ≥24 weeks gestation); (b) to a Welsh resident mother at birth, or a child resident in Wales as identified from the Welsh Demographic Service. The dataset is also linked to other routinely collected data (such as general practitioner records, hospital admissions) as well as BMI data from the Child Measurement Programme in Wales that includes measured height and weights of all primary school-aged children across Wales. A fuller description of the WECC and its contents is available [32,33].
- The Millennium Cohort Study (MCS) is a multi-disciplinary research project following the lives of children and their families across the UK. We are only using information relating to the ~ 2,000 residents in Wales at ages 5, 7, 11, 14, and 17 years. At each of these ages, detailed information has also been collected on parental-reported information on demographic, social, and health factors, as well as diet and physical (in)-activity behaviours relating to the children and their families. Height and weight was measured using standard protocols [34]. In addition, at age 7 physical activity was measured objectively using accelerometers. These are designed and calibrated for use in research, and capture frequency, intensity, and duration of free-living activities [35]. MCS data have also been linked to health record data already in SAIL Databank.

Figure 2 – Data sources and measures.



How are we using spatial data to answer the research questions?

Using spatial datasets, and based on findings from the legislation, policy landscapes and literature reviews, we aim to identify BE features that are associated with childhood obesity. These include access to open space for physical activity [36], and access to food outlets [37]. We use open-source [38], reproducible, and standardised geospatial techniques to construct a harmonised set of metrics between Wales and Western Australia that characterise the BEs each child inhabits across their life course.

Child-centred BE measures are being developed or adapted from available data, including household-level walkability (ease of walking to a location, such as a school, within the local environment), garden size, blue-green space availability, access to services, and facilities, as well as fast food accessibility around the home and school.

Challenges

One challenge of the study is the longitudinal aspect. As geospatial data has become richer and more varied over time, the coverage and precision of the data could influence the resulting models. Available spatial data include Open Street Map to provide a comparable network and data on points of interest. These data are being validated with and supplemented by authoritative datasets, such as from the UK Ordnance Survey (OS), Welsh Government, and local authority data (and equivalent data for Western Australia):

- Open Street Map (OSM) started in 2006 as a source of open geographic data to combat the lack of access to licensed geographic datasets. OSM is volunteered geographic information from citizens around the world and is therefore useful to compare networks between and within countries. Although it is possible to obtain different time-points from the data, the coverage varies spatially and temporally, which is addressed in the models.
- The UK Ordnance Survey provides authoritative and current data on all features of the built environment in the UK. A unique linkage field enables comparison with health data.

- Other data sources are being used to attempt to fill any identified gaps in the data for validation purposes and to compare sources of information (such as data available from commercial sources).
- Finally, we are bringing these measures together to create Geographic Information Systems (GIS) models of the BE with open-source tools, so that they are reproducible, standardised, and ready for later meta-analysis and comparison between regions and time-points.

Statistical analysis

Features of the BE are being analysed in a multi-level modelling framework to quantify the strength of associations between the weight status of children and different BE characteristics, as well as the respective roles of physical activity, sedentary behaviour, and diet in this relationship. Harmonising both child and BE indicators across large-scale studies could enable us to identify impacts of the BE that are common across settings. It could also help us explore how contrasting physical, cultural, and policy environments may mediate those effects.

In Wales, geospatial data are stored, managed, and analysed using the Swansea University-hosted GIS UK-Secure e-Research Platform (GIS UK-SeRP) (see spatial data above). Data are processed for all domestic dwellings in Wales, and a Residential Anonymised Linking Field (RALF) [39] is generated for each unique address. The anonymised geospatial data are then imported into the SAIL Databank and subsequently linked to individual children within the study via their registered addresses using the RALF. The combined geospatial and individual health and demographic data are accessed and analysed within the SAIL Databank.

Why it matters

Developing a better understanding of how the BE drives overweight/obesity by either promoting or inhibiting modifiable risk factors could inform evidence-based planning, policy, and practice strategies to improve child health in future generations. Engaging stakeholders throughout the project could develop a better understanding about how the BE contributes to childhood obesity. It could also support policy evaluation, development, and implementation.

We have identified stakeholders and policymakers that can act in advisory roles. Our stakeholders include health service commissioners, government departments of planning, transport, and health, planning officials, urban planners, building industry developers, and key advocacy non-governmental organisations, such as the British Heart Foundation and Active Healthy Kids Wales, as well as third sector and voluntary agencies. We are engaging with stakeholders at key points throughout the project using appropriated frameworks (such as 'appreciative inquiry') [40] to inform our quantitative research findings and translate them into stakeholder engagement activities.

What next?

Our research findings will be disseminated through the project. The ultimate goal is to develop more effective planning policies and implementation strategies to improve health and life-course outcomes for current and future generations of children.

Funding

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Acknowledgments

This is a joint initiative between Swansea University, the Telethon Kids Institute, and the University of Western Australia, with collaborators from Curtin University, Monash University, Queensland University of Technology, and University of Southern Denmark. This work uses data provided by patients and collected by the NHS as part of their care and support. We also thank all the Millennium Cohort families for their participation, the director of the Millennium Cohort Study, and colleagues in the management team at the Centre for Longitudinal Studies, UCL Institute of Education. We would like to acknowledge all the data providers who enable SAIL to make anonymised data available for research.

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This research has been carried out as part of the ADR Wales programme of work, as part of the Skills and Employability thematic research area. The thematic research areas are aligned to the priority themes as identified in the Welsh Government's Programme for Government. ADR Wales brings together data science experts at Swansea University Medical School, staff from the Wales Institute of Social and Economic Research and Data (WISERD) at Cardiff University and specialist teams within the Welsh Government to develop new evidence which supports the Programme for Government by using the SAIL Databank at Swansea University, to link and analyse anonymised data. ADR Wales is part of the Economic and Social Research Council (part of UK Research and Innovation) funded ADR UK.

For further information please contact
Cathrine.E.Richards@Swansea.ac.uk

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