



Rising to the Triple Challenge of Brexit, COVID-19 and Climate Change for health, well-being and equity in Wales

Spotlight on: Rural Communities

Liz Green, Kathryn Ashton, Michael Fletcher, Adam T. Jones, Laura Evans,
Tracy Evans, Lee Parry-Williams, Sumina Azam, Mark A Bellis



GIG
CYMRU
NHS
WALES | Iechyd Cyhoeddus
Cymru
Public Health
Wales



World Health Organization
Collaborating Centre on Investment
for Health and Well-being

Contents:



Executive Summary	4
Overview of the Triple Challenge	8
1. What are rural communities	10
2. Why is rural health, well-being and equity important in Wales?	10
2.1 Policy Context	12
3. Health, well-being, and equity impact of the Triple Challenge on rural communities	18
3a Social and community factors	19
3b Economic Factors	24
3c Environmental Factors	33
4. Policy Responses to date, mitigation, and opportunities	38
5. Key findings	39
6. Potential opportunities to promote rural health in Wales	40
7. Conclusion	42
8. Appendices	43



Rural Communities, Health, Well-being and Equity in Wales

Executive Summary

The Triple Challenge describes the cumulative and individual impacts of Brexit, COVID-19 and Climate Change. These impacts are multifaceted, are not static and will affect Wales in the immediate and long term.

Summary of Findings:

1. There is no one definition of 'rural', 'rural communities' or 'rural health' in Wales.
2. There is a gap in existing evidence which shows rural health and well-being as the main focus. This is needed to support the development of rural health policies and programme development.
3. Rural communities are impacted by the Triple Challenge in a myriad of ways, some of which are the same for urban communities, but others are more specific to them. For example, housing age, availability, quality and affordability, transport and active travel infrastructure. Rural communities have older populations and high levels of agribusinesses. These factors need careful consideration when drafting national, regional and local policies and plans in order to reduce health and well-being inequities.
4. Further research is needed to understand the differences and particular challenges which rural communities will face post Brexit, continually during the COVID-19 pandemic and in the future as climate change continues to progress. There are currently a number of 'unknown unknowns' which will become much clearer as the field of research on rural communities progresses.
5. Rural environments and communities have become much more attractive to live and work in during the pandemic period, mainly due to the increased focus on home working that promotes a more flexible approach for workers and their families. This could have both positive and negative impacts, for example, it could enable some rural communities and their economies to thrive and facilitate an increase in sustainable services and facilities, but it could also lead to housing price increases that disadvantage those who currently live in, or were brought up, in an area or shortages of affordable housing for the local populations.
6. Digital infrastructure and accessibility are very important for rural communities, but there should also be a focus on enabling digital and social media use by increasing digital literacy, particularly in the elderly population.
7. Brexit could present an opportunity to drive inclusive sustainable development in the UK and Wales and to develop an innovative and transformative approach to the rural economy in future years.

Population Groups affected

The whole population who live within rural communities are affected. Vulnerable population groups particularly negatively or positively affected include:

- Those with pre-existing health conditions and needs
- Older people
- Critical workers
- Those on low incomes/unemployed
- Children and young people
- Local businesses
- Fishers, farmers, and agricultural sector workers
- Employees / workforces
- Those who wish to remain in, or return to, their community of origin

Potential Opportunities

There are a wide range of actions that policy and decision makers can take to enable health and well-being in relation to rural communities in Wales. These actions focus on the creation of context specific plans with links to local agencies, local foundational economies and ensuring that digital literacy is increased to support these developments (see Section 6).



Rising to the Triple Challenge of Brexit, COVID-19 and Climate Change for health, well-being and equity in Wales – Rural Communities



What is the Triple Challenge?

The cumulative and individual impacts of Brexit, COVID-19 and Climate Change on health, well-being and equity in Wales. These impacts are multifaceted, are not static and will affect Wales in the immediate and long term.

There is no one definition of 'rural', 'rural communities' or 'rural health' in Wales.

KEY STATISTICS

In 2019, 25.4% of residents in rural counties were aged 65+ (Woods et al, 2021).

35% of the Welsh population live in rural areas (Woods et al, 2021).

In 2018, agriculture accounted for 78% of land usage in Wales (Scott, 2021).



ACCESS TO SERVICES
93% of respondents to a survey of rural communities in Wales in 2013 said they did not have a hospital in their community. (Wales Rural Observatory, 2013).



EMPLOYMENT
28% of people in Welsh rural communities work in the agricultural industry (Farmers' Union of Wales and NFU Cymru, 2018).
Between 2010 – 2017 the proportion of farmers under the age of 45 in Wales was under 10% (Future Generations Commissioner for Wales, 2020).



TOURISM
In 2018, tourism supported an estimated 16% of total jobs in rural counties of Wales. (Statistics for Wales, 2020).



DIGITAL INFRASTRUCTURE
12% of premises in rural residential premises are unable to access decent broadband (OfCom, 2020).
81% of farmers in Wales have access to broadband internet (Bowen and Morris, 2019).



ACTIVE TRAVEL
59% of people in rural areas walked more than 10 minutes as a means of transport more than once a month, compared to 74% of people in urban areas (Welsh Government, 2020).



LOCAL BUILT AND NATURAL ENVIRONMENT
The rural counties of Wales generate 45.5% of onshore renewable energy electrical output produced in Wales (Woods et al, 2021).

Rural Population Groups affected by the Triple Challenge



Those with Pre-existing Health Conditions and Needs



Older People



Critical Workers



Those on Low Incomes/ Unemployed



Children and Young People



Local Businesses



Fishers, Farmers and Agricultural Sector Workers



Employees



Potential actions for policy and decision-makers

- Development of a specific policy framework for rural Wales, covering the wider determinants of health, well-being and the Triple Challenge.
- Ensure future planning takes into consideration the interconnection between urban and rural communities.
- Increased focus on mental well-being and developing solutions to support rural populations.
- Explore and consider ways to reduce climate change effects to enhance rural communities.
- Local authorities to use existing Welsh Government policies as a platform to enable digital literacy, inclusivity and digital infrastructure.
- Create or enhance local rural communities in Wales, building on the changes witnessed during the COVID-19 pandemic.
- Involve key urban and rural stakeholders in identifying critical land use and infrastructure needs to support and strengthen food systems.
- Establish a Commission on Rurality as a driver of future policy and research activities.
- Collaborative working between local authority and other sectors, with the use of place-based approaches that involve local individuals.
- Prioritisation of a policy framework for post-Brexit Rural Development Funding.

Overview of the Triple Challenge

The global Coronavirus SARS-CoV-2 (COVID-19) pandemic has revealed the complex, interwoven relationships between health, well-being, inequalities, the economy, the environment, and society as a whole (Dyakova et al., 2021). In doing so, it has created new inequalities, but also exacerbated existing health inequalities. Threats such as the United Kingdom's (UK) withdrawal from the European Union (EU) ('Brexit') and climate change are also having a cumulative impact on the Welsh population's health and well-being.

The UK's recovery from the pandemic needs to consider, and interact seamlessly, with the UK's exit from the EU. It must also consider how to develop national and local resilience and provide support to many vulnerable industries and communities that are facing the increasing challenge of climate change and extreme weather events. Wales as a nation has to grapple with the multifaceted and evolutionary nature of Brexit, COVID-19 and climate change not only in isolation, but also as a cumulative whole. This is further complicated by the fact that these are not static events and will ebb and flow over the short, medium and long term. In short, Wales and the UK are facing an unprecedented 'Triple Challenge' that must be tackled in a coordinated fashion – one which considers the future of the planet and its population and identifies solutions to the well-being and economic challenges which Brexit and COVID-19 have brought sharply into focus.

In 2019, the Wales Health Impact Assessment Support Unit (WHIASU), World Health Organization Collaborating Centre (WHO CC) on Investment for Health and Well-being at Public Health Wales published a Health Impact Assessment (HIA) on the public health implications of Brexit to better understand the wider health and equity implications for Wales (Green et al., 2019). HIA is a systematic and flexible evidence based process that identifies the positive and negative impacts of policies, plans and events such as Brexit on the health and well-being of a population. It also identifies opportunities for health gain and unintended negative impacts that require mitigation. It is equity focused and as part of the process highlights the distinct impacts for particularly affected vulnerable population groups for example, children or those on low incomes (WHIASU, 2012).

Using the same multi-focal lens that covers immediate, medium and long-term perspectives the HIA approach was also applied to understand aspects of the COVID-19 pandemic for example, the 'Staying at Home and Social Distancing Policy' (commonly referred to as 'lockdown'); home and agile working (Green et al., 2020; Green et al., 2020a); and housing security (Woodfine et al., 2021). Furthermore, a HIA is currently underway which assesses the health and well-being impacts of climate change in Wales (Green et al., 2021a). The work to date has already demonstrated many commonalities and synergies in these three challenges in impact across health inequalities, and the wider determinants of health.

Triple Challenge Spotlight Papers:

As one of a series including a Strategic overview paper of the Triple Challenge, and a Spotlight Paper which focuses on the effect of the Triple Challenge on Food Security (Green et al., 2021a Green et al., 2021b) this Spotlight Paper focuses on rural communities' health and well-being in the context of the Triple Challenge in Wales.

The reports aim to provide a strategic overview of the complex interactions between Brexit, COVID-19 and climate change (hereafter referred to as the 'Triple Challenge') and key determinants of health, well-being and equity. Using a range of evidence, each paper aims to support strategic and organisational stakeholders to better understand the Triple Challenge facing Wales and its population both now, and in the future. It provides decision and policy makers, organisations and communities with options on how to address these impacts, suggestions about how these impacts could be addressed and identifies the potential actions that they can take.

Aim:

- Enable a better understanding of the potential positive health, well-being and equity impacts or opportunities and negative impacts of the Triple Challenge on rural communities.
- Provide an overview of the rural population groups in Wales who will be primarily affected by the Triple Challenge.
- Analyse the current and future Welsh, UK and international policy context, including consideration of policy levers.
- Articulate potential actions for the future for a wide range of stakeholders to consider and implement including mitigation for any negative or unintended negative impacts and how to maximise opportunities.

Methodology:

Building on evidence and findings from the previous HIAs carried out, rapid evidence searches of both the academic and grey literature were carried out, alongside a policy synthesis of both the policy context and policy response. In addition, interviews and focus groups have also been undertaken with key stakeholders within Wales. More information on the search methodology used and stakeholders can be found in Annex A.

Audience:

This paper aims to support policy and decision makers across a wide range of sectors and settings including public health and health care services and systems, environment and sustainable development, spatial planning and strategic organisational stakeholders including public bodies and the third sector.

Acknowledgements:

The authors would like to thank all those who provided their time, knowledge, evidence and expertise in the development of this report

1 WHAT ARE RURAL COMMUNITIES?

Box 1: Definition of a rural community

It is widely recognised there is no single definition of 'rural Wales' (Woods et al., 2021; Williams and Doyle, 2016; Welsh Government, 2014; Welsh Government, 2008).

At a local authority level, there are nine authorities in Wales that are classed as 'rural': Anglesey, Gwynedd, Conwy, Denbighshire, Powys, Ceredigion, Pembrokeshire, Carmarthenshire and Monmouthshire (Woods et al., 2021; Welsh Government, 2008).

According to population estimates at mid-year 2019, 32% of the Welsh population lived in these nine local authorities (Office for National Statistics, 2020), which make up 82% of the land area of Wales (Woods et al., 2021).

At a more local level, the Office for National Statistics classes settlements with a population under 10,000 people as rural (Woods et al., 2021; Office for National Statistics, 2016) with 40% of the Welsh population living in these areas (Welsh Government, 2021). The existence of several definitions highlights the complexities when investigating population health and well-being impacts on rural communities.

2 WHY IS RURAL HEALTH, WELL-BEING AND EQUITY IMPORTANT IN WALES?

Box 2: Key statistics

In 2019, 25.4 per cent of residents in rural counties were aged 65 or over, an increase from 19.6 per cent in 2000. In comparison, 18.9% of residents in urban counties were aged 65 or over in 2019 (Woods et al., 2021).

In total, 4.1% of employment in Wales is in the agricultural sector (National Assembly for Wales, 2017). Up to 28% of people in Welsh rural communities work in the agricultural industry (Farmers' Union of Wales, 2018).

In 2019, the agriculture, forestry and fishing industries made up 1% of all industries in Wales, contributing a total of £660 million to the economy (Statistics for Wales, 2021).

It is estimated that EU subsidies make up 80% of farm income in Wales. With Wales having the lowest percentage share of Common Agricultural Policy (CAP) Pillar 1 payments in the UK with 8.96% (€2,245 million), with Northern Ireland receiving 9.2%, Scotland 16.3% and the remaining 65.5% being received by England. Although Pillar 2 payments are smaller than Pillar 1, Wales still receives €355 million of the €2.6 billion that the UK receives from the EU (Green et al., 2019b).

Previous work carried out by Public Health Wales has highlighted that the health and well-being impact of COVID-19 and Brexit experienced by those living in rural communities can be different to those living in urban communities (Green et al., 2019; Green et al., 2020). With a significant amount of people in Wales living within rural communities there is a need for greater understanding of these differences and of the experiences of those in rural communities.

Of the 26 small areas of deep-rooted deprivation identified in Wales (areas that have remained in the top 50 most deprived for all Welsh Index of Multiple Deprivation (WIMD) iterations in the past 15 years), 15% are considered rural areas (Welsh Government, 2019). Although rural communities tend to be less deprived than urban communities, there is a significant amount of deprivation in rural communities, and there is a tendency for individuals in these areas to be more geographically spread out compared to urban communities (Welsh Government, 2014). As a result, it is possible those experiencing deprivation within rural areas are less visible than in urban areas where pockets of deprivation may be easier to identify. In addition, different issues associated with deprivation can affect people in rural and urban areas, for example, the former can be disproportionately impacted by access to services (Welsh Government, 2014) compared to the latter. Whilst overall health outcomes are better in rural areas compared to urban, there is recognition that the way in which health and well-being is measured could mean pockets of poor health and significant deprivation in rural populations could be concealed (Local Government Association, 2017). Rural poverty has also been highlighted as an issue relevant to Wales, due to its relatively large rural mass, along with levels of poverty that are higher than the UK average (Williams and Doyle, 2016).

There are several factors associated with living in rural environments which impact on health and well-being and can lead to poorer health and inequalities (Welsh Government, 2016a). Studies have explored the differences in health between rural and urban populations (Smith et al., 2008; Strasser, 2003; Watt et al., 1994) but it has been noted there is a scarcity of rural-urban epidemiological evidence which can support rural health policy and programme development and implementation (Smith et al., 2008).

Several risks and challenges to health in rural communities have been identified, associated with factors such as changing population patterns, infrastructure, digital access and exclusion, air quality, access to health and related services, transport, community support, isolation and social exclusion, housing and fuel poverty, and employment and under-employment (Welsh Government, 2021; Woods et al., 2021; OECD, 2020; Royal College of Nursing, 2020; Local Government Association, 2017; Welsh Parliament, 2008). Rurality impacts service provision and access but less is known about the role it may play in exacerbating the impact on other health determinants and poorer health status (Smith et al., 2008). For example, there is evidence of higher levels of Limiting Long Term Illness in less accessible rural areas compared to those rural areas that are more accessible (Barnett et al., 2001). Greater understanding of the determinants of health of rural communities is needed (Riva et al., 2009). This will assist in identifying mitigations to protect and improve health and well-being, and to reduce inequalities.

2.1 POLICY CONTEXT

International

Much of the international policy context in relation to rurality focuses on rural development, particularly in the low- and middle-income countries. In relation to high-income countries, a greater focus is seen on urban health and geographies. For instance, WHO Europe has an 'urban health' topic area, but no equivalent topic for rural regions. Its last policy document on rural poverty and health systems (WHO Europe, 2010) focused on health systems in rural areas, largely in Eastern European countries, exploring equitable access to services, workforce and health service financing.

The Food and Agriculture Organization of the United Nations (FAO) has a focus on reducing rural poverty, though this is focused predominantly on low to middle income countries due to the fact that 95% of the rural poor live in East Asia, South Asia and sub-Saharan Africa (FAO, 2021a).

Within the European Union, the European Commission (2021a) outlines three long-term policy objectives for rural development in the European Union:

- the competitiveness of agriculture and forestry;
- climate action and the sustainable management of natural resources;
- '*achieving a balanced territorial development of rural economies and communities*', which includes the creation and maintenance of employment.

Rural development programmes in the EU must work towards four of the six priorities of the European Agricultural Fund for Rural Development (EAFRD). These six priorities are as follows:

- fostering knowledge transfer and innovation in agriculture, forestry and rural areas;
- enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management;
- promoting food chain organisation, animal welfare and risk management in agriculture;
- promoting resource efficiency and supporting the shift toward a low-carbon and climate resilient economy in the agriculture, food and forestry sectors;
- restoring, preserving and enhancing ecosystems related to agriculture and forestry;
- promoting social inclusion, poverty reduction and economic development in rural areas.

In both the long-term objectives and these policy areas, there is an interconnectivity between climate change and rural policy. The EU also has a programme of work to better link urban and rural areas, focusing on land use and planning, the provision of services and management of natural resources (European Commission, 2021b).

United Kingdom

A Commission for Rural Communities was established by the former Labour government in 2005 to promote awareness of rural needs and address rural disadvantage, however this Commission was abolished in 2013 (UK Government, 2013). Its final annual report highlighted work conducted on barriers to employment, education and training for young people in rural areas, rural housing, and older people's social isolation in rural areas (Commission for Rural Communities, 2013).

Regions of England have begun to explore the challenges of rural life. For example, the North Yorkshire Rural Commission published its final report and recommendations for action in July 2021. The Commission explored seven key themes, including the rural economy, energy, digital connectivity, education and training and transport. Recommendations from the Commission include recognising the area as having a leading role in green employment, calls for investment in rural electricity infrastructure, and viewing digital connectivity as something to be considered a human right (North Yorkshire Rural Commission, 2021).

Broadband infrastructure and telecommunications

As noted in the Welsh policy context section below, powers over broadband infrastructure are largely reserved to the UK Government. Recent policy actions in this arena related to rural Wales include the previous UK Government choosing Monmouthshire as one of three areas in the UK to participate in the 5G Rural Integrated Testbed (5GRIT) – this aims to trial 5G technology for rural uses, such as smart agriculture (Select Committee on the Rural Economy, 2019).



Welsh Policy Context

Agriculture and Environment

One of the key areas of debate prior to and since the UK's exit from the European Union (EU) has been over the future of agricultural policy in the UK, and what powers the devolved administrations will retain, receive, or even lose. Clearly, agricultural policies are a particularly pronounced area of concern for rural Wales.

An Agriculture (Wales) Bill was introduced and consulted on near the end of the fifth Senedd term (Welsh Government, 2021b). This consultation sought opinions on a legislative framework to support Welsh agriculture, notably on proposals for:

- future support for agriculture
- regulatory reform
- future support for industry and the supply chain
- forestry and woodland management
- improving animal health and welfare
- improving monitoring through the effective use of data and remote technology.

A consequence of Brexit for those working in food producing agricultural businesses has been an increase in bureaucracy, such as the need for Export Health Certificates and some goods being banned from sale to the EU (Welsh Government, 2021l). The loss of specific EU funding streams is a key concern, with little detail thus far confirmed about UK-wide replacement structural funding. Welsh Government have highlighted how the UK Government's spending review showed rural development funding for 2021-22 as *'£137m less than the £337m that had been expected'* (Welsh Government, 2021l).

Concerns over the impact of climate change on the rural economy are a feature of Welsh Government's *'Prosperity for All: Climate Conscious Wales'* (Welsh Government, 2019a). This policy paper considers a range of actions needed to make adaptations to preserve the rural economy, such as the need to maintain, enhance, and restore flood plains to reduce flood risk and enable farmers to work sustainably, along with specific lists of sub-actions, stakeholders and delivery partners and outlines potential outcomes for addressing the specific climate risks. The updated Programme of Government highlights Welsh Government's ambitions with respect to the environment and climate change which include pursuing more devolutionary powers in order to assist reaching net zero in Wales and working towards the establishment of an Environmental Governance Body (Welsh Government 2021).



Fisheries

The UK's exit from the EU has involved extensive negotiations over the future of fishing arrangements between the two parties, with debates around access to waters and quota distribution (Institute for Government, 2020) and the 'adjustment period' for the new fisheries arrangements is due to end in June 2026 (Welsh Government, 2021l).

In 2019, Welsh Government launched a consultation to invite views on a future fisheries policy for Wales. The consultation responses were considered in 2020, whilst negotiations were ongoing between the UK and EU, but it was stated that any future Welsh fisheries policy would be 'rooted in our core values of economic, environmental and social justice.' It was also anticipated that the UK Fisheries Bill would give greater powers to Welsh Government for developing future policy (Welsh Government, 2020d; Welsh Government, 2020b).

Food Production

There is a clear link in policy documents between food production which is a key area of employment in rural Welsh communities, climate change and the impact of food on public health. This is observed in policy documents such as 'Food for Wales, Food from Wales 2010-2020' (Welsh Assembly Government, 2010) and Towards Sustainable Growth: An Action Plan for the Food and Drink Industry 2014-2020 (Welsh Government, 2014). However, these have not been revised or updated to date but the updated Programme of Government in December 2021 outlines an ambition to develop a Wales Community Food Strategy to encourage the production and supply of locally-sourced food in Wales (Welsh Government, 2021).

Flooding

Welsh Government's national strategy for the next ten years in respect to flooding (Welsh Government, 2020c) was published in October 2020, and aims to increase understanding of the risks of flooding and coastal erosion, increase resilience, focus investment at the most at-risk communities and develop effective responses to flooding events. The strategy also acknowledges the challenge of climate change increasing the risk of flooding. The Climate Change Risk Assessment (CCRA) for the United Kingdom published in June 2021 included a specific chapter on Wales that highlighted exposure to flooding (Netherwood, 2021).

Broadband Infrastructure and Telecommunications

Under the current devolution settlement, telecommunications infrastructure and regulation remains a reserved power to the UK Government. However there are some distinctions when interacting with devolved powers, for instance, planning and building regulations, as a devolved responsibility, mean that Wales could reject planning permission for the installation of telecoms infrastructure (Hutton, 2021). Digital enablement is a theme in the national planning framework for Wales 'Future Wales' (Welsh Government, 2021).

The Welsh Government has the ability to introduce policies aimed at increasing connectivity. Increasing broadband connectivity has been a keen focus of Welsh Government policy action in recent years, with a fund for local broadband connectivity introduced in 2020 in a desire to increase access to fast and reliable internet (Welsh Government, 2021g).

Business and Economy

Rurality appears not be made explicit in many key strategies even though the economic contribution of 16.6% Gross Value Added (GVA) is derived from diverse rural activities such as agriculture, tourism, agri-tech, energy generation, digital and creative industry and manufacturing (Cowie et al., 2018). However, there have been policies aimed at further rural development.

A Rural Development Programme for 2014-2020 was funded through the European Agricultural Fund for Rural Development (Welsh Government, 2019b). This programme was designed to *'promote competitiveness and create sustainable growth and jobs for the people who live and work in rural Wales'*, focusing on initiatives to *'drive economic growth, support the sustainability of rural communities and help tackle poverty'* (Welsh Government, 2019b). This Programme was reliant on European funding, and whilst this funding remains available at present for a range of businesses and community projects, it remains to be seen what any post-Brexit equivalent to this investment will look like, or what aims and objectives future rural development initiatives will have.

Grants from the Rural Development Programme are currently available for specific sectors, such as the food and drink industry (Welsh Government, 2021h), timber businesses (Welsh Government, 2021m), farming (Welsh Government, 2021d) and non-agricultural sectors (Welsh Government, 2021i). The recently updated Programme for Government Build on our approach to the Foundational Economy and develop a Backing Local Firms Fund to support local businesses but it does not specify rural communities within it (Welsh Government, 2021).

Health Services

How and where health services are delivered in rural Wales is critical. The Parliamentary Review on Health and Social Care in Wales (Welsh Government, 2018) noted that the recruitment of health and social care workforces in rural areas is challenging and that a strategy should be developed to enhance access to good quality care for rural communities which focussed on specific training in rural settings, utilising new ways of working and using the latest digital technologies. In 2019, in written evidence to the Select Committee on the Rural Economy in the House of Lords, Community Pharmacy Wales called for greater use to be made of community pharmacies to deliver healthcare needs for rural communities, reflecting on a successful pilot delivered in Llanidloes, where patients are able to be treated within a pharmacy (Select Committee on the Rural Economy, 2019).

Transport

In relation to rail, most powers regarding rail infrastructure are non-devolved, with the exception of the urban Valley Lines. Thus, any future policies to improve or increase rail infrastructure in rural Wales will be a UK Government responsibility. The updated Programme of Government (Welsh Government, 2021) commits to the development of Regional Transport Plans which will consider rurality and rural connectivity. In terms of roads, the Welsh Government has suspended building any more new roads in Wales at present due to potential impacts on the environment (Welsh Government, 2021).

Housing and Household Energy

Welsh Government's recent plan to tackle food poverty (Welsh Government, 2021k) commits to a consultation on how best to provide financial support to householders living in rural areas of Wales. It is acknowledged in a 2016 Welsh Government report that emergent technologies to reduce fuel poverty in rural areas that are 'off-grid' will lead to pilot schemes (Welsh Government, 2016b).

A pilot for in-home energy advice to reduce fuel poverty was launched in 2020, which targeted both urban and rural areas, and those on and off-grid; from a rural perspective, Ceredigion and Gwynedd were chosen as they were recognised as having 'high estimated levels of fuel poverty' (Welsh Government, 2020a). An optimised retrofit programme was launched in November 2020, which is designed to test how best to upgrade homes in Wales, including trialling different approaches to decarbonisation (Welsh Government, 2020e).



3 HEALTH, WELL-BEING, AND EQUITY IMPACT OF THE TRIPLE CHALLENGE ON RURAL COMMUNITIES

Evidence identified in the Brexit, COVID-19 and climate change HIAs and their analysis identified that rural communities in Wales have been and could be majorly impacted by the Triple Challenge. This paper discusses the potential (and where observed actual) direct, major, cumulative impacts (positive, negative and opportunities) of the Triple Challenge on rural communities across a range of determinants and vulnerable population groups.

Evidence has indicated the impacts of the Triple Challenge across a range of key determinants (Figure 1) and population groups (Box 3).

This section provides an understanding of the individual and cumulative direct health and well-being impacts and the groups potentially affected.

Figure 1: Summary of key determinants and pathways



Box 3: Population groups affected

- All those who live in rural communities
- Those with pre-existing health conditions and needs
- Older people
- Critical workers
- Those on low incomes/unemployed
- Children and young people
- Local businesses
- Fishers, farmers, and agricultural sector workers
- Employees / workforces
- Those who wish to remain in, or return to, their community of origin

3A SOCIAL AND COMMUNITY FACTORS

Access to health and social care services

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
✓	✓	✓	✓	✓	✓
Population Groups affected: <ul style="list-style-type: none"> • All those who live in rural communities • Those with pre-existing health conditions and needs • Older people • Critical workers 					

Healthcare provision in rural Wales is influenced not only by financial planning and clinical priorities, but also by challenges posed to recruiting and retaining appropriate personnel (Woods et al., 2021). For access to major services, such as specialist hospital facilities, residents must travel to cities in Wales, or larger urban centres across the English border (Bauchinger et al., 2021).

Positive impacts

The COVID-19 pandemic and EU exit could help to accelerate a responsive roll out of new models of healthcare working, such as digitalisation and artificial intelligence (McNamee, 2020). The most benefits could be reaped by rural communities including those who are older, have chronic conditions or are on low incomes because this may result in individuals not have to travel to appointments (Cowie et al., 2018).

Adapting to climate change and meeting ambitious Welsh Government goals for decarbonisation could further accelerate any changes as part of a drive to meet the NHS Wales Decarbonisation strategic delivery plan (Welsh Government, 2021n). These changes could make services more accessible for some population groups but could also potentially have some negative impacts for others for example, those who are digitally excluded.

Negative impacts

The COVID-19 pandemic regulations, including lockdowns, have affected the populations' ability and confidence to travel to access health and social care services (Mencap, 2020; Age UK, 2020). Rural communities are particularly vulnerable to the Triple Challenge in relation to accessing services in Wales. By its very geographical and topographical nature, it can make attending health and social care appointments challenging for those who do not own or have ready access to a car, or who cannot drive for a range of reasons (Baird and Wright, 2006; Focus Group 1; Focus Group 2). It takes considerably more time for those in rural communities to access services due to travel distances or the nature of the transport infrastructure, which can deter some patients from utilising health services as frequently as those living in urban communities, resulting in delayed diagnosis and treatment (Welsh NHS Confederation, 2018b, Focus Group 1). There are increased costs in providing health services in rural communities as it is more difficult to achieve economies of scale, and more staff are needed per head of the population to deliver health and care services (Welsh NHS Confederation, 2018a).

NHS providers in rural communities were identified as more likely to have experienced exacerbated workforce issues and poorer financial situations during the pandemic (Palmer and Rolewicz, 2020; Woods et al., 2021). The COVID-19 pandemic has also had a greater detrimental effect on hospital waiting times in rural and remote trusts across the UK than for more urban areas (Palmer and Rolewicz, 2020). Rural communities are more likely to have an ageing population, which can have a major impact on rural health services if there is a rapid increase in COVID-19 confirmed cases and hospitalisations (Phillipson et al., 2020).

The UK withdrawal from the EU was also identified as having a negative impact on workforce levels within the NHS in Wales, with difficulty recruiting workers predicted for the foreseeable future. This could have a disproportionate impact on smaller healthcare practices and health facilities in more rural communities (Woods and Rahman, 2019). The end of freedom of movement due to Brexit regulations and the introduction of a new UK immigration system could potentially present challenges for workforce recruitment in some sectors of the economy of rural Wales and add to existing pressures for example, workforce retention. The health and social care workforces are majorly affected, with European Economic Area (EEA) nationals making up 7% of doctors in Wales and 2.4% of employees in social care. Obstacles to future recruitment from the EEA may produce shortages in certain areas and this could have the greatest impact on smaller practices and institutions in more rural locations (Woods et al., 2021).

Those living in rural communities are more vulnerable to the impacts of climate change on transport links, for example, through flooding or heat, which could cause difficulty accessing health and social care services during extreme weather events (UK Government, 2017). This can have an impact not only on patients accessing services, but also those working within the health and care sectors.

Access to digital and communications services

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
✓	✓	✓	✓	✓	✓
Population Groups affected: <ul style="list-style-type: none"> • All those who live in rural communities • Those on low income/unemployed • Children and young people • Local businesses 					

Digital connectivity and supporting infrastructure is a key factor as an emerging tool for promoting health and well-being (Davies et al., 2019). The COVID-19 pandemic responses, including guidance to stay at home and work from home if possible, has highlighted the crucial need for fast, accessible, affordable telecommunications in all households in Wales. Broadband connectivity - previously seen as a luxury or an inessential utility – has become a major determinant of health and well-being, with households dependent on fast, reliable internet connection to provide education, entertainment, facilitate work and order supplies and food. However, digital accessibility is not always available, stable or high speed in some rural communities in Wales (Honeyman et al., 2020).

Positive impacts

Welsh agribusinesses could seek support from the Welsh Government to develop their ICT skills and develop a more proactive attitude towards digital technologies and their business (Bowen and Morris, 2019). It has been highlighted that it is important for rural communities to have a level playing field with urban areas in relation to digital connectivity (Bowen and Morris, 2019). At present, the infrastructure in some rural areas is lagging behind others, particularly urban areas, and these areas could benefit from a boost to digital skills and broadband in order to be able to diversify and develop innovatively (Bowen and Morris, 2019).

Additionally, although there is limited literature in the area, social media for agribusinesses could provide opportunities, as it increases exposure for these businesses. In 2019, it was reported that only 24.8% of farmers in Wales use social media, with a clear difference in age with the younger generation of farmers being more open to using it (Bowen and Morris, 2019).

Negative impacts

In the Wales National Plan 2040, more urban areas such as South Wales are noted as having 94% or more super or ultrafast broadband with more rural areas like Powys and Ceredigion having 81% or less (Welsh Government, 2021). Using Ceredigion as an example rural constituency, the majority of its areas are in the worst 10% of all areas in the UK for connectivity with, on average, 13.2% of its areas unable to receive adequate broadband speeds compared to a UK average of 2%. In relation to broadband, there is a significant rural divide when it comes to coverage with more rural countries such as Scotland and Wales lacking 4G service coverage in 18% and 8% respectively of their geographical area compared to only 2% in England.

In 2019, Ofcom (Ofcom, 2020) reported that 3% of premises (50,000 premises) in Wales were unable to receive adequate broadband from a fixed line, of which the majority (42,000 business and residential premises) were located in rural communities.

The COVID-19 pandemic has resulted in an increasing shift from 'out-of-home' to 'in-home' lifestyles and more physically and socially isolated living (Phillipson et al., 2020). This effect is exacerbated for those in rural communities who are less able to maintain social contact online whilst social distancing and shielding (Focus Group 1, Focus Group 2). These impacts are potentially acute for those already suffering from rural vulnerability, loneliness and social isolation (Phillipson et al., 2020). Small numbers of children and young people were confined to small, dispersed communities with few, or even no, similar age young residents, and some were less able to share, discuss and reduce their anxieties with peers about impending examinations, transfers to higher-level schools and colleges or the wider community impacts of the pandemic (Phillipson et al., 2020). For the wider rural population, any increase in home schooling and working from home has not only highlighted issues around poor mobile phone and digital access but increased the expectation of good quality service and access for rural or island communities (Milne, 2021). Furthermore, any system weakness was also exposed by concurrent demands for limited available bandwidth (data transfer capacity) among multiple household members (Phillipson et al., 2020).

Whilst digital connectivity can be an enabler for many to remain in their community of origin during the pandemic to access work and services, a major barrier to remaining in communities of origin, diversification and growth is the equitable access to digital infrastructure and technology, due to issues with broadband and digital speeds. The coverage, strength and reliability of internet connections and mobile phone signals has directly impacted on the ability of some rural residents to work effectively from home and to access online services during the COVID-19 pandemic (Woods et al., 2021).

Brexit, which has led to reduced access to funding such as the CAP and EU Structural Funds, has emerged as having a potentially negative impact on rural businesses and particularly agribusinesses in the UK. As such, there is an urgency that farmers and food producers engage with digital communication business methods to develop new, more innovative activities, seek new opportunities and to connect to new markets (Bowen and Morris, 2019). In 2019, only 81% of farmers had access to the internet (Bowen and

Morris, 2019). The lack of available technology or a lack of digital skills could act as a barrier to the development of entrepreneurial activities for farmers. The majority of farmers can be considered to be 'digitally disengaged' as the majority lack the necessary skills and do not use digital technologies to develop online sales (Bowen and Morris, 2019).

In respect to climate change, extreme weather conditions and events involving wind and lightning are a risk for disruption to overhead energy lines and digital networks that are delivered in rural areas (UK Government, 2017). Electricity transmission and distribution networks are likely to experience an increase of between 4-36% (depending on the climate scenario) in lightning-related faults by the 2080s (UK Government, 2017; Environment Agency, 2018). However, the impact of these events could be minimal and short term, as damage can be quickly repaired (UK Government, 2017).

Movement of people and migration

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
✓	✓	✓	✓	✓	✓

Population Groups affected:

- All those who live in rural communities
- Those who wish to remain in, or return to, their community of origin

Positive impacts

Brexit and the COVID-19 pandemic have resulted in some positive impacts on the movement of people and migration. Evidence suggests the move towards telecommuting and homeworking, due to COVID-19 restrictions, rather than physically commuting could lead to Wales capitalising on skilled workers moving from more urban communities to rural communities (Moeckel, 2017; Phillipson et al., 2020). For example, more affluent households may be drawn to larger houses with private gardens and accessible blue and green space in rural communities rather than smaller, more expensive homes in towns and cities (Royal Town Planning Institute, 2020a). This could have implications for the Welsh housing sector but it could also enable second homes in Wales to shift to becoming primary residences that could facilitate local community diversification, regeneration or economic, social and sustainable growth (Green et al., 2020a).

Although there is evidence which suggests Brexit could have negative implications on recruitment, sources indicate that the impact of this may be offset by increased recruitment from outside the European Economic Area (EEA), with health boards in rural Wales regularly running recruitment campaigns in countries such as New Zealand (Woods and Rahman, 2019).

Negative impacts

As suggested above, it is possible that COVID-19 will make rural communities more attractive for the future (Focus Group 2). However, this raises questions about trends to centralise health care and other services that could leave individuals living remotely with poorer access to health care (Phillipson et al., 2020). In addition, the dispersal of households from denser locations to more rural ones could undermine efforts for urban regeneration, while increasing the costs of providing social and utility infrastructure (Royal Town Planning Institute, 2020b).

Climate change can result in rural to urban migration (Adger et al., 2014; Focus Group 1) as weather dependent livelihoods, such as agriculture and forestry, diminish, forcing individuals to move to other income generating activities (Vos, 2015). This can result in overcrowding in urban destinations (Castells-Quintana, 2015).

With regards to Brexit, rural businesses depend on migrant workers for agribusiness, tourism, food production and health and social care. There is a fear that some of these businesses may be forced to close, in rural communities where migrants are very active socially and economically (Neal et al., 2021).

3B ECONOMIC FACTORS

Employment

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
✓	✓	✓	✓	✓	✓

Population Groups affected:

- All those who live in rural communities
- Those who wish to remain in, or return to, their community of origin
- Farmers
- Fishers
- Employees



Positive impacts

The restrictions associated with the COVID-19 pandemic has resulted in some individuals having to work from home where possible. Positively, homeworking has opened up employment opportunities, with technology being a solution in bridging geographic inequality in the UK, as people are now able to work from anywhere (O2, 2020). This particularly benefits, and could lead to the invigoration of, rural communities and economies, as employees have the opportunity to work further from their traditional place of work, and even move outside of the traditional commuter belts (Green et al., 2020; Focus Group 2). It provides the opportunity of employment for young people and young adults who want to remain in, or return to, rural communities (O2, 2020). For Wales, this could have potential positive implications for the Welsh language (Green et al., 2020a).

Evidence suggests Brexit also has the potential to offer benefits to those working in the rural agriculture sector. For example, freedom from the CAP and new opportunities for Welsh land management policy and environmental protections (Green et al., 2019a). In addition, pressures on rural employment can be reduced as a result of initiatives such as Climate-Smart Agriculture which is an integrated way to managing landscapes that addresses the interlinked challenges of food security and accelerating climate change (FAO, 2021b) to tackle climate change. The latter includes land redistribution and can increase economic growth, generate positive effects on rural employment, both on and off farm and reduce inequality and poverty (Rampa et al., 2020).

Negative impacts

Rural communities in Wales have a higher than national average level of self-employment than the remainder of Wales, and higher levels of part-time employment (Woods and Rahman, 2019). With the economic stresses that will come from the COVID-19 pandemic, Brexit and climate change, there is increased economic insecurity and job anxiety, particularly for those in precarious employment or running their own business, which can impact negatively on mental health and well-being (Woods and Rahman, 2019).

There is evidence to suggest that during the COVID-19 pandemic, farmers have found it harder to recruit and retain employees (National Federation of Young Farmers, 2020). There has been a major negative impact of the COVID-19 pandemic and Brexit on the seasonal migrant workforce (Green et al., 2019a; Mitaritonna and Ragot, 2020) mainly due to migration regulation and visa changes and quarantine.

Climate change can also have a negative impact on rural farmers and fishers with farmers at higher risk of developing depression, anxiety and other mental health related problems, including suicide due to drought related pressures and climate variability and their potential impact on economic livelihood (Smith et al., 2015; Yazd et al., 2019). This in turn can have an impact on employment in rural communities (Dasgupta et al., 2014). Fishers are increasingly reporting fluctuations in the duration and timing of rainfall, which is having an impact on fish populations and their catch. Additionally, coastal erosion, rising sea levels and frequency of flooding makes fishing more challenging, impacting on the livelihoods of fishers and their employees (Savo et al., 2018). Their employment can lead to them being at higher risk when coupled with the additional stress of increased financial pressures to upgrade equipment and fuel costs due to difficult conditions as a result of climate change (Savo et al., 2018).

Although European Union (EU) nationals currently working in rural Wales would be entitled to stay and work under the terms of the Withdrawal Agreement, future recruitment from the EU could be challenging (Woods and Rahman, 2019). Evidence suggests that this will particularly affect the agricultural, health and hospitality sectors, with a disproportionate impact on facilities and services in more rural communities (Woods and Rahman, 2019). EEA nationals make up 7% of doctors in Wales and 2.4% of employees in social care and the majority of EU workers earn well below the earnings threshold in new UK immigration legislation (Woods et al., 2021).

There are also concerns regarding mental health and well-being in the farming sector. Evidence indicates Brexit could exacerbate this issue through recruitment challenges, decreased opportunities to export goods and a historic dependency on EU funding (Woods and Rahman, 2019; Davies et al., 2019; Hughes and Hughes, 2020; Green et al., 2019a). It has been estimated that EU subsidies previously made up about 80% of farm income in Wales (House of Lords, 2017).

Tourism and hospitality

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
✓	✓		✓	✓	✓
<p>Population Groups affected:</p> <ul style="list-style-type: none"> • All those who live in rural communities • Young people • Farmers • Local businesses • National Parks in Wales 					

Positive impacts

In rural areas it was estimated that tourism supported 76,109 Full Time Equivalent (FTE) jobs in rural counties of Wales in 2018, or approximately 16% of total jobs (Statistics for Wales, 2020).

Evidence indicates the COVID-19 pandemic has had a moderate positive impact on tourism in Wales, particularly in rural settings, with more people visiting Wales when unable to travel outside of the UK for holidays (Green et al., 2020). Visitors particularly targeted countryside, mountain and rural coastal destinations, with Snowdonia, Pembrokeshire and Mid Wales the most popular areas including their national parks (Woods et al., 2021).

In parallel, as a result of Brexit, evidence indicates tourism may see a growth from both the UK domestic and overseas markets, potentially benefitting Wales' significant non-industrial coastline and designated landscapes (Dwyer, 2018). Some existing farms in Wales are starting to diversify, taking advantage of their location by moving into leisure and recreational activities, with agri-tourism becoming an important source of income (Ge et al., 2018; Focus Group 2).

Negative impacts

An evident impact of the COVID-19 lockdowns was the impact on job security, income, and health and well-being with the stay at home and stay local restrictions resulting in both tourism and hospitality closures. This impacted more heavily on rural communities (Green et al., 2020), particularly those with the importance of 'visitor economies' (Phillipson et al., 2020). For example, those farms who had diversified reported reduced or no income from activities such as cafes or weddings, which in turn had a knock-on effect on mental well-being (National Federation of Young Farmers, 2020). Businesses involved in tourism, such as campsites, rural attractions, pubs and shops have received reduced incomes or were forced to close as a result of a curb on non-essential travel (Phillipson et al., 2020).

This resulted in the take-up of individuals on 'furlough' being significantly higher in rural local authorities most dependent on tourism and hospitality sectors (Bevan Foundation, 2020a). The initial lockdown from March to July 2020 largely closed down the hospitality sector, with up to 70 per cent of businesses furloughing staff (Woods et al., 2021). In addition, immediate disruptions to trade for Welsh fisheries have been exacerbated by the COVID-19 pandemic, with reduced demand for hospitality affecting trade. Some businesses trading in produce such as mussels have ceased trading altogether (Welsh Government, 2021a).

Although an increase in tourism in the summer months of 2020 can be viewed as beneficial, the geographical concentration of this produced problems of over-crowding, obstructive parking and illegal camping and generated tensions in rural communities over fears that visitors could contribute to spreading the coronavirus in localities with relatively low incidence (Woods et al., 2021).

Alongside this, Brexit has resulted in EU funding received by small businesses in sectors such as tourism being cut, with domestic funding not matching what was previously provided (Johnson et al., 2021). Brexit has also led to workforce challenges in the tourism and hospitality industry with changes to immigration rules leaving shortages in many rural communities (Morris, 2021).

Concerning climate change, predictions accompanied by evidence show that by around 2050, some rural coastal areas of Wales will be unfit or unsustainable to live in (Netherwood, 2021). In addition, coastal heritage sites are at significant risk from climate change. Climate change projections of increasing temperatures, humidity, intense rainfall and flooding mean that this risk is likely to remain high in the future, which could have a knock-on effect on local businesses and employment in rural communities. This could have a major effect on the tourism sector, which in turn could have significant impacts on the health and well-being of local communities (Focus Group 2).

Local Foundational Economies

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
✓	✓	✓	✓	✓	✓
Population Groups affected: <ul style="list-style-type: none"> • All those who live in rural communities • Young people • Local businesses • Employees 					

Positive impacts

As a result of the pandemic and restrictions, many in the population were required to work from home (if they were able to), travel less and shop more locally (Price et al., 2021; Rolfe et al., 2020; Tilley et al., 2020, Food Standards Agency, n.d.; Focus Group 1). Individuals and their families used centres located near to them rather than travelling further afield and thus spent a greater amount of time in their local areas including in more rural locations (Royal Town Planning Institute, 2020c).

Rural locations have become more attractive to many due to the flexibility of home working (Green et al., 2020a). The Welsh Government is aiming for 30% of the population to be working remotely (either from home or somewhere nearby) and is actively exploring the concept of co-working hubs located within local communities (Green et al., 2021; Welsh Government, 2021b; Welsh Government, 2020b).

Brexit and the COVID-19 pandemic could lead to diversification in rural economies as Free Trade Agreements (FTAs) are concluded and EU funding streams such as the CAP end, and UK immigration policies take stronger effect.

Brexit has been highlighted as a potential opportunity to re-orientate land management policy drivers in Wales and this could include exploring local revenue streams which would boost local foundational economies (Bevan Foundation, 2020b). It could also stimulate opportunities to develop innovative local community and business responses and adaptation in rural communities, for example, the establishment or further development of food cooperatives (Phillipson et al., 2020).

Climate change could similarly lead to changes in land use in rural areas. The land within some rural communities in Wales has a huge potential for the growth of some types of fruit and vegetables and can encourage the production of not only local produce but by selling this locally increasing the attractiveness of rural foundational economies (Social Farms and Gardens, 2021; Business Wales, n.d.; Welsh Government, 2021r; Welsh Government, 2021s).

Negative impacts

Rural communities have been identified as a population group that will be impacted greatly following the UK leaving the EU given the high degree of investment received during the time involved with the EU (Green et al., 2019b; Green et al., 2019a). Rural Wales has been a major recipient of support from the European Regional Development Fund (ERDF) and European Social Fund (ESF). These are likely to be replaced by the Shared Prosperity Fund, with a strong risk that funding to rural Wales could be reduced (Woods and Rahman, 2019). Brexit will lead to reduced infrastructure investment funding schemes (or any replacement schemes) and grants could be cut which could affect rural community infrastructure for example, roads and community facilities (Welsh Government, 2017; Cowie et al., 2018).

Climate Change could negatively affect the development of rural economies including local foundational economies through increasing extreme weather events that will impact on infrastructure and access to the hubs and services hosted within them (Noy, 2021).

Food Production

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
✓	✓	✓	✓	✓	✓
Population Groups affected: <ul style="list-style-type: none">• Farmers• Local businesses• Agricultural employees / production and transportation workforces					

Food production is a major component of food security and as a topic area was explored in a previous Triple Challenge Spotlight Paper (Green et al., 2021b). However, that paper did not look specifically at the role that rural communities and businesses play in this.

Positive impacts

Positively, the COVID-19 pandemic has demonstrated resilience in the food production system, and the opportunity for governments to invest in farm businesses to re-set for a green recovery through diversification and modernising systems (NFU Cymru, 2020a). NFU Cymru proposed a range of instruments including capital grants and incentivisation measures to deliver food production and resource efficiencies, which in time can deliver positive environmental benefit for air, carbon, water and nature (NFU Cymru, 2020b).

Due to Brexit, changes are likely to the way in which farmers receive funding, particularly direct farm payments. However, the Welsh Government have committed support to farmers beyond 2022 through a dual-track system for economic resilience and public goods (Woods and Rahman, 2019). However, of the total farming population surveyed in Wales, 48% were non-claimants of Pillar 1 payments (which make up 80% of the CAP budget)

showing that despite some estates and holdings claiming for more than one holding, there are high levels of farm holdings with no reliance on Pillar 1 payments (Arnott et al., 2019). In addition, evidence suggests substitution of imported milk and dairy products to Welsh produce as a result of Brexit could benefit the dairy sector in Wales. However, this benefit may be limited due to dairy processing capacity in Wales (Woods et al., 2021). FTAs such as the Comprehensive and Progressive Transpacific Partnership Agreement could also affect the dairy produce industry in Wales either positively or negatively (UK Parliament, 2021a; European Commission, 2020; McNamara et al., 2021; Petchey and Cresswell, 2021).

Farmers are not the only food producers who could be affected in Wales. For fishers, there could be opportunities to increase fishing for quota-species in Welsh waters - however, similar to dairy production, the current fishing fleet has limited capacity and major investment would be required. Therefore, any benefits are more likely to be reaped by vessels from other UK nations (Woods et al., 2021).

Brexit could provide policy makers with a unique opportunity to shape the future of the agricultural landscape using strategies that manage production, mitigate against the ecological and social impacts of changing land use, and ensure the survival of rural cultural heritage (Arnott et al., 2019). For example, researchers from Reading University found that looking at five different Brexit scenarios, there could be between 35,000 and 313,000 hectares of additional broadleaf forest cover in Wales by 2030, with a proportionally similar boost to conifer forests (18% increase; University of Reading, 2021). There will also be changes for farmers such as Wales' proposed Sustainable Farming Scheme that will provide them with incentives for being mindful of the environment (University of Reading, 2021; Jones and Jones, 2021). This could lead to many farms intensifying or diversifying to compete in the market (Humble, 2019), by decreasing sheep numbers in order to benefit from the production of environmental goods (Jones and Jones, 2021; Arnott et al., 2019).

It has been proposed that Brexit could present an opportunity for inclusive sustainable development in the UK and to develop an innovative and transformative approach to the rural economy in future years. Evidence highlights that a positive aspect of EU withdrawal could be the development of '*rural devolution deals*' which are based on minimum obligations and maximum entitlements for rural areas in relation to subsidy payments for active agricultural producers (Milbourne and Coulson, 2020; Cox et al., 2017; Shucksmith, 2017). Furthermore, optimistic outcomes include increased innovation due to the end of the CAP and investment in technology to enhance productivity (Cowie et al., 2018). For agricultural workers and farmers, actions could include implementing peer-to-peer solutions which focus on the need for shift in perspectives, so that accessing and taking support both in relation to health and economic well-being becomes the norm and increasing mental health literacy amongst support agencies (Davies et al., 2019).

With respect to climate change, there is also scope for the development of strategies to reduce food vulnerabilities. Woods suggests that this could include strengthening urban – rural food connectivity, stimulating urban land-use for food, exploring new crop options for an ever-evolving climate and creating policies and standards to ensure local production is not more emission intensive than imports (Woods et al., 2021).

¹ **Pillar one - Direct Payments.** These made up 80% of the UK's 2018 CAP budget. Farmers receive payments based on how much land they farm, although they are required to meet 'greening' requirements and may have their subsidy cut if they do not comply with environmental regulations.

Negative impacts

The COVID-19 pandemic coincides with a period of major uncertainty for farmers and agribusiness. In addition to uncertainty about the impact of the pandemic on the Welsh economy and food supply chain, there is uncertainty around the future nature of the UK's relationship with the EU and the terms of future FTAs which will be negotiated and concluded, and which will all have significant implications for food trade. This is all against a backdrop of much longer-term uncertainty about the impact of climate change on the population, the natural environment and of the role farming in feeding a growing population with diminishing resources (NFU Cymru, 2020a).

Farmers have experienced a particularly turbulent period with the pandemic playing out alongside the EU withdrawal. Many farmers have been affected, as the food services sector they supply (which includes pubs, restaurants and cafes) have closed down under COVID-19 restrictions (Focus Group 1). This resulted in farmgate prices for livestock crashing in March 2020, and some dairy farms had to 'waste' and dispose of milk supplies as many hospitality and service sector contracts were cancelled. These issues were compounded by the fact that farmers were unable to access some of the business support schemes set up by the Welsh and UK Governments. For example staff could not be furloughed due to livestock needing daily attention. NFU Cymru asked the Welsh Government to extend the Economic Resilience Fund to farms, and the Welsh Government established a group involving dairy industry stakeholders to work out solutions for the sector (NFU Cymru, 2020a). This resulted in payments being maintained until 2022 (NFU Cymru, 2021a). Brexit complicated the situation for producers who export their produce, as changes to immigration rules contributed to an inability to obtain labour or transport, and export goods – this then led to an indirect impact on the general population through shortages in some food supplies (UK Parliament, 2021b; Speciality Food Magazine, 2021).

Food production and particularly agriculture which is a huge economic contributor in Wales could be or has been, majorly negatively affected by Brexit. There are a number of small rural family farms, which relied heavily on subsidies from the CAP (which ceased in 2018 but with elements of its support remaining until 2025 – albeit on a reduced budget). Wales and Welsh farmers, especially in the sheep sector (Jones and Jones, 2021) relied more heavily on CAP payments than UK counterparts at 80% compared with 55% for the UK average (Dwyer, 2018). In the UK, there are 217,300 agricultural holdings, with 143,385 claimants of the European Agricultural Fund Pillar 1 payments - also known as the Basic Payment Scheme (Arnott et al., 2019). One study shows that without intervention to support vulnerable businesses, it is likely that 34% of Welsh farmers will struggle to remain viable (Arnott et al., 2019). A decline in the economic viability of sheep production due to Brexit changes has also been predicted, with these businesses especially vulnerable to changes in both market access arrangements and public funding support (Dwyer, 2018). The Basic Payment Scheme and agri-environment payments are vital to Welsh farmers, as it constitutes a large proportion of farm business income. Without this, less favourable areas in Wales would see sheep and cattle farms make a loss without subsidy (Arnott et al., 2019). The sheep farming industry is among the most exposed to Brexit, with a third of Welsh lamb meat exported to the EU (Woods et al., 2021). New trade deals, such as the UK / New Zealand agreement on the importing of lamb, beef, dairy, and apples, could have a detrimental impact on Welsh farmers (NFU Cymru, 2021b; Focus Group 1).

Farming food production in Wales could also be affected by not only a lack of economic viability caused by Brexit and the pandemic but by the lack of interest in farming as a career in younger generations. A survey conducted by Fischer and Burton in Scotland found that the lack of interest in farming poses a threat to the continuation of family businesses and associated rural communities with similar findings found in other European countries (Ge et al., 2018).

Whilst there is a major focus on farmers and agriculture, it must be noted that the fisheries sector in Wales is also highly exposed to the impact of Brexit due to its orientation towards shellfish - 90% of which are exported to the EU with limited opportunities for redirection to domestic markets. Exports of fresh shellfish to the EU are dependent on swift and seamless transport and delays due to new customs procedures have presented challenges for seafood businesses in rural Wales. This is due to the increased costs, paperwork and risks of spoilage (House of Commons, 2021). As shellfish are non-quota species, there could be no real benefit to be gained from the return of fishing regulations to Wales (Woods et al., 2021).

Climate change can have a dramatic impact on food production in Wales in several ways. Crop production can be impacted due to increasing extreme weather events for example, flooding, drought or storms. Farmers, fishers and rural communities are at a particularly high risk of experiencing negative mental health and well-being impacts such as stress and anxiety due to the direct implications of climate change and extreme weather events on their livelihoods and access to supplies (Smith et al., 2015; Yazd et al., 2019). For fishers specifically, this could be compounded by reductions in catch size associated with climate change and overfishing, pollution and the deterioration of coastal habitats (Savo et al., 2017).



3C ENVIRONMENTAL FACTORS

Transport and active travel

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
	✓	✓	✓	✓	✓
<p>Population Groups affected:</p> <ul style="list-style-type: none"> • All those who live in rural communities • Those who live on their own • Those who have existing or chronic conditions 					

There is greater range of transport options, including active travel, available in urban areas compared to some rural settings. This is due in large part both to the topography of Wales and the existing transport infrastructure. Journey times are often longer, and there is a reliance on road transport – particularly cars. In many rural communities, particularly in mid and north Wales, roads can often be the only form of transport infrastructure, and in Wales as a whole, it is reported that 13% of people live less than 800m walking distance from a train station that has at least one train per hour – this figure reduces to 1% in mid Wales. Approximately 70% of the Welsh population live within 400m walk from a bus stop that has at least one bus per hour, and this reduces to 25% of the mid Wales population. Thus, connectivity within rural communities, and connectivity to other Welsh and UK locations, remains challenging (Welsh Government, 2021f). Lack of accessible transport has knock-on effects for employability and access to education and other services.

Positive impacts

The COVID-19 pandemic saw a reduction in traffic and transport movements across Wales including in rural Wales. For example, the use of public transport was around 95% less in 2020, than the previous year (Welsh Government, 2020f). However, this appears to be short term. Continued provision of public transport throughout the pandemic enabled many rural communities to access local services, employment and facilities. Active travel was (and continues to be) promoted as a means of remaining active and doing so where it could (and can) be used was encouraged. For example, in May 2020, the Emergency Active Travel Fund was announced, to get more people to travel on foot and bike to help mitigate public transport capacity constraints due to COVID-19 social distancing requirements (Welsh Government, 2020g).

Negative impacts

The COVID-19 pandemic has had an impact on, and implications for, public transport across Wales. With services reduced and social distancing reducing the capacity of services, the confidence of users to access public transport has been affected, and this will be a particular ongoing concern in rural communities which are dependent upon public transport (Welsh Government, 2021f).

Similarly, whilst there is available public transport this has limitations, for example, for many communities, it can be infrequent and for the providers it has potential to be unsustainable if not utilised more or rather than car journeys. Whilst active travel is promoted as a healthy and environmentally positive co-benefit, for many rural Welsh communities it is not an option due to the distances between settlements and services. Therefore, local communities cannot always safely substitute a car for walking or cycling due to distance, lack of pavements, street lighting or dedicated cycle lanes. This can also affect an individual's opportunity to access their COVID-19 vaccinations if transport is not available (Milne, 2021).

The 'staying at home' regulations led to a reduction in car journeys and road accidents (Jones, 2021; Green et al., 2020). However, the levels have since bounced back to pre-pandemic levels and many individuals note that they feel safer in a car from the COVID-19 virus than using other means of transport (Welsh Parliament, 2021a). As restrictions eased many rural communities experienced high levels of traffic as people travelled to access mountains and rural beauty spots. The trend for 'staycations' similarly led to higher levels of transport movements across Wales including in the tourist areas of Pembrokeshire, Carmarthen and Gwynedd.

Transport and infrastructure are also affected by climate change. Some rural communities in Wales, and particularly those living in flood risk areas, are highly exposed and vulnerable to flooding and intense heat events, which can have a negative impact on transport links (UK Government, 2017). For example, the lines across north and through mid-Wales were closed for several weeks during 2019 and 2020 (Dasgupta et al., 2014) and the recent Storm Arwen led to road and rail closures (BBC Online, 2021).

Rural built and natural environment

Positively impacted by:			Negatively impacted by:		
Brexit	COVID-19	Climate Change	Brexit	COVID-19	Climate Change
	✓	✓	✓	✓	✓
Population Groups affected: <ul style="list-style-type: none"> • All those who live in rural communities • Farmers • Local businesses • Those on low incomes / unemployed 					

Positive impacts

The COVID-19 pandemic has highlighted the attractiveness of rural communities as places to live and work – particularly now that the shift to home working can enable workers to live away from their employers' main bases and head offices which are often sited in urban towns and cities (Welsh Parliament, 2021b). Workers moving back to Wales and the places they were born and brought up in could have a positive impact on regenerating the built environment in local Welsh communities, increasing social connectivity and enhance family relationships and networks. It could lead to increased revenues for local rural town and village businesses and services and make them more sustainable longer term. This demographic movement will also have co-benefits to health and the environment – it can reduce levels of commuting and road use, have positive benefits for the natural environment and reduce the impact on built infrastructure such as roads. However, this shift can only be facilitated if housing and suitable accommodation for workers and their families is available at affordable prices – which can be limited in many rural areas (Welsh Government, 2009). Increased housing construction due to this rising interest in rural living and remote working could increase the availability of good accommodation and promote employment opportunities in rural areas. Modern construction and adaptation methods could also help to mitigate the impacts in relation to climate change (Penaloza et al., 2018; Stagrum et al., 2020).

With the COVID-19 pandemic exposing inequalities and the emphasis on a '*green recovery*' there is now greater interest in the concept and application of '*20-minute neighbourhoods*'. This concept promotes the idea of a community being able to access a range of services and facilities or connections by active or sustainable travel within a short time frame (TCPA, 2021). Compared to town and urban centres, implementing 20-minute neighbourhoods in more rural and / or widely dispersed communities will be more challenging but could provide environmental, economic and social benefits.

Access to green and blue infrastructure and spaces has been of critical benefit to mental well-being during the COVID-19 pandemic (Natural Resources Wales, 2021a), and the development of Welsh woodlands and reforestation could support Wales to meet its climate change objectives. Welsh Government's '*Woodlands for Wales*' strategy recognises the role that trees have on local climates, but notes that they need to be planned in a manner which makes them resilient to changing weather patterns, pests and disease themselves (Welsh Government, 2018a).

Negative impacts

There is much more access to open green and blue space in rural communities. However, much of this is only accessible by car or bicycle and at the start of the COVID-19 pandemic high numbers of visitors visited rural areas and National Parks in Wales causing road and other issues (Brecon Beacons National Park, 2021). Welsh Government introduced guidance on taking physical activity during the first lockdown in March 2020 which aimed to limit the number of visitors to rural open spaces and National Parks. This was amended on 24th April 2020 to clarify that physical activity could only be taken once a day in Wales, could only be

taken locally, and should not be accessed by a car unless necessary (Welsh Government, 2020h). There were also variations seen across local authorities in terms of allowing access to open spaces and parks (Office for National Statistics, 2021). This may have increased inequalities for those living in dense, urban areas and who did not have access to a garden or shared open space, for example by reducing opportunities to exercise in pleasant surroundings (Geng et al., 2021).

The pandemic responses included requirements for the population to remain at home at all times except in specific circumstances and work from home if they could (Welsh Government, 2020h). This meant that the whole population spent significant time in their homes – whatever the condition, size, type, tenure or access to green or blue space. This has a wide range of implications for residents. For some a high quality modern, accessible rural home environment and surrounding area could be hugely beneficial to physical and mental well-being during ‘lockdown’. However, for others who may live in a small, older, poorer quality, less energy efficient, damp and isolated homes it could be negative – particularly for those on low incomes, who need to work and home school or who live on their own and are digitally excluded (Chartered Institute of Housing, 2021; Chartered Institute of Housing, 2020; Place Alliance, 2020; Welsh Government, 2019d). Rural housing tends to be of older stock and less energy efficient (StatsWales, 2019) which when coupled with an older population in many areas could be detrimental to health and well-being and lead to hard choices around eating or heating a home.

Compounding this for some rural communities in Wales, the pandemic struck them immediately after significant flooding and extreme weather events that are associated with climate change (Welsh Government, 2021o). Therefore, policies requiring households to ‘stay at home’ may have resulted in residents living in unsuitable accommodation that could potentially have a negative impact on their health and well-being. Welsh Government provided some funding for these communities at the start of 2021 post Storm Christophe (Welsh Government, 2021o).

The COVID-19 pandemic has also increased people’s ambitions to relocate to rural communities, given the increasing prominence of home working that allows workers to be flexible in where they live and work. This has led to concerns about rising house prices and the increasing unaffordability of homes in rural communities, particularly for local people, a phenomenon observed recently in Scotland as well as Wales (Community Land Scotland, 2021; Hamptons, 2021; Evans and Necke, 2021; HM Land Registry, 2021).

Rural communities can also experience a range of different factors in relation to housing and household energy, which distinguish them from housing matters in urban settings. These include being ‘off grid’ for forms of heating, and a lack of affordable and social housing options. Prior to the EU withdrawal, it was predicted in some quarters that Brexit would have a negative impact on house prices, the property market and the UK’s ability to build more houses due to workforce and construction material supply issues (Penningtons Manches Cooper, 2021). Fuel poverty is a concern for those in rural housing, given this accommodation is likely to be older and may not be connected to heating networks more common in urban environments. Many older people reside in older and poorly insulated rural homes (Energy and Climate Change Committee, 2012; Climate Just, n.d.). In the context of climate change, being ‘off-grid’ may be considered at face value advantageous, but it is acknowledged that this makes the challenge of decarbonisation even greater (Welsh Government, 2020e).

Brexit has also led to delays in, and reduced supplies for, construction materials and some workforce issues associated with immigration rule changes and increased border and customs paperwork (BKL, 2021).

Flooding and coastal erosion is a critical concern in rural locations, exacerbated by climate change (IPCC, 2018; Netherwood, 2021). Flooding in rural communities can have significant impacts on transport infrastructure, and affect agricultural land and livestock, as well as the direct impact on people's homes, businesses, and access to services (Netherwood, 2021). Many coastal communities regularly experience nuisance floods (minor flooding when water levels exceed local thresholds - generally about 1.5 feet above the historical daily average). Nuisance floods are happening more frequently due to climate change. Although they do not cause severe property damage, they lead to degraded storm and wastewater systems, contamination of fresh water supplies and disruption to business (CDC, 2017). Whilst coastal erosion in Wales is generally seen to be of a lower risk than in some parts of England, it is still anticipated to be an increasing risk to some communities in Wales (Lle, 2015).

The recent Climate Change Risk Assessment 3 chapter for Wales also highlights the impact on health and well-being of rising temperatures and heat events (Netherwood, 2021). This is a concern both for the built environment such as housing but also green and blue environments. Those living in rural communities are most at risk of air pollution from wildfires (World Health Organization, n.d.). Health outcomes which emerge due to poor air quality also disproportionately impact vulnerable populations, including children, elderly people, pregnant women and those with chronic illnesses due to their lower baseline mortality (Wang et al., 2016; Grey et al., 2018; World Health Organization, n.d.). People living in rural communities may also be at a greater risk of household air pollution and emissions from agricultural activities (World Health Organization, n.d.).



4 POLICY RESPONSES TO DATE, MITIGATION, AND OPPORTUNITIES

Economic factors

The UK Agriculture Bill includes a provision to give the Secretary of State new powers to provide financial assistance to those managing the land to deliver public benefits such as air and water quality, public access and productivity in England and Wales (Roederer-Rynning and Matthews, 2019). In Wales, the recently proposed Agriculture (Wales) Bill White Paper (Welsh Government, 2021d) promotes sustainable land management and is an opportunity for Wales to develop and promote future policies to support farmers and others to produce food in a sustainable way post Brexit.

The Welsh Government is proposing two separate funds to replace the existing CAP Basic Payment Scheme. One of these is the Economic Resilience Scheme which provides investment for economic activities, in particular food and timber production. The other proposal is the Public Goods Scheme, which provides direct support for public goods delivery, particularly relating to the environment (Milbourne and Coulson, 2020).

Whilst the future for fisheries in Wales (and the UK) seems unclear at the time of writing, Welsh Government are providing support for the industry, most recently with a £1.3m scheme, the Welsh Seafood Sector Resilience Scheme (Welsh Government, 2021a).

Social and community factors

In relation to the built infrastructure, a UK Government initiative for Rural Gigabit Broadband has been introduced, which is part funded by Welsh Government (HM Government, 2021). This initiative sees £1,500 per resident or £3,500 per small to medium-sized business (SME) paid by both Welsh Government and UK Government (so a total of £3,000 per resident) for group projects seeking to connect a superfast connection to their premises. The Welsh Government focus on local foundational economies could provide opportunities to enable more rural connectivity and economic growth (Welsh Government, 2021).

Environmental factors

Wales' social house building strategy was published in 2020, with an action plan released in 2021 (Welsh Government, 2021j). This strategy identifies opportunities for jobs in forestry and wood processing, with Welsh-grown and processed timber being used in the construction of new social housing. Some local authorities such as Pembrokeshire have placed a rural dividend on those who are purchasing a second home in the authority (Pembrokeshire County Council, 2021). This is an attempt to deter the practice which can lead to villages which are largely unpopulated during the winter months leading to services and facilities becoming unsustainable (Welsh Government, 2019c; Leaver and Ahmed, 2021).

From December 2021, Welsh Government require spatial planning policies and plans to take into account the impact of flooding in development decisions as part of Technical Advisory Note 15 (Welsh Government, 2021p).

In May 2020, the Emergency Active Travel Fund was announced by the UK Government to aim to get more people to travel on foot and bike to help mitigate public transport capacity constraints due to COVID-19 social distancing requirements. Welsh Government announced an investment of £75 million for active travel (UK Government, 2020; Welsh Government, 2021q).

Welsh Government has recently released its latest transport strategy for Wales. This strategy features four 'cross-cutting delivery pathways', two of which relate to decarbonisation and a focus on rural transport. Amongst its aims, this strategy seeks to 'extend the geographical 'reach' of public transport into every community, especially in rural Wales' whilst also exploring 'disincentives to car use', though the strategy acknowledges that the needs of people in rural communities need to be considered on this latter point (Welsh Government, 2021e).

Future trends for transport point towards such modes of transport as electric cargo bikes for delivery of consumer goods, with Welsh Government citing examples of this being trialled in rural areas of Wales (Welsh Government, 2021f); such innovations can help increase rural transport connectivity as well as meet climate objectives.

5 KEY FINDINGS

1. There is no one definition of 'rural', 'rural communities' or 'rural health' in Wales.
2. There is a gap in existing evidence which shows rural health and well-being as the main focus. This is needed to support the development of rural health policies and programme development.
3. Rural communities are impacted by the Triple Challenge in a myriad of ways, some of which are the same for urban communities, but others are more specific to them. For example, housing age, availability, quality and affordability, transport and active travel infrastructure. Rural communities have older populations and high levels of agribusinesses. These factors need careful consideration when drafting national, regional and local policies and plans in order to reduce health and well-being inequities.
4. Further research is needed to understand the differences and particular challenges which rural communities will face post Brexit, continually during the COVID-19 pandemic and in the future as climate change continues to progress. There are currently a number of 'unknown unknowns' which will become much clearer as the field of research on rural communities progresses.
5. Rural environments and communities have become much more attractive to live and work in during the pandemic period, mainly due to the increased focus on home working that promotes a more flexible approach for workers and their families. This could have both positive and negative impacts, for example, it could enable some rural communities and their economies to thrive and facilitate an increase in sustainable services and facilities, but it could also lead to housing price increases that disadvantage those who currently live in, or were brought up, in an area or shortages of affordable housing for the local populations.
6. Digital infrastructure and accessibility are very important for rural communities, but there should also be a focus on enabling digital and social media use by increasing digital literacy, particularly in the elderly population.
7. Brexit could present an opportunity to drive inclusive sustainable development in the UK and Wales and to develop an innovative and transformative approach to the rural economy in future years.

6 POTENTIAL OPPORTUNITIES TO PROMOTE RURAL HEALTH IN WALES

Social and community factors

- Learning from the North Yorkshire Commission (North Yorkshire Rural Commission, 2021) could be implemented in Wales. This could focus on the challenges within, and opportunities for, rural communities post Brexit and the COVID-19 pandemic. A Commission on Rurality was previously in existence in the UK and could be a good focal point for rural issues through which rural issues could be considered in Wales and this could be a good driver of future policy and research activities (Commission for Rural Communities, 2013).
- There are existing connections across policy domains with ambitions to meet decarbonisation and Net Zero ambitions (broadband connectivity, electric vehicle charging strategy, electrification of home heating), and these are explicitly referenced in Welsh Government's Electric Vehicle Charging Strategy (Welsh Government, 2021c). However, these are not rural-specific. Within this existing work there are opportunities for greater cross-referencing of policies for climate change and rural Wales.
- A specific policy framework for rural Wales could be developed with cross sector and multidisciplinary input. It could cover the wider determinants of health and include a consideration of the Triple Challenge of Brexit, Climate Change and COVID-19. This would enable targeted action and help to address key inequities present in rural communities.
- Similarly, the development of a framework for post-Brexit Rural Development Funding can be considered to replace the programme previously supported by European Union funding (Welsh Government, 2021l). Future grants could consider how beneficiaries plan to respond to the Triple Challenge as an objective of the funding and as a prerequisite for eligibility criteria (for instance, business proposals that would accelerate positive environmental impact and / or reduce climate change).
- Organisations could consider drafting 'Rural Health and Well-being' Plans or emphasise the importance of rurality for example, with a specific chapter or section, within their current and developing plans and strategies.
- There are opportunities for further research to be carried out by public bodies, Third Sector organisations and academia to understand the differences and particular challenges which rural communities will face post Brexit and post COVID-19 and in the future, as the climate change occurs.
- The importance of mental well-being of rural populations has been highlighted in this report (see Section 3b) and can be considered in planning and developing plans and strategies. This includes for farmers and those in isolated areas. Solutions can include the need for better awareness of the support available, working across organisations to recognise stress and anxiety in vulnerable groups.

Economic factors

- Local authorities and organisations can focus on enabling digital literacy and inclusivity as much as digital infrastructure and use existing Welsh Government policies such as local foundational economies, remote working, and spatial plans as a platform to do so (see Section 3b). This can be targeted at those who are digitally excluded and by providing education about how to use digital technology as much as enabling and improving digital infrastructure. This includes for example, those who cannot afford broadband or data packages for mobile phones and for population groups such as agribusinesses and farmers so that they can develop their businesses.
- The pandemic has led to a major shift in patterns of working and shopping and there is a presently a 'window of opportunity' to enhance (or create) local rural communities in Wales by building on the momentum which the pandemic has created. This can help to support and promote sustainable and thriving local foundational economies and societies via the development of local hubs to support these new ways of living (see Section 3b). This can build on existing Welsh Government policies and future ambitions.
- The proposed Food Security (Wales) Bill 2021 and the Community Food Strategy provide opportunities to involve rural food producers and farmers in discussions and increase the positive impact of both. HIA could provide a beneficial vehicle to do this.

Environmental factors

- Innovative thinking and new policies can be developed which are sensitive to Welsh culture, demography and topography (Jones and Jones, 2021). Previously explored initiatives and actions such as expanding woodlands and better managing agricultural soils and peatlands (Jones and Jones, 2021) can be utilised in the future to reduce climate change effects and enhance rural communities.
- Further work is needed to explore the implementation of the 20-minute neighbourhood concept, especially in rural areas where there has been the suggestion of 20-minute neighbourhood hubs, where services are located in one place to help reduce the need for travel (Douglas and Beautyman, 2021). This can be used to support the development of Regional Transport Plans (Welsh Government, 2021).
- It has been suggested that new partnerships and governance structures comprising local planners and decision makers can include both key urban and rural stakeholders to identify critical land use and infrastructure needs that can support and strengthen regional food systems (Newell and Dale, 2020).
- Use place-based approaches that include local input (Community Led Local Development approaches) and integrated models of delivery to capture the importance of rurality in policymaking and planning. This can be achieved by working collaboratively with Local Authorities in Wales and other sectors.
- Future planning developments can consider the interconnection between urban and rural communities in order to promote and protect health and wellbeing.

7 CONCLUSION

Policy and decision makers require information and evidence to strengthen decisions and future long-term planning so that any negative impacts of the *Triple Challenge* can be mitigated for, positive impacts or opportunities be maximised and inequalities which emerge can be addressed in a sustainable and integrated way. This paper provides a unique insight into how these three challenges interact with, and impact upon the health and well-being of the populations of rural communities in Wales.

It has highlighted that it is important to consider future governmental, local and organisational policies in relation to the impact of the three policy streams. Using this lens can inform future economic, environmental, social, and health policy and actions and facilitate health improvement, service delivery and health protection. The need to address inequities underpins this as a key crosscutting theme. Efforts to address the three challenges must include a public health perspective to protect the most economically, physically, and mentally vulnerable, particularly in rural communities in respect to transport, local economies, agribusiness and access to services.

Brexit, COVID-19 and climate change represent the biggest combined Triple Challenge to health and well-being that Wales has faced in recent times. They also provide an opportunity for it to set a new direction and leverage policies and plans using health and well-being, equity, and sustainability as a lens through which to view this. The Well-being of Future Generations (Wales) Act 2015 provides a key driver to do this. Decisions will be difficult to make in coming years as the economy, environment, health of the population, and society mobilise to recover and renew from the pandemic, Brexit and climate change weather events. Building resilience in rural communities will be critical to the development and success of Wales.

Appendix A: Methodology

Rapid evidence searches

Building on the evidence collected through established HIAs on Brexit, climate change and COVID-19 in Wales (Green et al., 2019; Green et al., 2020; Green et al., 2020a; Green et al., 2022 forthcoming;), rapid evidence searches were undertaken on both grey and academic literature. Academic searches were run in PubMed and ProQuest, with the grey literature identified through sources from Welsh and UK Governments and the World Health Organization.

Table 1: Search terms

Search no.	Search terms
S1	"rural" OR "countryside" OR "coastal" OR "agriculture" OR "farming" OR "port towns" OR "rural villages" OR "rural settlement"
S2	"Brexit" OR "EU withdrawal"
S3	"climate change" OR "global warming"
S4	"COVID-19" OR "coronavirus" OR "pandemic" OR "syndemic"
S5	"health" OR "well-being" OR "wider determinants" OR "inequalities" OR "health equity" OR "sustainability"
S6	S1 AND S2 AND S3 AND S4 and S5
S7	S1 AND S2 AND S3 AND S5
S8	S1 AND S2 AND S4 AND S5
S9	S1 AND S3 AND S4 AND S5

All results were screened by title and abstract using the inclusion criteria outlined in Table 2.

Table 2: Inclusion criteria

Inclusion criteria
• literature published in the English language
• published from 2016-2021
• prioritisation of evidence based in Wales, followed by UK, European then international evidence

For all included studies, a data extraction process was undertaken with the reviewers extracting all relevant information on the following:

- authors, year of publication, title, reference, country/region studied
- potential positive impacts or opportunities and negative or unintended negative impact of national food security on health and well-being
- the population groups primarily affected in the short and long term by this key determinant of health
- identifying potential mitigation for any negative or unintended negative impact.

This evidence was then appraised and synthesized into key themes to present in the report.

Qualitative evidence

Two qualitative Focus Groups were held in May, 2021 which included a range of multi-disciplinary representatives from health and social care, food policy, EU transition, agriculture, climate change, social inclusion and poverty, economic and the environment and organisations such as Welsh Government, Natural Resources Wales and Universities. Three interviews were also undertaken with key academic stakeholders.

Results of the interviews were thematically analysed, synthesized into key themes, and triangulated with the evidence from the rapid evidence reviews.

REFERENCES

- Adger, W.N.; Pulhin, J.M.; Barnett, J; Dabelko, G.D.; Hovelsrud, G.K.; Levy, M; Spring, Ú.O. and Vogel, C.H. (2014) Human Security. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group 2 to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 755 – 791. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap12_FINAL.pdf [Accessed: 18 November 2021]
- Age UK (2020) The impact of COVID-19 to date on older people's mental and physical health. Available at https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/health-well-being/the-impact-of-covid-19-on-older-people_age-uk.pdf [Accessed: 20 October 2021]
- Arnott, D; Chadwick, D.R.; Wynne-Jones, S and Jones D.L. (2019) Vulnerability of British farms to post-Brexit subsidy removal, and implications for intensification, extensification and land sparing. Land Use Policy 107, 104154. DOI: <https://doi.org/10.1016/j.landusepol.2019.104154>
- Baird, A.G. and Wright, N (2006) Poor access to care: rural health deprivation? British Journal of General Practice 56(529), p. 567 – 568. Available at <https://bjgp.org/content/56/529/567#ref-13> [Accessed: 20 October 2021]
- Barnett, S; Roderick, P; Martin, D and Diamond, I (2001) A multilevel analysis of the effects of rurality and social deprivation on premature limiting long term illness. Journal of Epidemiology and Community Health 55(1), p. 44 – 51. DOI: <https://doi.org/10.1136/jech.55.1.44>
- Bauchinger, L; Reichenberger, A; Goodwin-Hawkins, B; Kobal, J; Hrabar, M and Oedl-Wieser, T (2021) Developing Sustainable and Flexible Rural-Urban Connectivity through Complementary Mobility Services. Sustainability 13(3), 1280. DOI: <https://doi.org/10.3390/su13031280>
- BBC Online (2021) Storm Arwen: Trains halted and homes lose power in Wales. Available at <https://www.bbc.co.uk/news/uk-wales-59434263> [Accessed: 15 December 2021]
- Bevan Foundation (2020a) Where next for the Welsh economy? Available at <https://www.bevanfoundation.org/wp-content/uploads/2020/05/Economy-Briefing-Final.pdf> [Accessed: 16 November 2021]
- Bevan Foundation (2020b) The business potential of the foundational economy in the south Wales valleys. Available at <https://www.bevanfoundation.org/wp-content/uploads/2020/08/The-business-potential-of-the-foundational-economy-in-the-south-Wales-valleys.pdf> [Accessed: 17 November 2021]

- BKL (2021) The Implications of Brexit for the Construction Sector. Available at <https://www.bkl.co.uk/wp-content/uploads/2021/04/Construction-campaign-report-The-implications-of-Brexit-for-the-construction-sector.pdf> [Accessed: 1 November 2021]
- Bowen R and Morris, W (2019) The digital divide: Implications for agribusiness and entrepreneurship. Lessons from Wales. *Journal of Rural Studies* 72, p. 75 – 84. DOI: <https://doi.org/10.1016/j.jrurstud.2019.10.031>
- Brecon Beacons National Park (2021) Coronavirus (COVID-19): Update 07.08.2021. Available at <https://www.beacons-npa.gov.uk/coronavirus-covid-19/> [Accessed: 1 November 2021]
- Business Wales (n.d.) Foundational Economy. Available at <https://businesswales.gov.wales/foundational-economy> [Accessed: 23 November 2021]
- Castells-Quintana, D; Lopez-Uribe, M.D.P and McDermott, T (2015) Climate change and the geographical and institutional drivers of economic development. Centre for Climate Change Economics and Policy, Working Paper No. 223. Grantham Research Institute on Climate Change and the Environment, Working Paper No. 198. The London School of Economics and Political Science. Available at <https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2015/07/Working-Paper-198-Castells-Quintana-et-al.pdf> [Accessed: 18 November 2021]
- Centre for Towns (2020) COVID-19 and our Towns: The effect of the COVID-19 pandemic on our towns and cities. Available at: <https://www.centrefortowns.org/reports/covid-19-and-our-towns/viewdocument/21> [Accessed: 19 May 2021]
- Centres for Disease Control and Prevention (CDC) (2017) Coastal Flooding, Climate Change, and Your Health: What You Can Do to Prepare. Available at <https://www.cdc.gov/climateandhealth/pubs/CoastalFloodingClimateChangeandYourHealth-508.pdf> [Accessed: 11 November 2021]
- Chartered Institute of Housing (2020) Evidence from the Chartered Institute of Housing. Available from <https://committees.parliament.uk/writtenevidence/7513/pdf/> [Accessed: 23 November 2021]
- Chartered Institute of Housing (2021) The worsening energy crisis – what more needs to be done to tackle fuel poverty? Available at <https://www.cih.org/blogs-and-articles/the-worsening-energy-crisis-what-more-needs-to-be-done-to-tackle-fuel-poverty/> [Accessed: 23 November 2021]
- Climate Just (n.d.) What can be done to tackle fuel poverty? Available at <https://www.climatejust.org.uk/messages/what-can-be-done-tackle-fuel-poverty> [Accessed: 1 November 2021]
- Commission for Rural Communities (2013) Annual Report and Accounts 2012-13. London: The Stationery Office. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/264010/0350.pdf [Accessed: 13 September 2021]
- Community Land Scotland (2021) Home Delivery: Community Led Housing in rural Scotland. Available at <https://thinkhouse.org.uk/site/assets/files/2275/cls1120.pdf> [Accessed: 18 November 2021]
- Cowie, P; Mulvey, G; Peck, F and Shaw, K (2018) Brexit: Implications for the rural north of England. Northumbria University, Newcastle University and University of Cumbria. Institute for Local Governance (ILG). Available at <https://www.ncl.ac.uk/media/wwwnclacuk/centreforruraleconomy/files/researchreports/brexitruralnorth-report.pdf> [Accessed: 10 November 2021]

- Cox, E; Murphy, C and Round, A (2017) *Forgotten Opportunities: The Dynamic Role of the Rural Economy in Post-Brexit Britain*. IPPR North. Available at <https://www.ippr.org/files/publications/pdf/forgotten-opportunities-feb2017.pdf> [Accessed: 22 October 2021]
- Dasgupta, P; Morton, J.F.; Dodman, D; Karapinar, B; Meza, F; Rivera-Ferre, M.G.; Toure Sarr, A and Vincent, K.E. (2014) *Rural Areas*. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group 2 to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 613 – 657. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap9_FINAL.pdf [Accessed: 18 November 2021]
- Davies, A.R.; Homolova, L; Grey, C.N.B.; Fisher, J; Burchett, N and Kousoulis, A (2019) *Supporting farming communities at times of uncertainty: An action framework to support the mental health and well-being of farmers and their families*. Public Health Wales and Mental Health Foundation. Available at <https://www.mentalhealth.org.uk/sites/default/files/Supporting-farming-communities-at-times-of-uncertainty.pdf> [Accessed: 10 November 2021]
- Douglas, J. and Beautyman, I (2021) *Comparing the 20 Minute Neighbourhood and Traditional Scenarios In Edinburgh Local Development Plan: a Rapid Scoping Assessment*. Available at https://www.improvementservice.org.uk/_data/assets/pdf_file/0021/19740/20-minute-neighbourhood-rapid-scoping-assessment.pdf [Accessed: 24 February 2022].
- Dwyer, J (2018) *The Implications of Brexit for Agriculture, Rural Areas and Land Use in Wales*. Wales Centre for Public Policy. Available at <https://www.wcpp.org.uk/wp-content/uploads/2018/04/The-Implications-of-Brexit-for-Agriculture-Rural-Areas-and-Land-Use-in-Wales-1.pdf> [Accessed: 11 November 2021]
- Dyakova, M.; Couzens, L; Allen, J; Van Eimeren, M; Stielke, A; Cotter-Roberts, A; Kadel, R; Bainham, B; Ashton, K; Stewart, D; Hughes, K and Bellis, M.A (2021) *Placing health equity at the heart of the COVID-19 sustainable response and recovery: Building prosperous lives for all in Wales*. The Welsh Health Equity Status Report Initiative (WHESRI). Cardiff: Public Health Wales NHS Trust. Available at: <https://phw.nhs.wales/news/placing-health-equity-at-the-heart-of-coronavirus-recovery-for-building-a-sustainable-future-for-wales/placing-health-equity-at-the-heart-of-the-covid-19-sustainable-response-and-recovery-building-prosperous-lives-for-all-in-wales/> [Accessed: 28 May 2021].
- Energy and Climate Change Committee (2012) *Fuel poverty in the private rented and off-grid sectors: Written evidence*. House of Commons. Available at https://publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1744i_ii/1744vw.pdf [Accessed: 1 November 2021]
- Environment Agency (2018) *Climate change impacts and adaptation*. UK Government. Available at <https://www.gov.uk/government/publications/climate-change-impacts-and-adaptation> [Accessed: 18 November 2021]
- European Commission (2020) *Trade Sustainability Impact Assessment in support of FTA negotiations between the European Union and Australia*. BKP Economic Advisors. Available at https://trade.ec.europa.eu/doclib/docs/2021/july/tradoc_159745.pdf [Accessed: 1 November 2021]
- European Commission (2021a) *Rural development*. Available at: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/rural-development_en [Accessed: 13 September 2021]

- European Commission (2021b) Urban-rural linkages. Available at: https://ec.europa.eu/regional_policy/en/policy/what/territorial-cohesion/urban-rural-linkages/ [Accessed: 14 September 2021]
- Evans, C and Necke, K (2021) House prices in Wales rising highest, says Rightmove. BBC News. Available at <https://www.bbc.co.uk/news/uk-wales-58203740> [Accessed: 18 October 2021]
- Farmers' Union of Wales (2018) Wales' farming unions outline 'Welsh way forward'. Available at <https://fuw.org.uk/en/news/13229-wales-farming-unions-outline-welsh-way-forward> [Accessed: 26 October 2021]
- Finlay, J; Audickas, L; Ward, M and Coe, S (2021) The Agriculture Act 2020. UK Parliament. Available at: <https://commonslibrary.parliament.uk/research-briefings/cbp-8702/> [Accessed: 5 October 2021].
- Food and Agriculture Organization of the United Nations (FAO) (2021a) Reduce Rural Poverty. Available at: <http://www.fao.org/reduce-rural-poverty/en/> [Accessed: 13 September 2021]
- Food and Agriculture Organization of the United Nations (FAO) (2021b) Climate-Smart Agriculture. Available at <https://www.fao.org/climate-smart-agriculture/en/> [Accessed: 16 September 2021]
- Food Standards Agency (n.d.) Covid-19 Consumer Tracker Waves 1 – 4. Available at: <https://www.food.gov.uk/sites/default/files/media/document/covid-19-wave-1-4-report-final-mc.pdf> [Accessed: 18 November 2021]
- Ge, J; Polhill, J.G.; Matthews, K.B.; Miller, D.G. and Spencer M (2018) Not one Brexit: How local context and social processes influence policy analysis. PLoS One 13(12). DOI: <https://doi.org/10.1371/journal.pone.0208451>
- Geng, D.C.; Innes, J; Wu, W and Wang, G (2021) Impacts of COVID-19 pandemic on urban park visitation: a global analysis. Journal of Forestry Research 32, p. 553 – 567. DOI: <https://doi.org/10.1007/s11676-020-01249-w>
- Green, L; Ashton, K; Fletcher, M; Jones, A.T.; Evans, L; Evans, T; Parry-Williams, L; Azam, S and Bellis, M.A. (2021a) Rising to the Triple Challenge of Brexit, COVID-19 and Climate Change for health, well-being and equity in Wales. Public Health Wales NHS Trust, Cardiff. Available at https://phwwhocc.co.uk/wp-content/uploads/2021/09/PHW_Strategic_Paper-ENGLISH-Final-1.10.2021.pdf [Accessed: 10 November 2021]
- Green, L; Ashton, K; Jones, A.T.; Fletcher, M; Morgan, L; Johnson, T; Evans, T; Azam, S and Bellis, M.A. (2021b) Rising to the Triple Challenge of Brexit, COVID-19 and Climate Change for health, well-being and equity in Wales. Spotlight on: Food Security. Public Health Wales NHS Trust, Cardiff. Available at https://phwwhocc.co.uk/wp-content/uploads/2021/10/PHW_PHW_Food_Security_Paper-FINAL.pdf19.10.2021.pdf [Accessed: 10 November 2021]
- Green, L; Edmonds, N; Clar, C; Cresswell, K; Judd, N; Wood, S; Hughes, K; Azam, S and Bellis, M.A (2021, forthcoming). Too hot to handle? A health and well-being impact assessment (HIA) of climate change in Wales. Public Health Wales NHS Trust, Cardiff.
- Green, L; Edmonds, N; Morgan, L; Andrew, R; Ward, M; Azam, S and Bellis, M.A. (2019) The Public Health Implications of Brexit in Wales: A Health Impact Assessment Approach. Technical Report Part 1. Public Health Wales NHS Trust, Cardiff. Available at https://phwwhocc.co.uk/wp-content/uploads/2020/08/PHW_Implications_of_Brexit_TechRep_Part_1.pdf [Accessed: 1 June 2021]

- Green, L; Edmonds, N; Morgan, L; Andrew, R; Ward, M; Azam, S and Bellis, M.A. (2019b) The Public Health Implications of Brexit in Wales: A Health Impact Assessment Approach. Technical Report Part 2. Public Health Wales NHS Trust, Cardiff. Available at https://www.wales.nhs.uk/sitesplus/documents/888/PHW_Implications_of_Brexit_TechRep_Part_2.pdf [Accessed: 1 June 2021]
- Green, L; Edmonds, N; Morgan, L; Andrew, R; Ward, M; Azam, S and Bellis, M.A. (2019a) The Public Health Implications of Brexit in Wales: A Health Impact Assessment Approach. Main Findings. WHIASU. Public Health Wales NHS Trust, Cardiff. Available at <https://phw.nhs.wales/services-and-teams/policy-and-international-health-who-collaborating-centre-on-investment-for-health-well-being/publications-and-resources-bucket/implications-of-brexit-main-findings-report-english-only/> [Accessed: 1 November 2021]
- Green, L; Lewis, R; Evans, L; Morgan, L; Parry-Williams, L; Azam, S and Bellis, M.A. (2020a) A COVID-19 pandemic world and beyond: The public health impact of home and agile working in Wales. Summary Report. Cardiff: Public Health Wales NHS Trust, Cardiff. Available at <https://phwwhocc.co.uk/wp-content/uploads/2021/02/PHW-HIA-Home-Working-Report-Final-English.pdf> [Accessed: 23 April 2021]
- Green, L; Morgan, L; Azam, S; Evans, L; Parry-Williams, L; Petchey, L and Bellis, M.A. (2020) A Health Impact Assessment of the 'Staying at Home and Social Distancing Policy' in Wales in response to the COVID-19 pandemic. Main Report. Public Health Wales NHS Trust, Cardiff. Available at https://phwwhocc.co.uk/wp-content/uploads/2020/07/HIA-Rapid-Review-of-SAH-Policy-Main-Web_Final.pdf [Accessed: 28 May 2021]
- Grey, C; Brunt, H; Jones, S; Azam, S; Charles, J; Porter, T; Jones, A; Knight, T and Price, S (2018) Making a Difference: Reducing health risks associated with road traffic air pollution in Wales. Public Health Wales NHS Trust, Cardiff. Available at <https://phw.nhs.wales/services-and-teams/knowledge-directorate/research-and-evaluation/publications/making-a-difference-reducing-health-risks-associated-with-road-traffic-pollution-in-wales/> [Accessed: 18 November 2021]
- Hamptons (2021) The Buyer's Gambit: Market Insight Summer 2021. Available at <https://www.hamptons.co.uk/research/reports/market-insight-summer-2021/#/> [Accessed: 18 October 2021]
- HM Government (2021) Wales – Gigabit Vouchers. Available at: <https://gigabitvoucher.culture.gov.uk/wales/> [Accessed: 18 November 2021]
- HM Land Registry (2021) UK House Price Index: reports. UK Government. Available at <https://www.gov.uk/government/collections/uk-house-price-index-reports> [Accessed: 18 October 2021]
- Homolova, L; Grey, C.N.B; Burchett, N and Davies, A.R. (2020) Building resilience in the fishing sector in Wales. Public Health Wales and Mental Health Foundation. Available at <https://phw.nhs.wales/publications/publications1/building-resilience-in-the-fishing-sector-in-wales-english/> [Accessed: 12 November 2021]
- Honeyman, M; Maguire, D; Evans, H and Davies, A (2020) Digital technology and health inequalities: a scoping review. Public Health Wales NHS Trust, Cardiff. Available at <https://phw.nhs.wales/publications/publications1/digital-technology-and-health-inequalities-a-scoping-review/> [Accessed: 20 October 2021]
- House of Commons (2019) Energy efficiency: building towards net zero – Twenty-First Report of Session 2017-19. Business, Energy and Industrial Strategy Committee. Available at <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/1730/1730.pdf> [Accessed: 15 December 2021]

- House of Commons (2021) Seafood and meat exports to the EU: Eighth Report of Session 2019-21. Environment, Food and Rural Affairs Committee. Available at <https://publications.parliament.uk/pa/cm5801/cmselect/cmenvfru/1189/1189.pdf> [Accessed: 18 November 2021]
- House of Lords (2017) Brexit: agriculture. 20th Report of Session 2016-17. European Union Committee: London. Available at <https://publications.parliament.uk/pa/ld201617/ldselect/ldeucom/169/169.pdf> [Accessed: 2 September 2021]
- Hughes, R.P. and Hughes, D.A. (2020) Impact of Relaxing Covid-19 Social Distancing Measures on Rural North Wales: A Simulation Analysis. *Frontiers in Public Health* 8, 562473. DOI: <https://dx.doi.org/10.3389%2Ffpubh.2020.562473>
- Humble, A (2019) Presentation on Geographical Vulnerabilities Project and updated analysis for Fisheries sector: Brexit roundtable. Welsh Government. Available at <https://gov.wales/sites/default/files/publications/2019-06/geographical-vulnerabilities-project-presentation.pdf> [Accessed: 26 October 2021]
- Hutton, G (2021) Building telecommunications infrastructure. UK Parliament. Available at: <https://commonslibrary.parliament.uk/research-briefings/cbp-9156/> [Accessed: 27 September 2021]
- Institute for Government (2020) UK–EU future relationship: the deal. Available at: <https://www.instituteforgovernment.org.uk/publication/future-relationship-trade-deal> [Accessed: 4 January 2021]
- Intergovernmental Panel on Climate Change (IPCC) (2018) Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.* [Masson-Delmotte, V., Zhai, P; Pörtner, H.-O; Roberts, D; Skea, J; Shukla, P.R.; Pirani, A; Moufouma-Okia, W; Péan, C; Pidcock, R; Connors, S; Matthews, J.B.R.; Chen, Y; Zhou, X; Gomis, M.I.; Lonnoy, E; Maycock, T; Tignor, M and Waterfield, T (eds.)] Available at <https://www.ipcc.ch/sr15/chapter/spm/> [Accessed: 1 November 2021]
- Johnson, C; Price, J and Tilley, H (2021) How is the Brexit trade agreement affecting the Welsh economy? Economics Observatory. Available at <https://www.economicsobservatory.com/how-is-the-brexit-trade-agreement-affecting-the-welsh-economy> [Accessed: 5 October 2021]
- Jones, G.W. and Jones, T (2021) The Agriculture White Paper: What Future for the Post-Brexit Welsh Countryside? Institute for Welsh Affairs (IWA). Available at <https://www.iwa.wales/agenda/2021/03/the-agriculture-white-paper-what-future-for-the-post-brexit-welsh-countryside/> [Accessed: 11 November 2021]
- Leaver, J and Ahmed, R (2021) The Welsh coastal villages turned into ‘winter ghost towns’ by millionaire second home owners. *North Wales Live, Daily Post*. Available at <https://www.dailypost.co.uk/news/north-wales-news/welsh-coastal-villages-turned-winter-20755934> [Accessed: 1 November 2021]
- Levi, M; Kjellstrom, T and Baldasseroni, A (2018) Impact of climate change on occupational health and productivity: a systematic literature review focusing on workplace heat. *La Medicina del lavoro* 109(3), p. 163 – 179. DOI: <https://doi.org/10.23749/mdl.v109i3.6851>
- Lle (2015) Natural Flood Risk Maps. Lle: A Geo-Portal for Wales. Welsh Government and Natural Resources Wales. Available at <http://lle.gov.wales/catalogue/item/NationalFloodRiskMaps/?lang=en> [Accessed: 1 November 2021]

- Local Government Association (2017) Health and well-being in rural areas. Public Health England. Available at: https://www.local.gov.uk/sites/default/files/documents/1.39_Health%20in%20rural%20areas_WEB.pdf [Accessed: 2 June 2021]
- McNamara, C.L.; Labonte, R; Schram, A and Townsend, B (2021) Glossary on Free Trade Agreements and Health Part 1: The Shift From Multilateralism and the Rise of 'WTO-PLUS' Provisions. *Journal of Epidemiology and Community Health* 75(4), p. 402 – 406. DOI: <http://dx.doi.org/10.1136/jech-2020-215104>
- McNamee, P (2020) Could Brexit open the gates to AI in the UK? Finextra. Available at <https://www.finextra.com/the-long-read/25/could-brexit-open-the-gates-to-ai-in-the-uk> [Accessed: 20 October 2021]
- Mencap (2020) My Health, My Life: Barriers to healthcare for people with a learning disability during the pandemic. Health Report 2020. Available at https://www.mencap.org.uk/sites/default/files/2020-12/MyHealthMyLife_COVID%20report.pdf [Accessed: 20 October 2021]
- Milbourne, P and Coulson, H (2020) Tackling Rural Poverty in Wales: Developing community-based approaches. A position paper for the Rural Futures project, Cardiff University. Available at <https://ruralfutures.wales/wp-content/uploads/sites/7/2020/06/Rural-Poverty-Report-final.pdf> [Accessed: 11 November 2021]
- Milne, J (2021) How coronavirus has highlighted the need for better rural transport. *The Conversation*. Available at <https://theconversation.com/how-coronavirus-has-highlighted-the-need-for-better-rural-transport-155533> [Accessed: 18 November 2021]
- Mitaritonna, C and Ragot, L (2020) After Covid-19, will seasonal migrant agricultural workers in Europe be replaced by robots? CEPII Policy Brief 33. Research and Expertise of the World Economy. Available at http://www.cepii.fr/PDF_PUB/pb/2020/pb2020-33.pdf [Accessed: 18 June 2021]
- Moeckel, R (2017) Working from Home: Modeling the Impact of Telework on Transportation and Land Use. 44th European Transport Conference 2016, ETC 2016, 5-7 October 2016, Barcelona, Spain. *Transportation Research Procedia* 26, p. 207 – 214. DOI: <https://doi.org/10.1016/j.trpro.2017.07.021>
- Morris, A (2021) How post-Brexit work visa rules are changing to address the labour crisis. Available at <https://www.peoplemanagement.co.uk/experts/legal/post-brexit-work-visa-rules-relaxed-address-labour-crisis#gref> [Accessed: 24 February 2022]
- Myers, M; Turton, A; Marshall Cross, E and Glover, L (2018) Technical Feasibility of Electric Heating in Rural Off-Gas Grid Dwellings. Delta Energy & Environment. BEIS Research Series Number 0024. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762596/Technical_Feasibility_of_Electric_Heating_in_Rural_Off-Gas_Grid_Dwellings.pdf [Accessed: 15 December 2021]
- National Assembly for Wales (2017) Protecting agricultural workers in Wales. Available at <https://research.senedd.wales/researchblogfilesen/2017/07/protecting-agricultural-workers-ine1.pdf> [Accessed: 27 October 2021]
- National Federation of Young Farmers (2020) Covid-19 and a post-Brexit rural future. Available at http://roseregeneration.co.uk/wp-content/uploads/2020/10/Final-RuralFuture_summaryreport.pdf [Accessed: 24 February 2020]
- Natural Resources Wales (2021a) Report highlights how nature helped us cope with Covid-19. Available at <https://naturalresources.wales/about-us/news-and-events/news/report-highlights-how-nature-helped-us-cope-with-covid-19/?lang=en> [Accessed: 1 November 2021]

- Natural Resources Wales (2021b) Our response to the coronavirus pandemic. Available at <https://naturalresources.wales/about-us/news-and-events/statements/our-response-to-the-coronavirus-pandemic/?lang=en> [Accessed: 15 December 2021]
- Neal, S; Gawlewicz, A; Heley, J and Jones, RD (2021) Don't forget the countryside: rural communities and Brexit. London School of Economics (LSE). Available at <https://blogs.lse.ac.uk/brexit/2021/04/19/dont-forget-the-countryside-the-social-impact-of-brexit-in-rural-communities-must-not-be-overlooked/> [Accessed: 10 November 2021]
- Netherwood, A (2021) Evidence for the third UK Climate Change Risk Assessment (CCRA3): Summary for Wales. UK Climate Risk. Available at <https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Wales-Summary-Final.pdf> [Accessed: 20 October 2021]
- Newell, R and Dale, A (2020) COVID-19 and climate change: an integrated perspective. Cities & Health – Special Issue: COVID-19. DOI: <https://doi.org/10.1080/23748834.2020.1778844>
- NFU Cymru (2020a) NFU Cymru asks First Minister for resilience funding to help Welsh farmers keep feeding the nation. Available at <https://www.nfu-cymru.org.uk/cross-sector/food-chain/nfu-cymru-asks-first-minister-for-resilience-fundi/> [Accessed: 1 November 2021]
- NFU Cymru (2020b) NFU Cymru – COVID-19 and future farming policy. Available at <https://www.nfu-cymru.org.uk/nfu-cymru/documents/paper-covid-19-and-future-agricultural-policy-final/> [Accessed: 18 November 2021]
- NFU Cymru (2021a) NFU Cymru welcomes Minister's future funding intentions. Available at <https://www.nfu-cymru.org.uk/home/nfu-cymru-welcomes-ministers-future-funding-inten/> [Accessed: 1 November 2021]
- NFU Cymru (2021b) UK-New Zealand trade deal: What it means for British farming. Available at <https://www.nfu-cymru.org.uk/news/latest-news/uk-new-zealand-trade-deal-what-it-means-for-briti/> [Accessed: 23 November 2021]
- North Yorkshire Rural Commission (2021) Rural North Yorkshire: The way forward. The findings and recommendations of the Rural Commission. North Yorkshire Rural Commission. North Yorkshire County Council. Available at <https://www.northyorks.gov.uk/sites/default/files/fileroot/About%20the%20council/Rural%20Commission%20Report.pdf> [Accessed: 13 September 2021].
- Noy, I (2021) What are the economic effects of extreme weather caused by climate change? Economics Observatory. Available at <https://www.economicsobservatory.com/what-are-the-economic-effects-of-extreme-weather-caused-by-climate-change> [Accessed: 4 November 2021]
- O2 (2020) The Flexible Future of Work. Available at <https://news.o2.co.uk/2020/05/20/the-flexible-future-of-work/> [Accessed 11 August 2020]
- Ofcom (2020) Connected Nations 2020: Wales report. Available at https://www.ofcom.org.uk/_data/assets/pdf_file/0020/209441/connected-nations-2020-wales.pdf [Accessed: 18 November 2021]
- Office for National Statistics (2016) 2011 rural/urban classification. Available at <https://www.ons.gov.uk/methodology/geography/geographicalproducts/ruralurbanclassifications/2011ruralurbanclassification> [Accessed: 21 May 2021]

Office for National Statistics (2020) Estimates of the population for the UK, England and Wales, Scotland and Northern Ireland- Mid-2019: April 2020 local authority district codes. Available at <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland> [Accessed: 21 May 2021]

Office for National Statistics (2021) How has lockdown changed our relationship with nature? Available at <https://www.ons.gov.uk/economy/environmentalaccounts/articles/howhaslockdownchangedourrelationshipwithnature/2021-04-26> [Accessed: 1 November 2021]

Organisation for Economic Co-operation and Development (OECD) (2020) OECD Policy Responses to Coronavirus (COVID-19): Policy implications of Coronavirus crisis for rural development. Available at <https://www.oecd.org/coronavirus/policy-responses/policy-implications-of-coronavirus-crisis-for-rural-development-6b9d189a/> [Accessed: 26 October 2021]

Palmer, W and Rolewicz, L (2020) Rural, remote and at risk: Why rural health services face a steep climb to recovery from Covid-19. Nuffield Trust. Available at <https://www.nuffieldtrust.org.uk/files/2020-12/covid-19-rural-health-services-final.pdf> [Accessed: 20 October 2021]

Pembrokeshire County Council (2021) Cabinet recommends 100% Council Tax premium for second homes. Available at <https://www.pembrokeshire.gov.uk/newsroom/cabinet-recommends-100-council-tax-premium-for-second-homes> [Accessed: 1 November 2021]

Penaloza, D; Erlandsson, M; Berlin, J; Wålinder, M and Falk, A (2018) Future scenarios for climate mitigation of new construction in Sweden: Effects of different technological pathways. Journal of Cleaner Production 187, p. 1025 – 1035. DOI: <https://doi.org/10.1016/j.jclepro.2018.03.285>

Penningtons Manches Cooper (2021) How is Brexit Affecting Housing Providers? Available at <https://www.penningtonslaw.com/news-publications/latest-news/2021/how-is-brexit-affecting-housing-providers> [Accessed: 18 October 2021]

Petchey, L and Cresswell, K (2021) What could post-Brexit trade agreements mean for public health in Wales? Public Health Wales NHS Trust, Cardiff. Available at https://phwwhocc.co.uk/wp-content/uploads/2021/10/FINAL-PHW-Polisi-Post-Brexit-Trade-briefing-note-English-26_10_21.pdf [Accessed: 1 November 2021]

Phillipson, J; Gorton, M; Turner, R; Shucksmith, M; Aitken-McDermott, K; Areal, F; Cowie, P; Hubbard, C; Maioli, S; McAreevey, R; Souza-Monteiro, D; Newbery, R; Panzone, L; Rowe, F and Shortall, S (2020) The COVID-19 Pandemic and its Implications for Rural Economies. Sustainability 12(10), 3973. DOI: <https://doi.org/10.3390/su12103973>

Place Alliance (2020) Home Comforts: How the design of our homes and neighbourhoods affected our experience of the Covid-19 lockdown and what we can learn for the future. Available at http://placealliance.org.uk/wp-content/uploads/2020/10/Place-Alliance-Homes-and-Covid-Report_2020.pdf [Accessed: 23 November 2021]

Price, J; Roberts, M and Bristow, D (2021) Towards a Just Transition in Wales. Available at: <https://www.wcpp.org.uk/wp-content/uploads/2021/01/Towards-a-Just-Transition-in-Wales.pdf> [Accessed: 18 November 2021]

Rampa, A; Gadanakis, Y and Rose, G (2020) Land Reform in the Era of Global Warming – Can Land Reforms Help Agriculture Be Climate-Smart? Land 9(12), 471. DOI: <https://doi.org/10.3390/land9120471>

- Riva, M; Curtis, S; Gauvin, L and Fagg, J (2009) Unravelling the extent of inequalities in health across urban and rural areas: Evidence from a national sample in England. *Social Science & Medicine* 68(4), p. 654 – 663. DOI: <https://doi.org/10.1016/j.socscimed.2008.11.024>
- Roederer-Rynning, C and Matthews, A (2019) What Common Agricultural Policy after Brexit? *Politics and Governance* 7(3) p. 40 – 50. DOI: <http://dx.doi.org/10.17645/pag.v7i3.2117>
- Rolfe, H; Lasko-Skinner, R; Atay, A; Judson, E; Mackenzie, P; Oakes, J; Wood, C; Hilhorst, S and Williams–Taplin, H (2020) Britain Under Lockdown. Available at <https://demos.co.uk/wp-content/uploads/2020/08/Britain-under-Lockdown.pdf> [Accessed: 18 November 2021]
- Royal College of Nursing (2020) Issue Briefing: Rural Health in the UK. Available at: <https://www.rcn.org.uk/about-us/our-influencing-work/policy-briefings/BR-0620> [Accessed: 7 June 2021]
- Royal Town Planning Institute (2020a) Plan The World We Need: The contribution of planning to a sustainable, resilient and inclusive recovery. Available at <https://www.rtpi.org.uk/research/2020/june/plan-the-world-we-need/> [Accessed: 18 November 2021]
- Royal Town Planning Institute (2020b) Invest and Prosper: A business case for investing in planning. Available at <https://www.rtpi.org.uk/research/2020/october/invest-and-prosper/> [Accessed: 18 November 2021]
- Royal Town Planning Institute (2020c) Pragmatic and Prepared for the Recovery: The planning profession’s rapid response to Covid-19. Available at <https://www.rtpi.org.uk/media/5304/pragmatic-and-prepared-for-the-recovery.pdf> [Accessed: 18 November 2021]
- Savo, V; Morton, C and Lepofsky, D (2017) Impacts of climate change for coastal fishers and implications for fisheries. *Fish and Fisheries* 18(5), p. 877 – 889. DOI: <https://doi.org/10.1111/faf.12212>
- Scott, E (2021) Rural Economy and UK Agriculture: Issues for the New Parliament. House of Lords Library, UK Parliament. Available at: <https://lordslibrary.parliament.uk/research-briefings/lln-2020-0029/> [Accessed: 27 September 2021]
- Select Committee on the Rural Economy (2019) Time for a strategy for the rural economy. London: House of Lords. HL Paper 330. Available at <https://publications.parliament.uk/pa/ld201719/ldselect/ldrurecon/330/330.pdf> [Accessed: 27 September 2021]
- Shucksmith, M (2017) Rural England after Brexit – a moment of opportunity? Newcastle University Institute for Social Renewal. Available at <https://blogs.ncl.ac.uk/nisr/rural-england-after-brexit-a-moment-of-opportunity/> [Accessed: 22 October 2021]
- Smith, E.F.; Keys, N; Lieske, S.N. and Smith, T.F. (2015) Assessing Socio-Economic Vulnerability to Climate Change Impacts and Environmental Hazards in New South Wales and Queensland, Australia. *Geographical Research* 53(4), p. 451 – 465. DOI: <https://doi.org/10.1111/1745-5871.12137>
- Smith, K.B.; Humphreys, J.S. and Wilson, M.G.A. (2008) Addressing the health disadvantage of rural populations: How does epidemiological evidence inform rural health policies and research? *The Australian Journal of Rural Health* 16(2), p. 56 – 66. DOI: <https://doi.org/10.1111/j.1440-1584.2008.00953.x>
- Social Farms and Gardens (2021) Website homepage. Available at <https://www.farmgarden.org.uk/> [Accessed: 18 November 2021]
- Speciality Food Magazine (2021) Why UK food shortages could be here to stay. Available at <https://www.specialityfoodmagazine.com/retail/uk-food-shortages-here-to-stay> [Accessed: 1 November 2021]

- Stagrum, A.E.; Andenæs, E; Kvande, T and Lohne, J (2020) Climate Change Adaptation Measures for Buildings – A Scoping Review. Sustainability 12(5), 1721. DOI: <https://doi.org/10.3390/su12051721>
- Statistics for Wales (2008) Rural Wales: definitions and how to choose between them. Welsh Government. Available at <https://gov.wales/rural-wales-definitions-and-how-choose-between-them> [Accessed: 28 April 2021]
- Statistics for Wales (2020) June 2020 Survey of Agriculture and Horticulture: Results for Wales. Welsh Government. Available at <https://gov.wales/sites/default/files/statistics-and-research/2020-12/survey-agriculture-and-horticulture-june-2020-932.pdf> [Accessed: 25 October 2021]
- Statistics for Wales (2021) Gross Value Added in Wales by industry. Welsh Government. Available at <https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/Regional-Accounts/Gross-Value-Added-GDP/gvainwales-by-industry> [Accessed: 5 October 2021]
- StatsWales (2019) Welsh Housing Conditions Survey (energy efficiency of dwellings): April 2017 – March 2018. Available at <https://gov.wales/welsh-housing-conditions-survey-energy-efficiency-dwellings-april-2017-march-2018> [Accessed: 24 February 2022].
- Strasser, R (2003) Rural health around the world: challenges and solutions. Family Practice 20(4), p. 457 – 463. DOI: <https://doi.org/10.1093/fampra/cm422>
- TCPA (2021) The 20-minute neighbourhood. Available at <https://www.tcpa.org.uk/the-20-minute-neighbourhood> [Accessed: 1 November 2021]
- The Welsh NHS Confederation (2018a) The key issues for health and social care organisations as the UK prepares to leave the European Union. Available at https://www.nhsconfed.org/sites/default/files/media/Wales-policy-forum-brexite-briefing_0.pdf [Accessed: 18 November 2021]
- The Welsh NHS Confederation (2018b) Rural Health and Care Services in Wales. Available at https://www.nhsconfed.org/sites/default/files/media/Rural-Health-and-Care-Services-in-Wales_0.pdf [Accessed: 18 November 2021]
- Tilley, H; Johnson, C; Roberts, M; and Price, J (2020) Recovery from the Coronavirus pandemic: Indigenous business and low carbon production. Available at: <https://www.wcpp.org.uk/wp-content/uploads/2020/11/Recovery-from-the-Coronavirus-pandemic.-Indigenous-business-and-low-carbon-production.pdf> [Accessed: 18 November 2021]
- UK Government (2013) Commission for Rural Communities. Available at: <https://www.gov.uk/government/organisations/commission-for-rural-communities> [Accessed: 13 September 2021]
- UK Government (2017) UK Climate Change Risk Assessment 2017. Department for Environment, Food and Rural Affairs. Available at <https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2017> [Accessed: 10 November 2021]
- UK Government (2020) £2 billion package to create a new era for cycling and walking. Department for Transport, Office for Zero Emission Vehicles, Office for Low Emission Vehicles and The Rt Hon Grant Shapps MP. Available at <https://www.gov.uk/government/news/2-billion-package-to-create-new-era-for-cycling-and-walking> [Accessed: 18 November 2021]
- UK Parliament (2021a) Hansard – Comprehensive and Progressive Agreement for Trans-Pacific Partnership: Volume 697. Available at <https://hansard.parliament.uk/commons/2021-06-24/debates/095302D5-7216-44AE-B64B-34D54BB3BA52/ComprehensiveAndProgressiveAgreementForTrans-PacificPartnership> [Accessed: 1 November 2021]

- UK Parliament (2021b) Labour shortages in the food and farming sector. Environment, Food and Rural Affairs Committee. Available at <https://committees.parliament.uk/work/1497/labour-shortages-in-the-food-and-farming-sector/> [Accessed: 1 November 2021]
- University of Reading (2021) Brexit could transform Wales from sheep farms to forest. [Phys.org](https://phys.org/news/2021-03-brexit-wales-sheep-farms-forest.html). Available at <https://phys.org/news/2021-03-brexit-wales-sheep-farms-forest.html> [Accessed: 11 November 2021]
- Vos, R (2015) Thought for Food: Strengthening Global Governance of Food Security. Department of Economic & Social Affairs, CDP Background Paper No. 29. Food and Agriculture Organization (FAO). Available at https://www.un.org/en/development/desa/policy/cdp/cdp_background_papers/bp2015_29.pdf [Accessed: 18 November 2021]
- Wang, L; Zhong, B; Vardoulakis, S; Zhang, F; Pilot, E; Li, Y; Yang, L; Wang, W and Krafft, T (2016) Air Quality Strategies on Public Health and Health Equity in Europe – A Systematic Review. *International Journal of Environmental Research and Public Health* 13(12), 1196. DOI: <https://doi.org/10.3390/ijerph13121196>
- Watt, I.S.; Franks, A.J. and Sheldon, T.A. (1994) Health and health care of rural populations in the UK: is it better or worse? *Journal of Epidemiology & Community Health* 48(1), p. 16 – 21. DOI: <http://dx.doi.org/10.1136/jech.48.1.16>
- Welsh Assembly Government (2010) Food for Wales, Food from Wales 2010 – 2020: Food Strategy for Wales. Available at <https://gov.wales/sites/default/files/publications/2018-05/food-strategy-for-wales-2010-to-2020.pdf> [Accessed: 18 November 2021]
- Welsh Government (2008) “Rural Wales” – definitions and how to choose between them. Statistics for Wales. Available at: <https://gov.wales/sites/default/files/statistics-and-research/2018-12/080313sb102008en.pdf> [Accessed: 21 May 2021]
- Welsh Government (2009) The Wales Planning Policy Development Programme: A study to examine local barriers to the delivery of affordable housing in rural Wales. Available at <https://gov.wales/sites/default/files/publications/2018-10/local-barriers-to-affordable-housing-rural-wales.pdf> [Accessed: 1 November 2021]
- Welsh Government (2014) Welsh Index of Multiple Deprivation 2014: A guide to analysing deprivation in rural areas. Statistics for Wales. Available at: <https://gov.wales/sites/default/files/statistics-and-research/2019-05/welsh-index-of-multiple-deprivation-2014-a-guide-to-analysing-deprivation-in-rural-areas.pdf> [Accessed: 6 May 2021]
- Welsh Government (2016a) Measuring the health and well-being of a nation – Public Health Outcomes Framework for Wales. Public Health Wales. Available at: <https://gov.wales/sites/default/files/publications/2019-06/measuring-the-health-and-well-being-of-a-nation.pdf> [Accessed: 21 May 2021]
- Welsh Government (2016b) Smart Living – Internet of Life: First Highlight Report. Available at <https://gov.wales/sites/default/files/publications/2019-05/smart-living-in-wales.pdf> [Accessed: 18 November 2021]
- Welsh Government (2017) Regional Investment in Wales after Brexit: Securing Wales’ Future. Available at <https://gov.wales/sites/default/files/publications/2018-10/regional-investment-in-wales-after-brexit.pdf> [Accessed: 12 November 2021]
- Welsh Government (2018) The Parliamentary Review of Health and Social Care in Wales – A Revolution from Within: Transforming Health and Care in Wales. Available at: <https://gov.wales/sites/default/files/publications/2018-01/Review-health-social-care-report-final.pdf> [Accessed: 21 May 2021]

Welsh Government (2018a) Woodlands for Wales: strategy. Available at: <https://gov.wales/woodlands-wales-strategy> [Accessed: 5 May 2021]

Welsh Government (2019) Welsh Index of Multiple Deprivation (WIMD) 2019: Results report. Statistics for Wales. Available at: <https://gov.wales/sites/default/files/statistics-and-research/2019-11/welsh-index-multiple-deprivation-2019-results-report-024.pdf> [Accessed 6 May 2021]

Welsh Government (2019a) Prosperity for All: Climate Conscious Wales. A climate change adaptation plan for Wales. Technical Annex. Available at: <https://gov.wales/sites/default/files/publications/2020-03/prosperity-for-all-a-climate-conscious-wales-technical-annex.pdf#:~:text=%20Prosperity%20for%20All%3A%20A%20Climate%20Conscious%20Wales,climate%20change%2C%20since%20in%20many%20cases%2C%20the%20actions> [Accessed: 27 May 2021]

Welsh Government (2019b) Rural Development Programme document 2014 to 2020. Available at: <https://gov.wales/rural-development-programme-document-2014-2020> [Accessed: 5 May 2021]

Welsh Government (2019c) United Kingdom – Rural Development Programme (Regional) – Wales. The European Agricultural Fund for Rural Development: Europe investing in rural areas. Available at <https://gov.wales/sites/default/files/publications/2019-07/rural-development-programme-document-2014-to-2020.pdf> [Accessed: 1 November 2021]

Welsh Government (2019d) Welsh Housing Conditions Survey (energy efficiency of dwellings): April 2017 to March 2018. National Statistics. Available at <https://gov.wales/welsh-housing-conditions-survey-energy-efficiency-dwellings-april-2017-march-2018> [Accessed: 23 November 2021]

Welsh Government (2020a) In-home domestic energy advice pilot: guidance. Available at: <https://gov.wales/home-domestic-energy-advice-pilot-guidance-htm> [Accessed: 7 January 2021]

Welsh Government (2020b) Marine and fisheries policies for Wales after Brexit. Available at: <https://gov.wales/marine-and-fisheries-policies-wales-after-brexit> [Accessed: 27 May 2021]

Welsh Government (2020c) The National Strategy for Flood and Coastal Erosion Risk Management in Wales. Available at: <https://gov.wales/national-strategy-flood-and-coastal-erosion-risk-management-wales> [Accessed: 27 April 2021]

Welsh Government (2020d) Written Statement: A response to the Brexit and our Seas consultation and the next steps towards a future fisheries policy for Wales (15 September 2020). Available at: <https://gov.wales/written-statement-response-brexit-and-our-seas-consultation-and-next-steps-towards-future-fisheries> [Accessed: 27 May 2021].

Welsh Government (2020e) Written Statement: The Optimised Retrofit Programme 2020-21 (6 November 2020). Available at: <https://gov.wales/written-statement-optimised-retrofit-programme-2020-21> [Accessed: 10 February 2021]

Welsh Government (2020f) Up to £65 million set aside to keep Wales' railway running. Available at <https://gov.wales/65-million-set-aside-keep-wales-railway-running> [Accessed: 20 October 2021]

Welsh Government (2020g) Active travel fund: guidance 2021 to 2022. Available at <https://gov.wales/active-travel-fund-guidance-2021-2022> [Accessed: 20 October 2021]

Welsh Government (2020h) The Coronavirus Act 2020 (Commencement No. 1) (Wales) Regulations 2020. Available at <https://gov.wales/coronavirus-act-2020-commencement-no-1-wales-regulations-2020> [Accessed: 23 November 2021]

Welsh Government (2020i) Active travel (walking and cycling): April 2019 to March 2020. Available at <https://gov.wales/sites/default/files/pdf-versions/2021/1/3/1610565464/active-travel-walking-and-cycling-april-2019-march-2020.pdf> [Accessed: 15 December 2021]

Welsh Government (2021) Future Wales – The National Plan 2040. Available at: <https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf> [Accessed 21 May 2021]

Welsh Government (2021a) £1.3m for Welsh seafood sector to help deal with Brexit and Covid impacts. Available at: <https://gov.wales/13m-welsh-seafood-sector-help-deal-brexit-and-covid-impacts> [Accessed: 27 May 2021]

Welsh Government (2021b) Agriculture (Wales) Bill. Available at: <https://gov.wales/agriculture-wales-bill> [Accessed: 26 May 2021]

Welsh Government (2021c) Electric vehicle charging strategy for Wales. Available at: <https://gov.wales/electric-vehicle-charging-strategy-wales> [Accessed: 22 April 2021]

Welsh Government (2021d) Farm Business Grant: rules booklets. Available at: <https://gov.wales/farm-business-grant-rules-booklets> [Accessed: 5 May 2021]

Welsh Government (2021e) Llwybr Newydd: the Wales Transport Strategy 2021. Available at: <https://gov.wales/llwybr-newydd-wales-transport-strategy-2021> [Accessed: 22 April 2021]

Welsh Government (2021f) Llwybr Newydd the Wales transport strategy 2021: mobility in Wales. Available at: <https://gov.wales/llwybr-newydd-wales-transport-strategy-2021-mobility-wales> [Accessed: 27 April 2021]

Welsh Government (2021g) Local Broadband Fund. Available at: <https://gov.wales/local-broadband-fund> [Accessed: 21 April 2021]

Welsh Government (2021h) Rural Business Investment Scheme - Food: guidance. Available at: <https://gov.wales/rural-business-investment-scheme-food-guidance> [Accessed: 5 May 2021]

Welsh Government (2021i) Rural Business Investment Scheme – Non Agricultural: guidance. Available at: <https://gov.wales/rural-business-investment-scheme-non-agricultural-guidance> [Accessed: 5 May 2021]

Welsh Government (2021j) Social house building strategy. Available at: <https://gov.wales/social-house-building-strategy> [Accessed: 27 April 2021]

Welsh Government (2021k) Tackling fuel poverty 2021 to 2035. Available at: <https://gov.wales/tackling-fuel-poverty-2021-2035> [Accessed: 9 March 2021]

Welsh Government (2021l) The new relationship with the EU: What it means for Wales. Available at: <https://gov.wales/the-new-relationship-with-the-eu-what-it-means-for-wales> [Accessed: 26 May 2021]

Welsh Government (2021m) Timber Business Investment Scheme: guidance. Available at: <https://gov.wales/timber-business-investment-scheme-guidance> [Accessed: 5 May 2021]

Welsh Government (2021n) NHS Wales decarbonisation strategic delivery plan. Available at <https://gov.wales/nhs-wales-decarbonisation-strategic-delivery-plan> [Accessed: 15 October 2021]

Welsh Government (2021o) Flood-hit homes to receive funding following “devastating” scenes across Wales. Available at <https://gov.wales/flood-hit-homes-receive-funding-following-devastating-scenes-across-wales> [Accessed: 1 November 2021]

- Welsh Government (2021p) Technical advice note (TAN) 15: development and flood risk (2004). Available at <https://gov.wales/technical-advice-note-tan-15-development-and-flood-risk-2004> [Accessed: 1 November 2021]
- Welsh Government (2021q) £75 million investment to get more people walking and cycling. Available at <https://gov.wales/75-million-investment-get-more-people-walking-and-cycling> [Accessed: 4 November 2021]
- Welsh Government (2021r) The foundational economy. Available at <https://gov.wales/foundational-economy> [Accessed: 23 November 2021]
- Welsh Government (2021s) £2.5 million funding boost to back businesses in the everyday local economy. Available at <https://gov.wales/25-million-funding-boost-back-businesses-everyday-local-economy> [Accessed: 23 November 2021]
- Welsh Government (2021) Welsh Government Programme for government: update. Available at <https://gov.wales/programme-for-government-2021-to-2026-html> [Accessed: 13 January 2022]
- Welsh Parliament (2008) Rural Development Sub-Committee – Poverty and Deprivation in Rural Wales. Available at: <https://senedd.wales/media/w0zpi44z/poverty-and-deprivation-in-rural-wales-english.pdf> [Accessed: 21 May 2021]
- Welsh Parliament (2021a) Putting the ‘public’ back into public transport. Senedd Research. Available at <https://research.senedd.wales/research-articles/putting-the-public-back-into-public-transport/> [Accessed: 23 November 2021]
- Welsh Parliament (2021b) Remote Working: Implications for Wales. Economy, Infrastructure and Skills Committee. Available at <https://senedd.wales/media/nbbhxrbrn/cr-ld14202-e.pdf> [Accessed: 1 November 2021]
- WHIASU (2012) Health Impact Assessment – A practical guide. Wales Health Impact Assessment Support Unit (WHIASU), Public Health Wales and Cardiff University. Available at https://phwwhocc.co.uk/whiasu/wp-content/uploads/sites/3/2021/05/HIA_Tool_Kit_V2_WEB-1.pdf [Accessed: 8 June 2021]
- Williams, E and Doyle, R (2016) Rural Poverty in Wales: Existing Research and Evidence Gaps. Public Policy Institute for Wales. Available at: <https://www.wcpp.org.uk/wp-content/uploads/2018/04/An-introduction-to-Rural-Poverty.pdf> [Accessed: 21 May 2021]
- Woodfine, L; Green, L; Evans, L; Parry-Williams, L; Heathcote-Elliott, C; Grey, C.N.B.; Irving-Clarke, Y; Kennedy, M; May, C; Azam, S and Bellis, M.A. (2021) No place like home? Exploring the health and well-being impact of COVID-19 on housing and housing insecurity. Summary Report. Cardiff, Public Health Wales NHS Trust. Available at <https://phwwhocc.co.uk/wp-content/uploads/2021/11/PHW-Housing-Security-and-Covid-report-E-final.pdf> [Accessed: 26 November 2021]
- Woods, M and Rahman, R (2019) How changes in the rural economy post-Brexit might impact upon healthcare/health inequalities in rural Wales: Research Briefing. National Assembly for Wales. Available at <https://senedd.wales/media/rwubra04/19-009-web-english.pdf> [Accessed: 10 November 2021]
- Woods, M; Heley, J; Howells, H and Goodwin-Hawkins, B (2021). A Rural Vision for Wales. Aberystwyth University. Available at: <https://rural-urban.eu/sites/default/files/Rural%20Vision%20Evidence%20Report%20Final%20Eng.pdf> [Accessed: 6 May 2021]

World Health Organization (n.d.) Delivering on Air Quality, Climate Change and Health. UN Environment, World Meteorological Organization and Climate and Clean Air Coalition. Available at <https://www.who.int/phe/delivering-air-quality.pdf> [Accessed: 18 November 2021]

World Health Organization (WHO) Europe (2010) Rural poverty and health systems in the WHO European Region. WHO Regional Office for Europe. Available at: https://www.euro.who.int/_data/assets/pdf_file/0019/130726/e94659.pdf [Accessed: 13 September 2021]

Yazd, S.D.; Wheeler, S.A. and Zuo, A (2019) Key Risk Factors Affecting Farmers' Mental Health: A Systematic Review. International Journal of Environmental Research and Public Health 16(23), 4849. DOI: <https://doi.org/10.3390/ijerph16234849>





World Health Organization
Collaborating Centre on Investment
for Health and Well-being

ISBN 978-1-78986-154-367
© 2022 Public Health Wales NHS Trust.

Material contained in this document may be reproduced under the terms of the Open Government Licence (OGL)
[www.nationalarchives.gov.uk/doc/open-government-licence/version/3/provided it is done so accurately and is not used in a misleading context.](http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/provided%20it%20is%20done%20so%20accurately%20and%20is%20not%20used%20in%20a%20misleading%20context)

Acknowledgement to Public Health Wales NHS Trust to be stated.
Copyright in the typographical arrangement, design and layout belongs to Public Health Wales NHS Trust.