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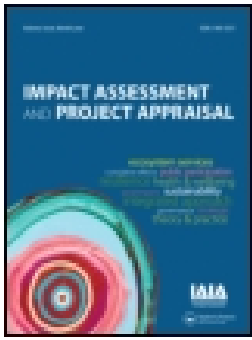
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Brexit, COVID-19 and climate change: mapping the impact of the 'triple challenge' on health and well-being in wales

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ABSTRACT

Brexit, COVID-19 and climate change pose challenges of national and global importance. They continue to have impacts across the economy, society, health, and the environment, all of which are determinants of health and well-being. Between 2018 and 2021, Public Health Wales undertook three Health Impact Assessments (HIA) in relation to the impact of the challenges in Wales. Based on these, work has been carried out to map the synergies across the 'Triple Challenge'. This paper highlights the commonalities in the impact of the three challenges for Wales, discusses the process carried out, learns from it and proposes actions that can be taken to mitigate harm. Results indicate the three components of the Triple Challenge must not be viewed as separate silos as they have cumulative multi-faceted impacts. This affects some population groups more negatively than others and present a 'Triple Challenge' to nation states in the UK and Europe. A HIA approach can enable a range of stakeholders to critically view similar challenges not just as single issues but as a holistic whole to mobilise action.

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Introduction

The United Kingdom's (UK) withdrawal from the European Union (EU) ('Brexit'), the COVID-19 pandemic and climate change all pose major contemporary challenges of either national or international importance for population health, well-being, and health inequalities (Chiesa et al. 2021; Douglas et al. 2020; Fahy et al. 2017; Green et al. 2021, 2020, 2020a; IPCC 2022; Romanello et al. 2021). The wider determinants of health such as the economy, the environment and community have an impact on physical and mental health and well-being (Acheson 1998; Marmot 2010). All three challenges impact across the wider determinants of health in a myriad of ways – some of which are the same and some of which are different (Figure 1; Box 1).

Little literature to date has referred to or looked to systematically combine and objectively examine the policy impacts of these challenges on public health (Burns 2020; Woods 2020; Farming Life 2021; Hasa 2021; One World 2021; Rivington et al. 2021). The National Public Health Institute for Wales, Public Health Wales, carried out three Health Impact Assessments (HIA) in relation to the separate challenges to capture the impact on population health and well-being in Wales between 2018 and 2021 (Green et al. 2019, 2020b; Public Health Wales 2021b).

Wales has at its core a focus on sustainable development and has a unique act, the Wellbeing of the Future Generations (Wales) Act 2015 which focusses on driving sustainable development for the future and promoting well-being across society, the environment, and the economy (Welsh Government 2015).

HIA provides a useful methodology through which to explicitly articulate the impacts of unexpected and unique policies, plans, or projects. The benefits, challenges, and effectiveness of HIA have been long debated (Parry and Stevens 2001; Ahmad et al. 2008; Dannenberg 2016; Nour et al. 2016), concluding the approach to be successful and impactful in many circumstances (Harris-Roxas et al. 2014; Haigh et al. 2015; Green et al. 2020, 2021). It is a decision and policy informing process which is acknowledged as a tool to drive 'Health in all Policies' approaches in practice (Leppo, 2013; WHO, 2018). In addition, HIAs have been proven to have a key role in health improvement, protection, and prevention (Winkler et al. 2020; Cave et al. 2021) and have been used in Wales as a vehicle through which to drive health in all policies and sustainable development (Green et al. 2020; Green and Edmonds 2021). Like many other impact assessments, HIA tends to look at a single project, policy, and plan in isolation. There are examples of peer-reviewed papers

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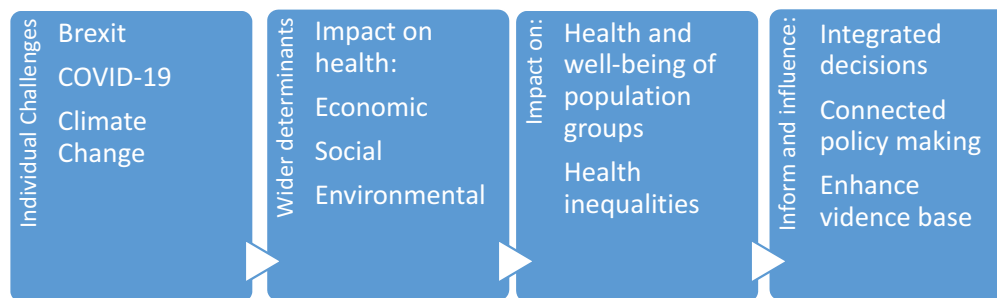


Figure 1. Conceptual relationship between the three challenges and the wider determinants of health and policy making.

Box 1. Examples of the individual health and equity impacts of the individual three challenges.

Coronavirus SARS-CoV-2 (COVID-19) pandemic

The global pandemic has revealed the complex, interwoven relationships between health, well-being, equity, the economy, the environment, and society as a whole. In doing so, it has created new inequalities, but also exacerbated existing social and health inequalities and inequities (Dyakova et al. 2021; Marmot et al. 2020). High levels of morbidity and mortality have been witnessed across the world as a result of the pandemic, with the UK being particularly affected – both in terms of the impact on a range of specific vulnerable populations for example, older people and health and care workforces, but also in terms of the policies implemented to contain the virus (Institute for Fiscal Studies 2020; Public Health England 2020; United Nations 2021; Woodfine et al. 2021). This has resulted in major impacts for health determinants such as economic inactivity, education and mental well-being and for some populations for example older people and those from ethnic minority groups (Dyakova et al. 2021; Institute for Fiscal Studies 2020a, Public Health England 2020).

Climate Change

Climate change can affect positively or negatively health and well-being directly or indirectly through, for example, facilitating the amount of physical activity someone takes, their employment, health care services provision and infrastructure and the local environment (Watts et al. 2021). It can impact whole communities and residents in their entirety and dispersed populations, depending on the nature of extreme weather events such as flooding (Netherwood 2021). Children and young people may be affected, as well as those on low incomes and those in specific settings or employment, for example, farmers and agriculture workers (IPCC 2022; Netherwood 2021).

Brexit

Brexit affects not only the 66 million people who live and work in the UK and its devolved nations of Northern Ireland, Scotland and Wales, but also affects those who visit each year and who trade with the UK. Brexit can affect health and social care services and their workforces, the economy and lead to loss of access to funding to improve social and environmental infrastructure in communities (Fahy et al. 2017; UK Parliament, n.d.). It affects a wide range of population groups including non-UK EU residents, older people, those who work in industries highly exposed to trade and tariff barriers and men (Green et al. 2019).

that examine or discuss cumulative health impact as part of environmental assessments (Morello-Frosch et al. 2011; Morgan 2012; Blakley and Franks 2021) such as Strategic Environmental Assessment (SEA) and Environmental Impact Assessment and SEA, for example, considers cumulative health impacts in environmental planning and to inform strategic decision-making (Fischer 2006; Fischer, 2014; UNECE 2020). However, there is no literature on how a standalone HIA can be utilized to view the cumulative impact of multiple plans or policies together in relation to wider determinants of health, well-being, and inequalities.

This paper presents a strategic overview of the impact, and interconnectedness of the challenges of Brexit, the COVID-19 pandemic and climate change, termed by Public Health Wales as the ‘Triple Challenge’, in a specific region of the United Kingdom. This research provides an opportunity to take the learning from Wales into the international arena to understand how the challenges have impacted on public health. Based on the evidence from the three individual HIAs carried out within Public Health Wales, it articulates the synergies in impact and the population groups affected across the ‘Triple Challenge’ and provides

a better understanding of how any potential positive or negative impacts will manifest themselves. It focuses on how using the systematic process of HIA as a platform and multi-challenge lens can paint a picture of dynamic and cumulative impact and provides some specific examples demonstrating transferable learning for practitioners and policy-makers both in the UK and internationally.

Materials and methods

A small team consisting of two researchers, two policy officers and two impact assessors carried out the Phases of the research outlined in Figure 2. The researchers were responsible for leading the literature review and engaging with stakeholders, the policy officers gathered the grey literature and the impact assessors provided insight and tools from the HIAs.

Phase 1: collation of evidence

Existing evidence was collated by firstly undertaking a mapping process of the three individual HIAs that

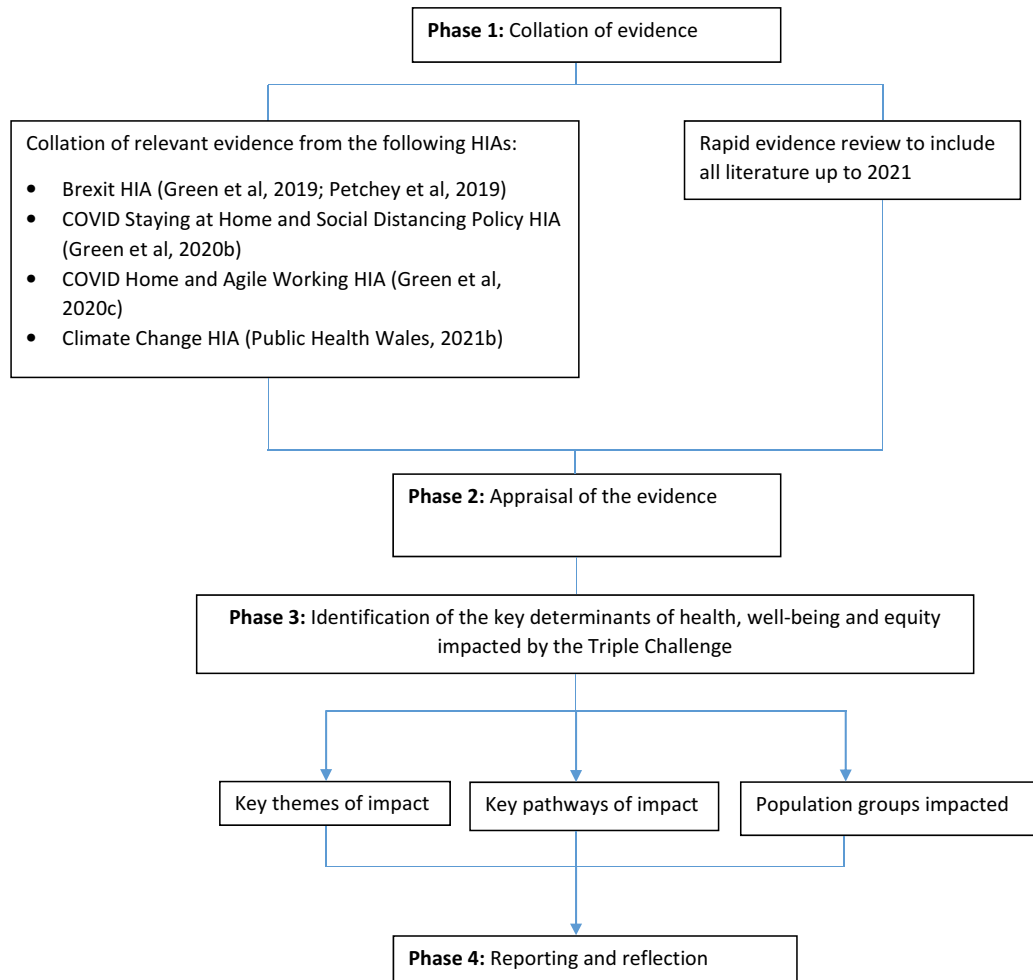


Figure 2. Methodological Process.

had been carried out in Wales on the wider impact of the events of Brexit, COVID-19 and climate change in Wales from 2018 to 2021 (Green et al. 2019, 2020c; Petchey et al. 2019; Public Health Wales 2021b). HIA is a five-step process that assesses the impact of policies, plans, and projects on the health and well-being of the population (ECHP, 1999; WHO, n.d; Winkler et al. 2021; Box 2).

HIA can explicitly capture evidence-based health impacts, highlight synergies between policy sectors and lead to actions to reduce any negative impacts that may emerge from these and any population inequity. It considers the wider determinants of

health and well-being and any uneven distribution of impacts across population groups for example, older people, children, and young people or those with long-standing illnesses or conditions (WHIASU, 2012; Pyper et al. 2021; Winkler et al. 2021). All of the three HIAs had research protocols, clear search terms, and stakeholder participation. For example, interviews (n = 13 for Covid HIA; n = 17 for Brexit HIA and n = 18 for climate change HIA) and interactive workshops (n = 1 for Brexit HIA; n = 2 for climate change HIA) (Green et al. 2019, 2020, 2021; Martin-Olmedo and Green 2020; Green and Edmonds 2021; PHW, 2021).

Box 2. The five steps of the HIA process

Step 1: Screening – does the policy or plan have an impact on health and well-being? If so, who does it affect and how?

Step 2: Scoping – what are the parameters of the HIA? How long will it take, what resources should it require, what are any deadlines, and what evidence should be gathered and appraised?

Step 3: Appraisal – assessing the evidence gathered by synthesising it and analysing it to form a picture of impact. This evidence can include peer reviewed and grey literature, stakeholder evidence and routinely gathered statistics and data for example, government statistics and reporting.

Step 4: Recommendations and reporting – construction of a report which includes the findings and any recommended actions that should be taken to maximise the positive impact and mitigate any negative impact

Step 5: Review and reflection including monitoring and evaluation – this involves highlighting milestones to measure any changes in impact or if the predicted impacts were observed, reviewing the process and any impact which it may have had on decisions and future policies.

Building on evidence and findings from the previous HIAs, rapid evidence searches were undertaken to identify the literature which focused on the Triple Challenge as a whole and its impacts. The search terms used were 'Brexit' OR 'EU withdrawal' AND 'climate change' AND 'COVID-19' OR 'coronavirus' and 'health' OR 'well-being' OR 'wider determinants' OR 'inequalities'. These search terms were used to search on title or abstract within peer-reviewed databases (PubMed and ProQuest). The grey literature was explored using the same search terms as the academic search on Google scholar and organizational websites such as the World Health Organization. Manual snowball and forward citation searches were also conducted on the academic and grey literature identified for inclusion. One researcher independently conducted the search in January 2021. An additional researcher also screened the evidence, and any conflicts in opinion were discussed by the two researchers and a consensus agreed upon. Evidence was deemed eligible if they were published in the English language and focused on identifying possible health and well-being implications of all of the three challenges.

Phase 2: appraisal of the evidence

Using the data and evidence and processes from the previous HIAs, crossovers of impact between the three challenges were identified and mapped by the team members. The exercise captured both the positive and negative impacts and any opportunities or unintended negative impacts. An example of this is depicted in [Supplementary Table 1](#).

The determinants of health and groups were then explored further in a screening session with the team members. This was based on the evidence gathered in the previous HIAs. It also included papers and research published since the publication of the HIAs which had been identified as part of the rapid literature review and as part of conversations and engagement with key stakeholders for example, Welsh Government representatives from departments such as EU Exit, agriculture, food policy, poverty, and health inequalities.

Phase 3: identification of the key impacts on health and well-being

The main determinants and population groups were then analysed to further pull out the significant impacts across all the challenges only. Definitions which had been previously debated and validated by the individual HIAs external Strategic Advisory Groups were utilised. These included four directions (positive/negative/opportunities/unintended negative impacts); intensity (major/moderate/minimal), and duration (short/medium/long term) which included representatives from national government, environmental public

health, Public Health Wales policy, health services specialists, and academia. These have been previously published elsewhere (Green et al. 2019, 2020b).

Screening criteria for inclusion in the work include the following: Are there major impacts across all three challenges either positive and negative or both?; Is the evidence to support this robust and credible?; Is there significant evidence to support the inclusion of the determinant or group or does it add to another determinant or group?; Is it a major evidence gap and an area for further research?

Phase 4: reporting and reflection

As part of the process, a quality assured summary paper was produced in both Welsh and English which summarised the findings, those affected and some suggested actions for policymakers. Multi-disciplinary internal and external stakeholders were given the opportunity to provide feedback on the report, and a reflection meeting was held post publication to evaluate the process, impact to date, and learn from it.

Results

The three challenges that this work considers (Brexit, Climate Change, and COVID-19) have a broad range of commonalities in impact across many determinants of health and population groups. Results captured the synergies in both positive and negative impact across those determinants, which were deemed majorly affected and for which there was sufficient evidence available ([Figure 3](#)).

The rapid evidence searches identified two eligible studies from the academic literature and four studies from the grey literature that had previously considered the multiple impacts of the Triple Challenge on health and well-being. These plus evidence identified in the individual Brexit, COVID-19 and climate change HIAs have highlighted that the population of Wales have been majorly impacted by the Triple Challenge. These are summarised with some specific examples below and in [Box 3](#) and [Supplementary Table 2](#).

A clear result is in respect to the pathways and factors, which lead to impact. It is not the actual challenges that directly affects health and well-being per se but the pathways of impact for example, policies around lockdowns or immigration, legislation, and trade and Free Trade Agreements. These were also mapped and used as some of the causal pathways on the determinants and population groups ([Supplementary Table 2](#)).

Alongside the results of this study which demonstrate the potential impacts of the Triple Challenge on health and well-being, reflections were observed around the complexities of the work undertaken. The work assessed three challenges which are highly complex in themselves. However, policy making itself is complex as is

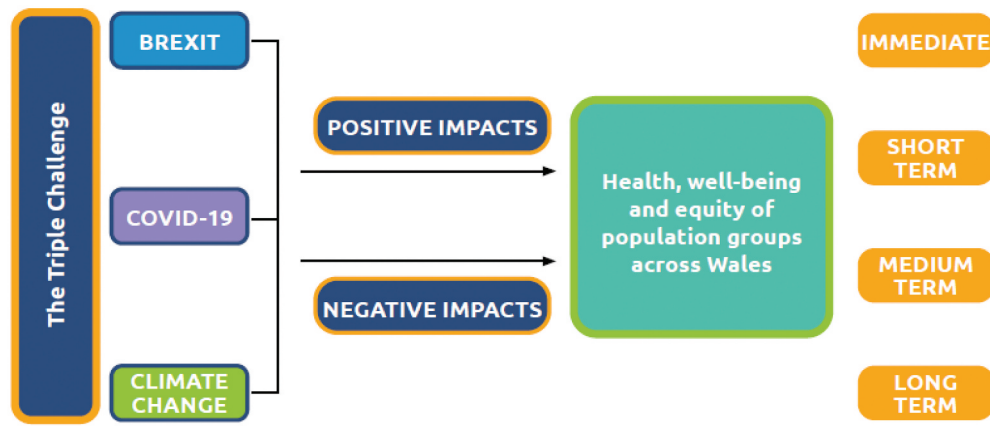


Figure 3. The triple challenge.

Box 3. Determinants of health and well-being and the population groups impacted by Brexit, COVID-19 and Climate Change.

Determinant:

- Healthcare service delivery
- Health Protection including intelligence, evidence, research and development
- Diet, alcohol, tobacco
- Types of employment
- Working conditions including health and safety and workers' rights and equality
- Skills and employment
- Poverty – food, fuel, employment status
- Community, economic, and infrastructure investment for addressing inequalities
- Community infrastructure and resilience
- Divisions in communities
- Intergenerational relationships
- Environmental regulations
- Sustainable food supply, security, production
- Food security, cost, access, supply, and safety
- Transport and movement of people
- Mental well-being
- Access to services
- Communication and digital media
- Health and Social Care workforce including recruitment, retention
- New models of working

Population Groups:

- Those on low incomes
- Those at risk of unemployment/who are unemployed
- Children and young people/young adults
- Older People
- Black and Minority Ethnic Groups
- Those with existing health conditions including mental health and those in need of health and social care
- Those who need care in a community or acute setting
- Geographical groups – urban/rural settings
- Key occupations and critical workers including construction, outdoors workers such as farmers and health and social care services
- Coastal towns
- Immigrants, Refugees, and Asylum Seekers.

cross system and sector working (Cairney et al. 2019; Love and Stockdale-Otarola, 2017) and so to unpick some of the health impacts was and still is, complex too. The team used the logical stepped process to drive the work and map the specific health and equity impacts across the three challenges and met regularly to share perspectives in an open and honest collaborative way. The timeline and main objectives of the work had to be adapted as it progressed due to the complexity of the proposal, and it was necessary for the work to evolve due to the dynamic situation of the Triple Challenge.

Limitations around the availability of particular areas of evidence, the breadth of the policy context, and changes in Brexit regulations, policies, and COVID-19 measures whilst undertaking the work created some challenges. These challenges were overcome by remaining flexible and reactive throughout the process, which the HIA assessment process allows for. The benefit of setting clear roles at the start of the project was seen as a positive of the work and resulted in a clear and comprehensive output.

The main impacts and their connectedness are summarised below and further condensed in Supplementary Table 2.

Health and social care

Common positive impacts were identified across all three challenges in relation to developing new models of working (including remote and teleworking) and providing future employment opportunities. Common negative impacts evidenced were issues around workforce recruitment and retention that are largely linked to the changes in immigration policy as part of Brexit with large numbers of non-UK health and social care staff working in Wales including from the EU (Department of Health 2017; Fahy, 2017).

Health protection

Common negative impacts highlighted were around loss of access to data intelligence, evidence, and research and development networks in a post Brexit world for example, changes due to Brexit meant that the UK could no longer access some important intelligence or be part of networks such as the European Medicines Agency (EMA). However, the research also highlighted positive impacts for networks for example, the pandemic had brought a renewed appetite for international data sharing and co-working to address the pandemic and the transmission of the SAR-COV-02 virus (Welsh Government 2020).

Health behaviours

Diet, nutrition, tobacco, and physical activity could be positively or negatively affected from all the challenges (Heaney et al. 2019; World Health Organization 2020; Chang et al. 2021; Public Health England 2021; Public Health Wales 2021). For example, they are highly dependent on the provisions contained in trade agreements (McNamara and Labonté 2016; McNamara 2017; Labonté et al. 2020).

Intergenerational impacts

Brexit voting patterns demonstrated that younger voters were more likely to vote to remain in the EU whilst older voters wanted to leave (Moore 2016). COVID-19 is a disease, which primarily affects older people's mortality and morbidity levels (Mueller et al. 2020). Response measures also affected children and young people as educational settings were closed and sectors in which they mainly worked, for example, hospitality and non-essential retail closed down (Joyce and Xu 2020). Therefore, older and younger generations are cumulatively impacted by the three challenges.

Mental well-being

Negative impacts on mental well-being impact were noted mainly with respect to stress and anxiety relating to uncertainty about the future (Public Health Wales 2021, 2021a). Negatively, for Brexit, this is related to immigration changes and settled status and the impact on non-UK EU citizens and their families who work and reside in Wales whilst for COVID-19 this again is related to stress and uncertainty about employment status, loss of social freedoms, and the length of time of response measures such as 'lockdowns'. Further compounding the impact is climate change, where there is evidence of stress and fear about future extreme weather events that will affect homes and businesses for example, those of farmers and the subsequent negative economic impacts that these may bring (Castells-Quintana et al. 2015; Bonafede et al. 2016; Flouris et al. 2018; Levi et al. 2018; Binazzi et al. 2019; Davies et al. 2019; Cianconi et al. 2020).

Environmental policies and regulations (Figure 4)

For Brexit, the impacts are driven by potential divergence in standards away from those of the EU and it could have an impact on the carrying out of environmental assessments in the UK which still refer to the EU Directives (Fischer et al. 2018). Whilst current standards will remain aligned with the EU, in the future they could diverge and be diminished (or enhanced) by government reviews and changes after these (UK Government 2022) or through the conclusion of Free Trade Agreements with other trading nations or blocs. These trade agreements could also lead to challenges from investors about public health laws and policies for example, minimum unit pricing or alcohol or tobacco labelling (Hirono et al. 2016). The pandemic has placed an emphasis positively on environmental regulations including lockdowns to control and reduce the transmission of COVID-19. The focus on climate change alongside the COVID-19 pandemic provides an opportunity to enhance environmental regulations that contribute to global warming, for example Wales's Clean Air Bill and the NHS Decarbonisation Plans (NHS Wales Shared Service Partnership 2021; Welsh Government 2021a) or develop new sustainable models of working, but extreme weather events could majorly affect the provision of health-care services and disrupt infrastructure and workforces and single-use Personal Protection Equipment (PPE) and health-care waste has implications for the environment and the climate (Rume and Islam 2020; WHO, 2022).

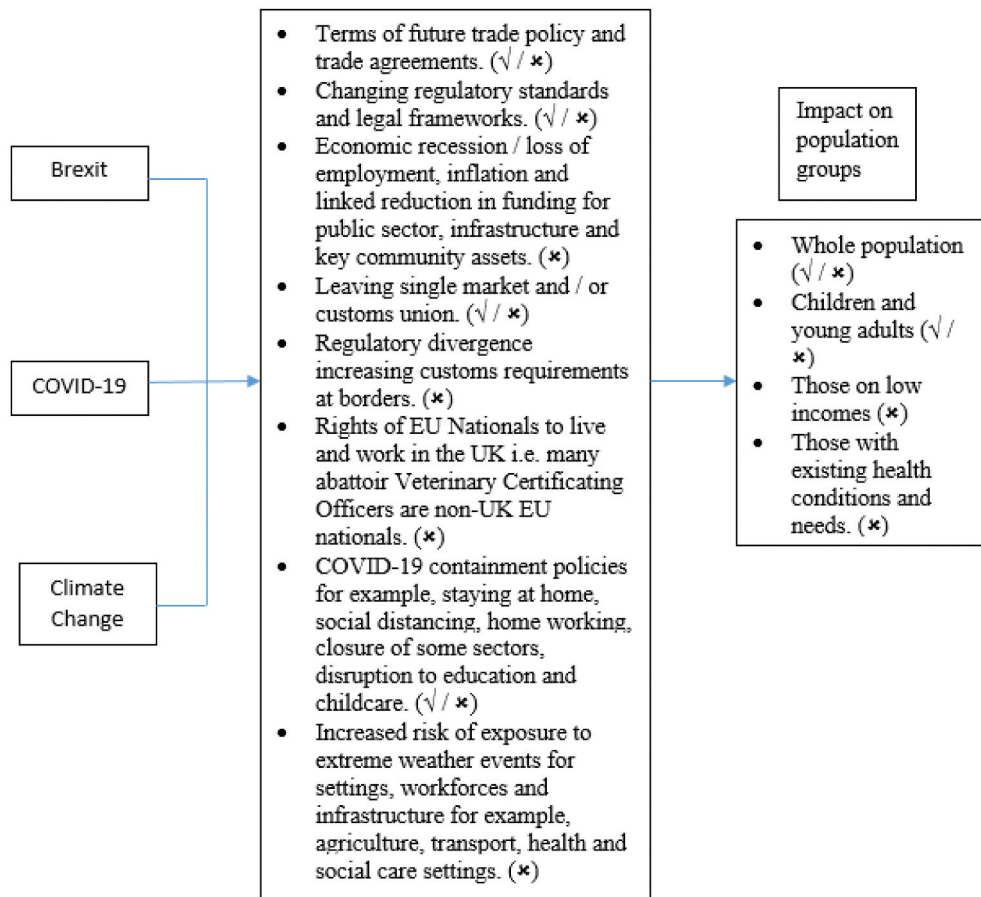


Figure 4. An example of the factors and impact of the triple challenge on environmental policy and regulations determinants of health and population groups.

Workforce

Regarding Brexit, EU withdrawal has led to changes in the UK's immigration policy that has had an impact not only on the recruitment of the health and social care workforce in Wales but also its retention as large numbers in the workforce come from the EU (NHS Confederation, 2021; Welsh Government 2022). COVID-19 has positively raised the profile and respect of health and social care workforces, but the workload and intense and stressful working conditions and high levels of mortality and morbidity have placed the workforce under immense stress, which can (or has) led to anxiety and burnout. The workforce has also been split into those who can work from home, and those who cannot, as the former work directly with patients and service users. However, the pandemic and responses such as working from home has provided an opportunity to think through new models of working and ways of delivering services and who may particularly benefit (or not) from such models. Climate change will also provide similar opportunities to develop new and more sustainable service delivery and workforce resilience as increasingly frequent extreme weather events disrupt services and infrastructure and decarbonisation leads to changes in practice for example, changes in anaesthetics (Van Hove and Leng 2019).

Transport

The determinants of transport and travel also have many commonalities in impact (either positive or negative). For example, climate change was positively impacted at the start of the COVID-19 pandemic by 'lockdowns' which led to a reduction in transport movements when people in Wales were encouraged to use active travel and take more physical activity as a means to access work and services if they could. Reduced car movements during the early part of 2020 led to reduced emissions (Usman et al. 2021). Transport movements release high levels of GHG emissions each year, which contributes to global warming and climate change. However, in Wales by mid-2021 levels were back to those pre-pandemic, driven by a reluctance to use public transport for fearing of being infected with the virus, an increase in online delivery transport vehicles, and many people feeling safer in one's own car (Neill 2021).

Free Trade Agreements (FTAs)

Finally, FTAs are an important driver for the three challenges and their impact on health both now and in the future. For some determinants, for example,

environmental regulation and standards or the economy, this is more evident than for others (Hirono et al. 2016; Labonté et al. 2020; Johnson et al. 2021; Van Schalkwyk et al. 2021) and is most often referred to in relation to Brexit and the need for the UK to have an independent trade policy for the first time in 40 years. However, trade is also important for COVID-19, for example, with the supply of vaccines and accessing data and intelligence networks and in respect to climate change as FTAs can limit the ability to tackle climate change and local policies and targets. A more holistic and integrated way of policymaking is required for trade with leadership needed to bring all those affected together to consider the health impact of these and who is affected (Faculty of Public Health 2019; Petchey and Cresswell 2022).

Discussion

The Triple Challenge collectively is having significant impacts on the key determinants of health (Box 3; Supplementary Table 2). This study also highlights the factors that affect the determinants, and a wide range of population groups who are vulnerable to Brexit, COVID-19 and climate change. The need to address the impacts which in turn have are having a major impact on inequalities underpins the Triple Challenge work as a key crosscutting theme. These findings reinforce those efforts to address the three challenges must connect and include a public health perspective in order to protect and advocate for, the most vulnerable in society.

As little literature had been published to date that looked at the three challenges collectively, the previous individual HIAs were invaluable as they provided a wide range of peer reviewed and stakeholder evidence. This is therefore a gap and warrants further research, exploration, or discussion between and by academics, researchers, and policymakers. By undertaking this process, it has highlighted the need for further research on specific determinants of health. For example, only a few studies have been published to date on the topic of alcohol and consumption in relation to the pandemic, Brexit and climate change as individual challenges (Cusack et al. 2011; Ventura-Cots et al. 2018).

The pandemic has also raised the profile of public health and its importance to individuals, communities, and society as a whole (Dyakova et al. 2021). It highlights the role of National Public Health Institutes to mobilize action and provide evidence and information to promote discussion about the unseen health and well-being impacts of major challenges. This study also identified recommendations that identified an opportunity to strengthen public health messaging around health behaviors with the increased profile of public health and environmental issues related to Brexit,

COVID-19 and climate change for example, alcohol, tobacco and nutritional labelling, food insecurity, and waste. Policy and decision makers require information and evidence to strengthen future long-term planning and decisions so that 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 manner.

This work also highlights that HIA can be used creatively as a process by using it singularly, but also a model to capture multiple impacts. This can be done by mapping the single HIAs in order to form a matrix to provide information from which to gather research evidence in order to form a coherent assessment of how policy areas interact (Supplementary Table 1). Using HIA in a combined way as a process can paint a picture of multifaceted, cumulative impact and taking this approach can enable a wide range of organisations and strategic stakeholders to critically view the challenges not just as single issues but as a holistic whole in order to mobilise action. The combined HIA lens could also be useful in relation to other multiple challenges for example, syndemics which are defined as a set of linked health problems involving two or more afflictions, interacting synergistically, and contributing to the excess burden of disease in a population (Horton 2020). Additionally, other challenges for example, 'black swan' or unexpected occurrences, which require policy responses, such as the Ukrainian war or the cost-of-living crisis in the UK, could be added into the mix as a fourth challenge or replace one of the others as they may recede or dissipate. These additional challenges have already been noted as having an impact on population and determinants of health (Jones 2022; UK Parliament, n.d.; Welsh Government 2022).

As part of the recovery process from the pandemic, there is a 'window of opportunity' for policy change that will have co-benefits for the wider determinants, based on evidence within the HIAs and the Triple Challenge reports. Some of the policy areas affected, such as environment, are devolved to Wales and some of these areas are non-devolved and therefore nations will need to work together to maximise any positive impacts and mitigate any negative ones. This includes through events such as the COP 26 and also the proposed Agriculture (Wales) and Food (Wales) Bills in passage (Welsh Government 2020a; Parliament 2021). In addition, the Well-being of the Future Generations (Wales) Act 2015 with its implicit focus on 'Health in All Policies' and facilitating cross-sectoral working can provide an enabling environment for Wales to utilise the application of a Triple Challenge lens to policies and strategies (Welsh Government 2015). This can be transferable to other similarly devolved nations across the UK and Europe. It can also be highlighted that

whilst policymakers and politicians are often more sensitive to the interconnected nature of the policy areas they work in, the challenges collectively and singularly (in the case of the pandemic) also highlight the vulnerability of wider systems if public health and wellbeing is not robust (OECD 2017). Being able to explicitly demonstrate this in an evidence-based way provides an opening for policy to be steered towards beneficial opportunities in the future as much as avoiding unintended negative impacts.

As part of the review and reflection session it was noted that, to date, the work has been positively received and has been utilised by Public Health Wales to guide planning (Public Health Wales 2022) and for Welsh Government work and Parliamentary Committees (Welsh Parliament 2022). The reflection session also noted that it was beneficial as it clearly mapped the specific health impacts to others and carrying it out helped to breakdown silos between colleagues and stakeholders and start conversations about health with them. The Triple Challenge work has been used to also develop further work for example, identifying the compounding impacts on specific topics, for example, food security and rural populations in order to further assist Welsh policymakers and organisations (Green et al. 2021, 2022).

Finally, it must be noted that there are some limitations to this work. The review and reflection session highlighted that it was hugely complex and time intensive. However, as noted previously, policy making and the synergies between it are similarly hugely complex and time intensive (Love and Stockdale-Otárola 2017; Cairney et al. 2019). Wales had the benefit of extensive previous HIA experience and is advanced in using this methodology to inform policymaking and practice to specifically identify health and equity impact

Whilst the review and reflection session evaluated the process and the immediate impact in the same way as the singular HIAs did (Green et al. 2020, 2021, 2022) capturing the longer term impact of the triple challenges on health and well-being outcomes faces the difficulties of confounding and attribution – for example, is it Brexit, climate change, or COVID-19 which will lead to the health outcome or another intervention or policy? The collective team learning also identified that the team collaboration was key, clear leadership and direction for the work from the outset and regular short meetings helped everyone to clarify any points or discuss any issues or findings with the team in an open and timely way. The team recognised that they needed to be flexible and adapt throughout the process and to be realistic about timeframes and what could be achieved in that time.

HIAs and the multi-challenge HIA approach as used in this study can also be utilized as a platform to complement other research. For example, using DESTEP analysis that implicitly explores the impact on

wider determinants of health such as political (or policy), economic, technological, and social factors but through a different lens and context (Frue 2017). This would provide a more comprehensive view of the wider landscape. Additionally, the approach could be enhanced and provide more evidence by including more statistical modelling and predictive techniques such as Foresight technologies, which anticipate trends and provide information around current and future challenges (Verschuuren et al. 2020).

However, this paper shares learning which could make the work replicable at a smaller scale in other nations with some capacity building or with a focus on alternative challenges, which may be context-specific. It could provide a blueprint for others to carry out similar work and make connections to major multiple challenges or policies and start conversations with other sectors and external partners and nations, for example, the NPHIs of England, Scotland, Ireland, and Wales in the UK and could be replicated by others at an international level also.

Conclusion

COVID-19, Brexit, and climate change represent the biggest combined challenge to health and well-being that the UK has faced in recent times. However, 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. In the example of Wales, the Wellbeing of Future Generations (Wales) Act 2015 provides a key driver to do this.

HIA provides a flexible evidence-based and systematic process through which to identify health and wellbeing impacts across the population. It is routinely used to assess the impact on one policy, plan, or project, but until now has not been used to assess the cumulative and compounding impact of several developments or policies when viewed together and not only in isolation as singular challenges with multiple policy responses at a national, local, or regional level. The innovative Triple Challenge impact assessment has used a multi-challenge lens which can support discussions around future policies and plans for example, new models of working for future health service delivery and new economic models, for example an eco-environmental one that considers environmental and health protection and promotes renewable energy and sustainable transport systems but also highlighted negative impacts which can be mitigated for and a balanced way forward. There is also the opportunity for HIA to work more in alignment with other impact assessment processes which include cumulation such as SEA and EIA in order to assess these impacts.

This approach can be replicated by other nation states, regions, or public health institutes to enable a wide range of organisations and strategic stakeholders to critically view challenges such as Brexit and COVID-19 not just as single issues but as a holistic whole. This can support action and ‘Health in all policies’ approaches which can promote intersectoral action and the need to consider common areas which may affect health and wellbeing across policy areas.

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