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# The Lancet-Chatham House Commission on improving population health post COVID-19

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## Executive Summary

An ever-growing number of national and international commitments have failed – sometimes spectacularly - to reduce three intimately interconnected major global threats to population health: non-communicable diseases, the risk of infectious disease pandemics, and environmental degradation.

Non-communicable diseases cause over 40 million deaths every year, of which 17 million are in people under 70 years of age, over 80% of whom live in low- and middle-income countries. At the time of writing the official toll of COVID-19 is of over 630 million cases and more than 6.6 million deaths, although the true figures are far higher due to under-reporting. Environmental degradation is unravelling complex ecosystems, setting the world on a path to mass extinction, and the climate crisis creates an existential threat to human survival.

These three threats are driven by many shared and interacting factors. One example is the clearance of vast areas of land globally to support high levels of red meat consumption. The resulting clearance reduces the capacity of the land to retain carbon while the livestock emit methane, a potent greenhouse gas. Excessive consumption of meat contributes to non-communicable diseases, which are major risk factors for morbidity and mortality from infectious diseases including COVID-19. At the same time, the destruction of ecosystems and the loss of habitats increases the likelihood of interactions between wild animals and humans, in turn increasing the risk of new zoonotic diseases developing, while global heating drives increases in disease vectors such as those for malaria and dengue, and air pollution is creating an epidemic of respiratory disease.

The drivers of these three threats are underpinned by political systems which privilege economic growth over population health and the natural environment, undermining economies through increased healthcare costs and reduced human productivity. Across all these threats it is the poorest people, and the poorest countries, that experience the greatest harms.

Reducing these threats requires a global shift in the behaviour of most populations including eating healthier and more sustainable diets, drinking less alcohol, not smoking, and increasing levels of physical activity. These behaviours are largely cued, reinforced and maintained by physical, economic, digital and social environments over which populations have little control. Exhorting individuals to change their behaviour is therefore an ineffective strategy for change of the magnitude and at the scale required. Changing these behaviours

necessitates changes in the environments that shape them, requiring action largely by governments and business actors, and also by citizens, in order to transform the conditions that determine population health and the natural environment.

The recommendations of this Commission target three interacting systems that that if transformed would reduce the three threats:

- (a) physical environment and transport;
- (b) agriculture and food; and
- (c) energy

Other systems contributing to these threats, including political and economic systems, were beyond the scope of this Commission.

## Recommendations

### **1) Replace harmful policies and interventions with actions to improve population and natural environments**

The Commission identified many government policies that could contribute to improving population health and the natural environment, and many that cause harm. We describe multiple potentially beneficial interventions that should be instigated, and harmful ones that should be ended. Examples of these interventions are listed below, under each of the three system headings of physical environment and transport; agriculture and food; and energy:

Among the most harmful policies of governments globally are those underpinning an estimated \$700m in subsidies to fossil fuel industries and \$540bn to agriculture, much of which is for practices that harm the environment and generate foods that ultimately harm population health. We recommend that these subsidies are ended, with the money redirected to interventions that benefit health and the natural environment, such as plant-based agriculture, support for renewable energy, and ecosystem restoration.

#### ***Physical environment and transport***

- a. Design and build infrastructure in urban and rural areas to enable and prioritise safe, affordable, accessible, and convenient active travel and public transport.
- b. Design, build and manage urban and rural environments in which the need for vehicles is minimised.
- c. Design habitations and associated areas to foster biodiversity and to support and restore ecosystems, including where relevant the provision of accessible public green and blue spaces.
- d. Build and renovate buildings and infrastructure using sustainable and healthy materials and practices.

#### ***Agriculture and food***

- e. Conduct all activities within the agri-food system, including production, processing, packaging, distribution and consumption, such that they do not contribute to exceeding planetary boundaries, or cause other harms such as increasing animal/human contact.
- f. Design production and distribution systems to ensure access to sufficient nutritious fruit and vegetables for everyone on the planet
- g. Minimise production and consumption of alcohol, tobacco, ultra-processed foods, and other foods that harm health and the environment including animal-sourced foods.
- h. Protect and/or restore land and marine ecosystems in rural areas, including through reforestation, rewilding, and reintroduction of native animals

### ***Energy***

- i. No new fossil fuel exploration, extraction, or power stations. End all fossil fuel use while ensuring a just transition and energy security, and replace it with net zero carbon energy sources
- j. Minimise harms caused by energy production, and from equipment for its storage and use. Reduce production and consumption to minimise energy related harms both during and after the energy transition, including any harms related to sustainable energy.

## **2) Enhance the effectiveness of governments, commercial actors, and civil society to improve population health and the natural environment**

Achieving these transformations requires local, national and international action by governments, private sector organisations and civil society. The Commission identified three enabling conditions that would support this:

- a) State institutions and political leaders act now to strengthen and implement existing legal and regulatory governance structures to achieve policies that protect population health and the natural environment. This would contribute to achieving long term improvements in population health, and to embedding and maintaining these improvements over the long term.
- b) Businesses act in line with effective regulations and policies for improved population health. In order to achieve this, governments need to develop and strengthen systems to protect public policy making from harmful business practices, and in particular prevent corporate interference in public policymaking, including through misinforming the public.
- c) Citizens and civil society groups voice their demand and support for effective interventions to improve population health and their lack of support for ineffective interventions. They should take all opportunities offered by policy makers to engage in all stages of the policy-making process, including in the prioritisation of policies and the allocation of public resources. Such actions require governments and other bodies first to communicate the evidence for the (in)effectiveness of policies at achieving improvements to population health; second to protect against misinformation; third,

to empower and fund civil society organisations to participate meaningfully in policy development; and fourth, for leaders in public office to act in trustworthy ways.

**3) Develop capability and capacity in systems level responses to the three threats**

To develop capability and capacity in systems level responses the Commission recommends first, that research funders including governments support the development of methods for systems level analyses to assess the impact of interventions; second, that governments, educational institutions and research funders increase the skills and those with these skills to apply such methods in policy settings; and third, that governments and other bodies implement mechanisms to support the design and implementation of policies to transform systems for better population health.

Acting on these recommendations should contribute to halting, and may even start to reverse, the harmful trajectories created by the three threats at the heart of this Commission's work, resulting in sustainable improvements in population health and natural environments across the world.

## SECTION 1: conceptualising the problem

### 1.1 Three major linked threats to population health

This Commission addresses three major and growing global threats to population health. The first of these is non-communicable diseases (NCDs), including type 2 diabetes, cardiovascular and respiratory disease, mental illness, and many cancers. Second is the continued burden from infectious diseases including COVID-19, tuberculosis (TB), malaria and HIV. And third is catastrophic environmental degradation, made up of a range of escalating crises including climate heating, loss of habitats and biodiversity, pollution, and mass extinction.

Each of these threats presents enormous challenges on its own, but they are interlinked, and together constitute a syndemic, reinforcing one another and multiplying together to create an even greater set of problems, including wide and growing global inequalities. Treating interacting threats as if they exist in isolation risks ignoring their amplified harms, and thus the potential to address them: in the words of Milstein: ‘To prevent a syndemic, one must not only prevent or control each disease but also the forces that tie those diseases together’ (Singer and Mills 2003).

This Commission is focused on the syndemic of non-communicable diseases, infectious diseases, and environmental degradation. It seeks to identify the shared underlying drivers, and thereby to prioritise key actions for international, national and local actors that have the potential for triple wins through interventions that contribute to tackling all three threats. If pursued equitably and synergistically, this approach has the potential to contribute towards achieving the Sustainable Development Goals, creating lasting health, social and economic benefits for people and the planet.

Success in this endeavour will require major shifts in behaviour in all parts of society across the world. Shifts such as these are often characterised by a default framing that places the onus for such change on individuals, but the behaviour of individuals is determined by the physical, social, economic and political environments in which they live, profoundly shaping the opportunities people have to change.

This Commission does not accept this default framing, and although it argues strongly for the need for behaviour change, it is governments that must change their behaviour in order to reshape environments to create the conditions that are necessary for individuals to be able to live in healthy and sustainable ways (Marteau et al 2019, Marteau et al 2021).

#### 1.1.1 The non-communicable disease pandemic

The COVID-19 pandemic has rightly received huge attention but its impact pales against the continuing and growing toll of non-communicable diseases. Every year, NCDs cause more

than 40 million deaths, over 70% of all deaths globally (WHO NCD factsheet, Bennet et al 2018), with almost half these deaths in people under 70 years of age. The 5x5 model adopted by WHO in 2015 identifies five groups of NCDs and five behavioural risk factors. The disease groups are cardiovascular disease (responsible for approximately 18m deaths globally), cancers (approx. 9m), mental and neurological conditions [add figure], respiratory diseases (approx. 4m), and type 2 diabetes (over 1.5m) (WHO factsheet).

The five behavioural risk factors - tobacco use, harmful use of alcohol, unhealthy diets, physical inactivity, and air pollution (Schwartz et al, 2021, UN 2011) - are tightly aligned to activities within the agriculture and food ('agri-food'), built environment and transport, and energy systems. Energy-dense ultra-processed foods that are high in fat, sugar and salt increasingly dominate the global food system (Monteiro et al 2013), and their consumption is strongly associated with elevated risks of cardiovascular disease and all-cause mortality (Rico-Campà et al 2019, Srour et al 2019). Tobacco consumption is responsible for around 8 million deaths every year (GBD 2021), while physical inactivity is responsible for over 5 million deaths each year (Lee et al 2012). Excess alcohol consumption is a risk factor for multiple forms of cancer, contributes to obesity, has been linked to about 3 million annual deaths globally, and is responsible for an estimated 5.1% of the global burden of disease (WHO Alcohol 2022) Air pollution is now the greatest threat to human health shortening lives by more than any other external threat including tobacco (Greenstone 2022).

### 1.1.2 Infectious disease pandemics

COVID-19 is only the most recent in a long line of infectious disease pandemics. Plagues are described in the Bible and the Qur'an as well as by the ancient Greeks: the Athenian plague of 430-426 BC described by Thucydides, and the Antonine Plague of 165-180 AD described by Galen (Huremovic 2019). The first documented global pandemic, the Black Death, arrived in Europe from China in 1347 and lasted 50 years, killing as many as 150 million people, one third of the global population and possibly 60% of the population of Europe (DeWitte 2014). The 'Spanish Flu' pandemic of 1918-20, caused by the H1N1 influenza virus, may have caused over 100 million deaths, with young and otherwise healthy people particularly affected (Flecknoe et al 2018).

Since then we have seen the scourge of HIV/AIDS (GBD 2015 Lancet), Severe Acute Respiratory Syndrome (SARS) (Smith 2006), Middle East Respiratory Syndrome (MERS) (WHO MERS factsheet 2022), the reappearance of H1N1 in the 'Swine Flu' pandemic of 2009-10 (Trifonov et al 2009), and multiple smaller but important outbreaks including Ebola virus in West Africa in 2014-16 (Kalra et al 2014) and Zika virus in South America in 2015-16 (Kindhauser et al 2016). Tuberculosis has killed more than a billion people over the past 200 years and still kills 1.5 million people every year (WHO TB factsheet 2021). Meanwhile, the problem of antimicrobial resistance continues to grow, increasing the risks of untreatable infection (Murray et al 2022).

A recent report from the United Nations Environment Programme (UNEP) and International Livestock Research Institute (ILRI) has emphasised the urgent and growing threat from zoonotic and zoonoanthropotic diseases, driven by factors including increased human exploitation of livestock and wildlife, unsustainable agriculture and land use practices, and

increased travel (UNEP and ILRI 2020). The impacts of climate change and environmental degradation will increase these threats as many species are forced to change their habitats, [and human animal interactions increase] resulting in new opportunities for transmission of pathogens between species (Carlson et al 2022, Brooks et al 2021, Rupasinghe et al 2022).

Following the Ebola outbreak in West Africa, WHO convened a network of experts in 2015 to develop an 'R&D Blueprint for Action to Prevent Pandemics' (WHO R&D Blueprint). The blueprint is a global preparedness plan to support the rapid activation of research and development during epidemics. It includes preparations for 'Disease X' - an as yet unknown disease that could cause a serious international epidemic. Despite these and many other preparations COVID-19 was able to establish itself rapidly as a global pandemic which at the time of writing had directly caused over 15 million excess deaths worldwide (WHO global excess deaths 2022), caused untold suffering, and cost the global economy over \$10 trillion (Wang et al 2022, WHO Covid dashboard, Economist 2021).

### 1.1.3 Environmental degradation

Environmental degradation poses an existential threat to all life on earth, and time is running out to avert catastrophic impacts for humanity. The UN Secretary-General Antonio Guterres has stated that we are 'firmly on track towards an unliveable world' and 'on a fast track to climate disaster' with major cities underwater, unprecedented heatwaves, terrifying storms, widespread water shortages, and the extinction of a million species of plants and animals (UN 2022). The Intergovernmental Panel on Climate Change stated in February 2022 that '*human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people...Across sectors and regions the most vulnerable people and systems are observed to be disproportionately affected...Global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans*' (IPCC WGII 2022). The adverse health impacts of climate heating include the direct effects of excess heat, respiratory diseases, cardiovascular disease, mental ill health, malnutrition due to the disruption of food systems, and conflict resulting from competition for human habitats (WHO COP26 report 2021). Climate heating also has major impacts on the spread of infectious diseases via vectors, water, air, food and direct contact (Mora et al 2022).

The planetary boundaries framework defines the 'safe operating space for humanity' – the limits within which human activity can be safely maintained into the future. Boundaries have been defined for nine major Earth system processes, including climate change, land-system change, freshwater use, and biosphere integrity (Rockström 2009), with boundaries quantified for eight earth systems (Steffen 2015), and boundaries exceeded within six Earth systems as of 2022 (Persson 2022, Wang-Erlandsson 2022).

Environmental degradation is unravelling the complex ecosystems on which we all depend, with changing land and sea use, exploitation of nature, pollution, and invasion of alien species driving rapid declines in biodiversity and destruction of ecosystems, exceeding multiple planetary boundaries (IPBES 2019, Hickel 2022, Landrigan 2018). The sizes of repeatedly monitored populations of wild vertebrates have fallen by an average of by

almost 70% globally since 1970 (WWF 2022), and around one million species face extinction as a result of human activity; the planet's sixth mass extinction event appears to be underway (Kolbert 2015, Cowie et al 2022).

#### 1.1.4 Inequalities across the three threats

All three threats are characterised by extensive inequities, leading to wide and growing global inequalities. The impacts of NCDs are strongly patterned by socioeconomic status, both within and between countries. Among the world's poorest billion people, NCDs account for as much as a third of the overall disease burden (Lancet NCDI Poverty Commission). More than 15 million people die below the age of 70 as a result of NCDs, with 85% of these premature deaths occurring in low and middle-income countries (WHO factsheet). Over 3 billion people could not afford a healthy diet in 2020, and over 800 million people worldwide were affected by hunger in 2021, an increase of 150 million since the start of the COVID-19 pandemic (FAO 2022). Effective action to address NCDs can therefore have a major impact on the burdens faced by the world's poorest populations.

The greatest burdens of infectious disease – both direct and indirect – fall on the poorest people (ref). COVID-19 has revealed and amplified existing inequalities in health within and between countries. Although highly effective vaccines against SARS-CoV-2, the virus that causes COVID-19, were developed within a year of the virus being identified, the distribution of vaccines is highly inequitable globally, with extremely low levels of vaccine access in many LMICs.

There is a major mismatch between contributions to, and the impacts of, environmental damage within and between countries and world regions (Hickel et al 2022). The climate emergency in particular is having greatest impact on the poorest countries, which have contributed least to global carbon emissions (Callahan 2022). The world's wealthiest countries have per capita cumulative historical carbon emissions many times higher than the world's poorest, but it is the poorest countries that are most vulnerable to the consequences of climate heating. The United States is responsible for 25% of total historical CO<sub>2</sub> emissions, and still has per capita emissions more than double those of China, even before accounting for the embedded emissions in products made in China that are sold in the US. (World Bank Open Data, OECD 2021). Meanwhile, over 750 million people worldwide live without electricity (IEA et al 2021).

The principle of equity sits at the heart of public health with a strong focus on social determinants of health (WHO CSDH 2008). Intergenerational equity has, however, received insufficient attention, but is both an essential component of equity and an important lever for achieving environmental sustainability (Coote 2015). Responses to the three threats should embed intergenerational equity as well as equity in terms of age, disability, ethnicity, gender, geography, sexual orientation, gender identity and expression, socio-economic position, and other axes of identity that may intersect with each other in important ways.

Many features of the global systems have produced highly unequal patterns of production and consumption; these, as well as their unequal health effects, reflect the legacy of colonialism, slavery and racism (Packard 2016). It is important to acknowledge this history

and its enduring impact, and for actions to address these harmful legacies that continue to stand in the way of equitable responses to the three threats. This has guided the work of this Commission.

Effective action will go beyond the specific focus of Sustainable Development Goal 10 on reducing inequalities and will help to achieve many of the other Sustainable Development Goals, leading to reductions in poverty, hunger, and gender inequity, while also increasing the inclusivity of education, peace and justice, and health and well-being.

### 1.1.5 Global context

The work of this Commission has taken place within a rapidly changing global context. During the drafting of this report, for example, Russia invaded Ukraine, not only causing a humanitarian catastrophe in Ukraine but threatening global food and energy supplies. We highlight below elements of three global systems - built environment and transport, agriculture and food; and energy - that provide the context for the work of this Commission.

Over the past few decades, the globalised food system has grown more connected, and more complex (Benton 2019). It has become increasingly specialised on fewer products, grown intensely and at large scale in a few breadbasket regions of the world. These crops (maize, rice, wheat, barley, soya, palm oil, sugar and potatoes) form the basis of the majority of the consumption in the world, often in highly processed ways, in products with complex and long supply chains. The production of calorie-dense crops also underpins diets which are increasingly obesogenic on a global basis, and cheap, widely available grains enable large scale production of animal-sourced foods. The Food and Agriculture Organisation of the UN has described how the world's food and agriculture systems are in crisis, with land and water resources at breaking point, livelihoods threatened, smallholder farmers marginalised, and major risks to the global food supply (FAO 2022).

The Russian invasion of Ukraine in 2022 has laid bare two key consequences of the globalisation and industrialisation of the food system. First, this era of high energy costs has shown the extent to which food and energy are connected. Energy prices impact on costs across the food system, from agriculture and transport through to consumption. Nitrogenous fertilisers, for example, require significant amounts of fossil fuel to produce, and their price and availability are therefore highly correlated to energy prices. In 2021, the economic rebound after the COVID-19 pandemic increased demand for energy and therefore the price of fertilisers (Benton 2022). Following the Russian invasion of Ukraine in 2022 availability of fertilisers fell as a result of sanctions on Russia and Belarus, important producers of nitrogenous and potassic fertilisers respectively.

Second, the interconnectedness of local and global food systems means that, although there is no overall food shortage globally this could rapidly change, and the poorest communities are vulnerable to high food prices due to market fluctuations. If flows from major exporters are disrupted (for example by war), markets foresee a shortfall in availability, prices rise, countries institute export bans to protect local food security, and prices increase further (Benton et al 2022, Challinor et al 2018). The consequence is that

low-income households suffer most – whether in rich nations or low-income, import-dependent countries in the Global South.

The conflict in Ukraine has disrupted energy supplies through the direct impacts of conflict, the imposition of sanctions by third party countries, and retaliation to these sanctions by Russia. These shocks in energy supply have driven major increases in costs, leading to extensive fuel poverty in many countries, and a resurgence in fossil fuel use to ensure energy security, setting back the limited progress there has been to date in the transition to renewables.

The Russian invasion of Ukraine could be a materially instrumental turning point, shaping global economic and geopolitical development. First, food and energy systems are now seen increasingly in terms of security rather than as simply relying on a well-functioning global market. Should countries depend for critical resources (food, fertiliser and fuel) on countries that are not allies and may become enemies? Second, the invasion is creating a more fragmented and polarised world, with significant tensions between “the West” and Russia and China. However, and whenever, the war ends, the combination of these two issues means there are likely to be significant, long-term, structural changes in international markets, with – at least at some level – increased pressure towards deglobalisation. If this continues, prices will continue to increase significantly even when the immediate crisis is past.

All this is happening while disruptions to our economic, health and food systems from the impacts of climate and environmental change are becoming more tangible. Many climate change risk assessments (e.g. the UK’s CCRA3) highlight the volatility that is likely to arise from increasingly disrupted supply chains (Benton 2022, Challinor 2018). The urgency is growing to transform our systems to address the immediate challenges of climate change, biodiversity loss, pollution, human health, and inequity whilst also building resilience (Webb 2020).

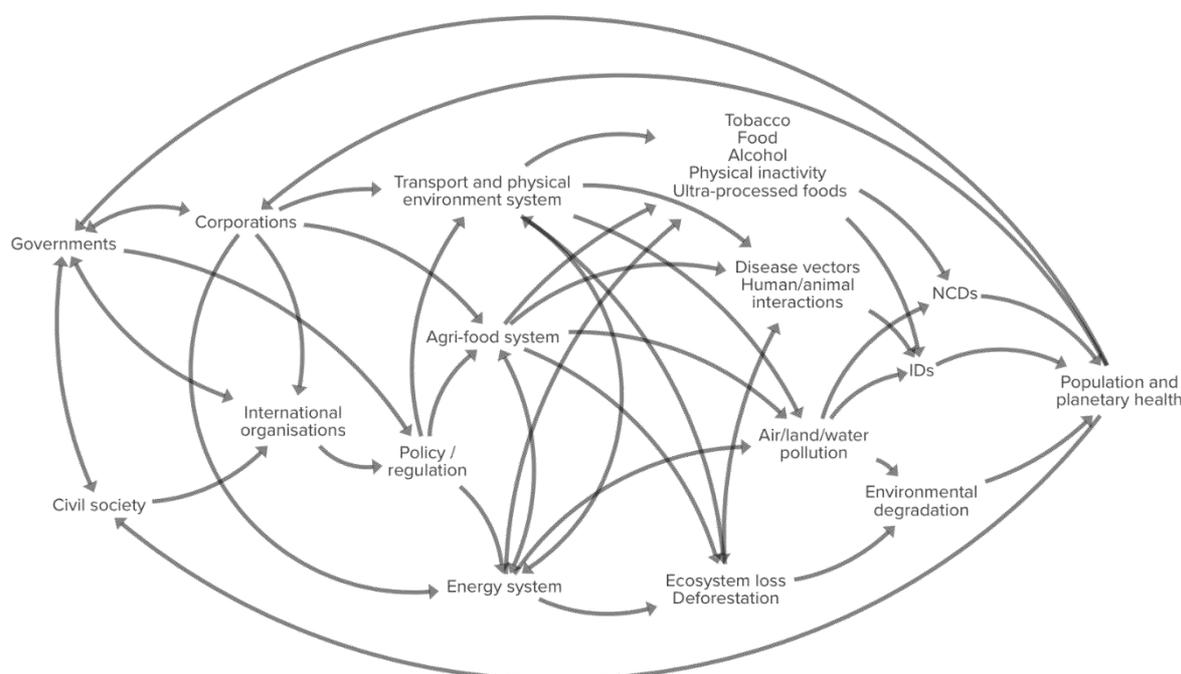
If action is limited to addressing only the cost of living crisis, and the current unsustainable and dysfunctional food, energy and land systems are re-entrenched, we will fail to achieve the essential larger, longer term goals (Benton 2022). The significant systemic changes currently underway create a crucial opportunity for interventions that could achieve ambitious transformation towards systems that equitably promote population health.

## 1.2 Identifying drivers and systems

### 1.2.1 Methods

As a first step, the Commission used a series of group model building workshops (Hovmand 2014, Siokou 2014) to develop a conceptual model of the key actors, systems, and drivers of the three threats to population health, and the relations and interactions between them. This is shown in Figure 1 below.

Figure 1: Conceptual model of key actors, systems, and drivers of the three threats to population and planetary health.



### 1.2.2 Drivers of harm across the three threats

The COVID-19 pandemic has driven unprecedented action globally, with many similar policy responses around the world (Hale et al 2021). By the end of April 2020, over 4 billion people, more than 50% of the world's population, had their movements restricted to reduce disease transmission (IEA 2020). A wide range of measures was put in place, including restricting international travel, population testing at scale, and limiting the size of gatherings (Hale et al 2021). Less than a year after the virus was first identified, effective vaccines were developed and – in high income countries – widely administered. Although there were multiple failures of policy and practice around the world, the nature of the responses to COVID-19 did at least demonstrate that countries are able to act radically and rapidly when faced with an urgent crisis of global magnitude.

The experience of responding to COVID-19 shows the need for urgent preventive action against further pandemics. The 2021 WHO COVID-19 Strategic Preparedness and Response Plan has six strategic objectives: suppress transmission; reduce exposure; counter

misinformation; protect the vulnerable; reduce mortality and morbidity from all causes; and accelerate equitable access to new COVID-19 tools including vaccines, diagnostics and therapeutics (WHO 2021). In response to ‘failures and gaps in international and national responses’, the Independent Panel for Pandemic Preparedness and Response argued strongly for urgent measures to apply non-pharmaceutical interventions; to ensure equitable global coverage of vaccination, tests and therapeutics; and for WHO to establish a roadmap for short-, medium- and long-term actions to end the COVID-19 pandemic (Independent Panel 2021). These are all measures aimed at tackling the *immediate* problems of transmission, infection, and unintended secondary harms of such measures. *[NB in due course will need to update refs to WHO policy on pandemics in light of results of <https://inb.who.int>]*

The global response to the far greater, but more slowly developing, pandemic of NCDs remains profoundly inadequate. There are now more smokers than ever before - over a billion people globally - while increasingly unhealthy diets and declining levels of physical activity drive ever-growing levels of obesity (Reitsma et al 2021, WHO 2021).

The WHO Global Action Plan for the prevention and control of NCDs 2013-2030 (extended from its original end date of 2020) also has six objectives: raise the priority accorded to prevention and control of NCDs; strengthen national capacity to address NCDs; reduce modifiable risk factors; strengthen health systems; increase research capacity; and monitor trends and determinants of NCDs. These objectives are applied across the 5x5 model of diseases and risk factors, which foregrounds the importance of tackling unhealthy diets, excess alcohol consumption, tobacco use, physical inactivity, and exposure to air pollution. There is no room for complacency or inaction, as these major risk factors persist and the burden of NCDs continues to rise.

The global policy response to environmental degradation has taken a broadly equivalent approach, dominated by action on drivers of environmental harms such as fossil fuel use, plastic waste, and deforestation, which have direct impacts on environmental outcomes. Action on proximal drivers of ill health and environmental degradation is essential for responding to the three threats that are the focus of this Commission. However, sustained long term improvements to health and environment will require action not only on these proximal drivers but also on the structures and systems of more distal factors, the kinds of structural drivers that promote the establishment and persistence of the more proximal ones. As Margaret Chan, former DG of the WHO, said in 2014:

*“NCDs are driven by the effects of globalization on marketing and trade, rapid urbanization and population ageing – factors over which the individual has little control and over which the conventional health sector also has little sway. While individual behaviour change is important, tackling NCDs definitively requires leadership at the highest levels of government, policy development that involve all government departments, and progress towards universal health coverage.”* (WHO 2014).

### 1.2.3 Systems

A “complex systems model of public health conceptualises poor health and health

inequalities as outcomes of a multitude of interdependent elements within a connected whole. These elements affect each other in sometimes subtle ways, with changes potentially reverberating throughout the system” (Rutter et al 2017). Systems thinking and systems science for public health encompasses a range of approaches from computational modelling to qualitative methods for stakeholder engagement (Carey et al 2015). These have been used to address a broad range of public health challenges, including community-based action on obesity (Allender et al 2015), describing the determinants of dietary inequities (Friel et al 2017), analysing commercial determinants of health (Knai et al 2018), and developing global and national physical activity plans (Rutter et al 2019). Their use in LMICs has been uneven, even though their potential is widely recognised (Kwamie 2021), indicating a need to develop capacity for these approaches.

The Jevons paradox, which states that increased efficiency may make a resource cheaper, leading in turn to increased overall consumption, illustrates the importance of a systems level perspective (Alcott 2005). For example, although energy efficiency has improved in recent years, any environmental benefits have been more than outweighed by increased global activity of industry, energy supply, transport, agriculture and construction (IPCC AR6 part iii, statement B2, Sims 2014). There are strong incentives for corporations to emphasise increases in efficiency - relative benefits - while diverting attention away from total carbon emissions - the absolute harms. A systems perspective helps to expose such obfuscation.

The response to the COVID-19 pandemic has shown the importance of considering impacts - both intended and unintended - across systems. Locking down populations in their homes may be highly effective at reducing viral transmission, but it also carries a wide range of unwanted physical, psychological, social, and economic side effects. By being open to the likelihood of system-wide impacts and harmful unintended consequences, we can achieve a more measured approach to interventions and identify ways to mitigate any potential harms (Jung et al 2021).

The conceptual map show in Figure 1 above identified three interacting systems that will need to be transformed to achieve improved population health (see Figure 1): physical environment and transport; agriculture and food; and energy. The Commissioners recognised the importance of other systems, including the economic, healthcare, education systems, but decided that these were beyond the scope of this project.

The figure illustrates the harmful impacts of these three systems: on non-communicable diseases, through ultra-processed foods and reduced physical activity; on infectious diseases, through changes to disease vectors and animal-human interactions; and on the environment, through activities such as deforestation and pollution.

Swinburn et al have described the global syndemic of the synergistic epidemics of obesity, undernutrition, and climate change, which ‘co-occur in time and place, interact with each other to produce complex sequelae, and share common underlying societal drivers.’ The global food system has driven transition towards diets that are energy dense but poor in nutrients, fuelling non-communicable diseases (Swinburn et al 2019), while also contributing around a quarter of global greenhouse gas emissions (Jia et al 2019, Shukla et al 2019 Ch.2) and driving loss of marine and terrestrial biodiversity (Benton et al, 2021). In

addition, there is growing evidence that emerging infectious diseases are made more likely by the impacts of climate change and land use on ecosystems as a result of novel ecological associations between wild and farmed animals, and between animals and people (Brooks et al. 2019; Morand and Lajaunie 2021). Meanwhile, the mental health of young people around the world is increasingly worsened by anxiety about the climate emergency, inadequate climate commitments, and political inaction (Hickman et al 2021), while the Covid pandemic has led to major increases in mental ill health including anxiety and depression (WHO mental health and Covid 2022). Similarly, high levels of private car result in multiple environmental impacts including carbon emissions, air, soil and water pollution, while also increasing physical inactivity (Woodcock 2022), which is in turn associated with increased risk of severe outcomes from COVID-19 (Sallis 2021).

Each system needs to be reshaped away from its current harmful configuration to achieve synergistic benefit, moving from vicious to virtuous cycles in order to promote rather than damage population health and environmental sustainability. This will require major but achievable changes to the ways in which we build our towns and cities, how we travel within and between them, the things we produce and consume and how we produce them, and the ways in which we produce and consume energy.

## 1.3 Commission's aims and objectives

### 1.3.1 Methods

The conceptual model shown in Figure 1 above was used to direct discussions between Commissioners to agree the aims and objectives of the Commission. Building on a consensus that the three systems of built environment and transport, agri-food, and energy, underpin the three threats, the Commissioners agreed three aims:

Aim 1: Achieve healthy and sustainable physical environment and transport systems

Aim 2: Achieve healthy and sustainable agri-food systems

Aim 3: Achieve healthy and sustainable energy systems

These aims were used to create a framework by which to agree a set of objectives via a two-stage survey and modified Delphi exercise. In the first round of the survey, we asked Commissioners to propose objectives that would help to achieve the three aims, based on the systems and drivers depicted in the conceptual map. This resulted in 262 free-text items. These responses were then analysed, revealing considerable overlap, and combined where appropriate. This resulted in a set of 42 draft objectives which the Commissioners were then asked to rank. From this second survey, 12 priority objectives were identified, which were then refined to a final list of 10 and, following further consultation with the Commissioners, clustered under each of the three aims. The final aims and objectives are listed in **Table 1.1**.

The process of identifying these objectives revealed some common, cross-cutting principles. To avoid repetition, these have not been restated in each of the ten objectives but are summarised in Box 1.1. with examples to illustrate their importance. A central principle of

the Commission is equity. Embedded in all the objectives is the need to reduce and where possible eliminate inequalities by age, gender, ethnicity, disability, socioeconomic status, geography, and over time through the principle of intergenerational equity. While the mechanisms for achieving the objectives will vary across local, regional and national contexts, the objectives apply equally in high, middle and low income countries. They are therefore designed to be achievable for everyone everywhere, whilst allowing for context-specific requirements.

Sustainable development has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (Brundtland et al. 1987) In line with this we define sustainable processes and components as those that do not contribute to exceeding planetary boundaries.

**Table 1.1: Commission aims and objectives**

<b>Aim 1</b>	<b>Achieve healthy and sustainable physical environment and transport systems</b>
Objective 1	<b>Ensure healthy and sustainable transport</b> Design and build infrastructure in urban and rural areas to enable and prioritise safe, affordable, accessible, and convenient active travel and public transport.
Objective 2	<b>Reduce the need to travel</b> Design, build and manage urban and rural environments in which the need for vehicles is minimised.
Objective 3	<b>Healthy sustainable urban ecosystems</b> Design habitations and associated areas to foster biodiversity and to support and restore ecosystems, including where relevant the provision of accessible public green and blue spaces (rivers, lakes and sea).
Objective 4	<b>Ensure sustainable construction</b> Build and renovate buildings and infrastructure using sustainable and healthy materials and practices. Ensure all private and public buildings incorporate sanitation, ventilation and temperature regulation as appropriate that do not contribute to exceeding planetary boundaries, or harm health.
<b>Aim 2</b>	<b>Achieve healthy and sustainable agri-food systems</b>
Objective 5	<b>Ensure healthy sustainable agriculture</b> Conduct all activities within the agri-food system, including production, processing, packaging, distribution and consumption, such that they remain within planetary boundaries in proportion to yields, and do not cause other harms such as increasing animal/human contact.
Objective 6	<b>Provide healthy and sustainable food for all</b> Design production and distribution systems to ensure access to sufficient nutritious fruit and vegetables for everyone on the planet; minimise waste through supply side and demand side mechanisms; and reduce/eliminate environmentally harmful products.
Objective 7	<b>Minimise harmful produce</b>

	Minimise production and consumption of alcohol, tobacco, ultra-processed foods, animal-sourced foods, and other produce that harms health and the environment
Objective 8	<b>Ensure sustainable land use</b> Protect and/or restore land and marine ecosystems in rural areas, including through reforestation, rewilding, and reintroduction of native animals
<b>Aim 3</b>	<b>Achieve healthy and sustainable energy systems</b>
Objective 9	<b>Achieve zero carbon energy</b> No new fossil fuel exploration, extraction, or power stations. End all fossil fuel use while ensuring a just transition and energy security, and replace it with net zero carbon energy sources.
Objective 10	<b>Healthy sustainable energy</b> Minimise harms caused by energy production, and from equipment for its storage and use. Reduce production and consumption to minimise energy related harms both during and after the energy transition, including any harms related to sustainable energy.

## SECTION 2: Interventions and mitigations

Building on its three aims and 10 objectives, the Commission then sought to identify interventions that could contribute synergistically and equitably to achieving them. There was no expectation that this would result in an exhaustive list, but rather an illustrative set of interventions that could, in combination, make an important contribution to achieving the aims of the Commission.

The Commissioners recognised that, as well as benefits, many of the interventions could also create harmful unintended consequences, especially in terms of creating or widening inequalities. Many of these undesired impacts result from unavoidable trade-offs between competing demands, such as those between the total area of land required globally to feed the world's population – land which could be used for alternative functions such as ecosystem restoration - and the side effects of intensive agricultural production. Others represent unwanted, regressive distributional effects from implementing the interventions, of which two main categories were identified: reduced affordability of and accessibility to key services and products; and job losses in industries that harm health or the environment. All these unintended harms need to be mitigated as part of a fair transition.

The Commission's approach was that effective interventions should not be avoided merely because they carry a risk of unwanted harm – not least because the status quo already creates major harmful impacts to health, environment and equality - but that any such potential harms should be minimised and mitigated through careful policy design and packages of mitigation measures. Therefore, we also sought illustrative examples of these kinds of mitigations.

Costs imposed on society and/or environment by interventions proposed by the Commission should be distributed in ways that ensure equitable consumption of resources, and prevent inequitable imposition of harms on the basis of wealth and/or power. For example, per capita emissions in a number of countries in sub-Saharan Africa are below 0.2 tCO<sub>2</sub>, while the average carbon footprint in the United States is 14.5 tCO<sub>2</sub>; the 10% highest carbon emitters within the global population are responsible for almost half of all global emissions, and the top 1% responsible for 15% (Bruckner et al 2022). Interventions to achieve a good quality of life for all of humanity while remaining within planetary boundaries must take account of these huge disparities in baseline emissions, which will require significant reductions in resource use in high income countries (O'Neill et al 2018).

We recognised that some interventions and mitigations would serve across multiple objectives. Indeed, these would have the greatest potential value, in being “triple wins”, and were thus a major focus of our work. Actions such as removing subsidies from harmful products and industries, or providing retraining and re-employment for people who lose their jobs when harmful business practices are ended, should thus be supported by overarching actions to embed them in all policy domains, rather than applying them piecemeal from case to case. Policies should be designed within packages that embed mitigation of unwanted effects alongside interventions, with the intention of creating synergistic benefit by simultaneously increasing the likelihood of uptake and reducing

barriers to implementation.

## 2.1 Identifying interventions and mitigations

### 2.1.1 Methods

This work took place in five phases: phase 1, semi-structured interviews; phase 2, thematic analysis; phase 3: rating of interventions; phase 4, review, iteration and consensus; phase 5, modelled analysis of potential impacts of carbon pricing.

In phase 1 we conducted semi-structured interviews with 26 experts selected for expertise in one of four subject areas: the three systems of interest – built environment and transport, agri-food, and energy, with the agri-food system subdivided into two (food systems; and tobacco, alcohol, ultra-processed foods, meat, and dairy). The interviews were designed to elicit suggestions for interventions, with an intervention defined as ‘a planned action intended to change a pre-specified outcome or set of outcomes.’

In phase 2, elicited interventions were subjected to a thematic analysis conducted by the core team of the Commission, to create a list of distinct interventions, similar in scope and level of detail.

In phase 3, experts from phase 2 and Commissioners rated the interventions for their potential impact on the 10 objectives previously identified by the Commission. They were also asked to propose actions to mitigate any potential harmful consequences from these interventions. These actions were analysed thematically by the core team of the Commission, then reviewed and refined by the full Commission.

In phase 4, the outcomes of phase 3 were reviewed by the core team of the Commission to identify gaps and overlaps. Through an iterative process of consensus via both written consultation and discussion in workshops, Commissioners reached an agreed set of 26 interventions and potential mitigations. These were grouped under the Commission’s three overarching aims (see below and table 2.2).

For phase 5 we commissioned an independent analysis by an economics consultancy of the potential impacts of carbon pricing, given its recognised importance as an intervention with potential for . In order to make this manageable and in discussion with the group undertaking this analysis, we chose to align the modelling with 1.5°C and 2°C pathways and to focus on only two contexts: land use and the agri-food system; and land transport.

### 2.1.2 Proposed interventions and mitigations

*Aim 1: Achieve healthy and sustainable physical environment and transport systems*

**Objective 1) Ensure healthy and sustainable transport**  
*Design and build infrastructure in urban and rural areas to enable and*

*prioritise safe, affordable, accessible, and convenient active travel and public transport.*

## **Interventions**

The private car is the dominant mode of transport in cities around the world (ref). Driving offers a range of benefits to those who drive, but imposes many external costs on others - including other car drivers - in the form of air, noise and land pollution, carbon emissions, road danger, community severance, land take, and congestion (ref), as well as indirect effects such as reduced physical activity through discouraging active travel. Manufacturing and maintaining private cars carries major environmental costs, far greater than providing public transport to support equivalent levels of travel. The transport system needs to be considered as a whole, not only in terms of the relative harms and benefits of different kinds of vehicle.

Electric vehicles provide only a marginal improvement over fossil fuel vehicles as they impose all these harms, other than tailpipe emissions, and until the electricity supply has been fully decarbonised impose a significant opportunity cost for the use of constrained availability of sustainable energy. Private car ownership is positively associated with income, while the harms of driving are negatively correlated with income and socioeconomic status, and car use tends to be more flexible, and cheaper per trip than public transport, even in many urban areas. Transport policy that favours active travel and public transport is thus likely to narrow inequalities as well as to improve health in most contexts.

Countering the harms of private car use in the interests of health, environment and equity requires a realignment of spatial and urban planning to maximise provision of active travel infrastructure and public transport through planning and transport policies that prioritise positive health and environmental outcomes. In addition to policies that actively support walking, cycling and public transport, authorities should also restrict the use of private cars (Kuss and Nicholas 2022). Charges for road use and parking should be proportional to the health and environmental impact of vehicles (eg size, weight, energy usage), and reflective of their true costs to health, environment, and economy using a life-cycle approach that takes into account the full impacts of manufacturing and ownership, as well as use.

Achieving these outcomes will require both demand and supply side measures to disincentivise motoring and ensure that active travel and public transport are safe, affordable, accessible, dependable and convenient. Demand side measures may include pricing of carbon, fuel, road use, vehicle purchase, and parking, to ensure that travel by public and active transport is more affordable than travel by private vehicle (Kuss and Nicholas 2022). Supply side measures require regulation to ensure a high level of service of public transport, public investment in active travel infrastructure, and active travel promotion (Zukowska 2022).

## **Mitigation of harms**

Distances and journey times are likely to be socially patterned, with people on low incomes living further from key destinations and poorly served by public transport, especially in rural areas, which may require them to drive. Notwithstanding the overall positive association of

car ownership with affluence, measures that simply increase the cost of motoring may thus risk creating transport poverty. Public transport systems should be designed and operated in ways that prioritise the needs of people on low incomes and others facing transport poverty. Transport systems should meet the needs of all social groups in sustainable ways while also explicitly promoting transport equity.

**Objective 2) Reduce the need to travel**

*Design, build and manage urban and rural environments in which the need for vehicles is minimised.*

**Interventions**

Initiatives such as the '15 minute city' proposed for Paris by Carlos Moreno (Allam et al 2022) go beyond supporting active and public transport. They aim to reduce the need to travel by meeting people's daily needs within a short walk from their home, while also facilitating public transport connections to destinations beyond the immediate neighbourhood (C40 Knowledge Hub). Achieving this kind of urban reconfiguration - also seen in Bogotá's *Barrios Vitales*, Portland's *Complete Neighbourhoods*, and Melbourne's *20 Minute Neighbourhoods* - requires planning and transport policy designed to create positive health and environmental outcomes rather than prioritising vehicle movements.

Measures to support this include: creating vehicle-free and low emission zones, as seen in Florence in Italy (Visit Florence website) and Ghent in Belgium (gent: website); enforcing a road user hierarchy that prioritises active travel and sustainable mobility over private car use; restricting the numbers of cars allowed on the roads, as in Singapore where a system of vehicle ownership certificates applies (Government of Singapore 2022); road user and parking pricing that is tiered by health and environmental impact of vehicles (eg size, weight, energy usage); and removing heavy goods vehicles from urban areas by placing lorry distribution centres and rail freight hubs away from conurbations and transferring goods from there to small electric vehicles or cargo bikes for local deliveries.

Rural transport imposes more difficult challenges and requires carefully designed responses. Disincentivising driving may, paradoxically, improve the availability of rural public transport by tackling the vicious cycle in which high car usage reduces the economic viability of public transport through reduced passenger numbers, leading to reduced service levels. This makes those services less convenient, thus increasing incentives for car use.

Changing patterns of work, accelerated by the COVID-19 pandemic, have great potential to reduce the need to travel through the use of video-conferencing and other forms of remote working technology.

Many of the examples above are from high income countries. While the particular transformations required in urban areas in low and middle income countries may be quite different, the ultimate outcomes of reducing the need for private cars and maximising the availability, affordability and convenience of active travel and public transport are the same.

**Mitigation of harms**

These interventions will themselves involve construction, manufacture and disruption. Efforts should be made during these activities to reduce noise pollution using, for example, low-noise tarmac (UNECE 2011, Männel et al 2013) and installing sound barriers alongside transport corridors. Construction carries an environmental cost, which should be minimised by conserving and adapting existing materials wherever possible, and using sustainable products and practices where not (Hu 2019).

The creation of high quality, highly accessible habitations may drive up house prices, leading to gentrification and pricing poorer people out. Ensuring an appropriate level of social housing within any such developments will be important to mitigate this, and will bring the additional benefit of helping to sustain economic activities in such zones.

**Objective 3) Healthy sustainable urban ecosystems**

*Design habitations and associated areas to foster biodiversity and to support and restore ecosystems, including where relevant the provision of accessible public green and blue spaces (rivers, lakes and sea).*

**Interventions**

National, regional and local planning and transport policy should take a “health and sustainability in all policies” approach that engages citizens over the long term, and in which positive health and environmental outcomes are required. The aim should be to design, improve and protect biodiverse green and blue spaces that are accessible and in accordance with peoples’ preferences and needs (Stott et al 2015).

Ecosystems should also be protected by the creation of urban green and blue space, national parks, and other forms of support. Traditional, sustainable approaches to designing the physical environment should be applied where relevant and effective (ref).

**Mitigation of harms**

Land is likely to be cheaper in deprived areas than affluent ones. Land use for ecosystem restoration may therefore create cost pressures that disadvantage poor people. This is likely to apply internationally as well as within countries, as rich nations attempt to outsource their biodiversity commitments to low income countries. Measures to mitigate these harms should include prioritising biodiversity preservation in lower resourced contexts, and mandating a requirement not to widen inequalities - including international or inter-regional inequalities - when protecting and restoring ecosystems. Achieving this requires the use of reliable and appropriate metrics. For example, measuring ecosystem restoration purely in terms of habitat area may be misleading when offsets are applied internationally as habitats tend to be more biodiverse per unit area at lower latitudes.

Partnerships with local communities as custodians of biodiversity may help, for instance through People’s Biodiversity Registers which ‘document folk knowledge of status, uses, history, ongoing changes and forces driving changes in biodiversity resources, gainers and

losers in these processes and people's perceptions of how these resources should be managed' (Gadgil 2000).

**Objective 4) Ensure sustainable construction**

*Build and renovate buildings and infrastructure using sustainable and healthy materials and practices. Ensure all private and public buildings incorporate sanitation, ventilation and temperature regulation as appropriate that do not contribute to exceeding planetary boundaries, or harm health.*

**Interventions**

Planning and building regulations should be designed to prioritise sustainability and health in the construction, running and maintenance of buildings and other infrastructure. This includes the mining and extraction of materials used in construction and maintenance, both in terms of the ecosystems from which they originate, and the health of workers extracting them. Where possible existing buildings should be adapted and renovated to conserve embedded carbon and other resources, rather than demolishing and rebuilding. Building standards should mandate efficient forms of heating/cooling eg phasing out gas boilers to be replaced by heat pumps, and require systems to support grey water recycling. (World Green Building Council 2019).

Supply side measures such as building regulations and demand side measures such as carbon pricing should be applied both directly and indirectly to incentivise sustainable and/or low energy forms of ventilation, for example through airflow design and passive cooling, and to disincentivise high resource use, for example by air conditioning, with similar measures applied to water and other resources. Many LMICs have effective traditional and vernacular architecture responses to these problems in place that may provide lessons for HICs (Cocojaru 2021, Singh 2011).

These measures may well entail balances across health and sustainability, for example tensions between energy-efficient heating and appropriate levels of ventilation to reduce risks of transmission of airborne viruses such as SARS-CoV-2 (Petrou 2022). Approaches for managing these trade-offs are being actively explored (Royal Academy of Engineering 2022).

**Mitigation of harms**

Applying these standards, regulations, and pricing mechanisms may increase the up-front cost of buildings and infrastructure, and potentially also the cost of running and maintaining buildings over the short term, reducing their affordability. However, mandating the relevant standards should drive economies of scale, and many of these measures will reduce running costs through more efficient use of resources, which will save money over the long term and incentivise the development of sustainable technologies. Grants and subsidies for capital expenditure could be means tested to avoid disadvantaging people on low incomes, and there will need to be ongoing incentives, subsidies and technical and practical support to maintain infrastructure (for example, solar panels accumulate dust and can lose up to 80% of their efficiency if not regularly maintained (Kazem 2020)). Inclusive design processes that

meaningfully engage women, children, the elderly, disabled, those on low incomes and other groups in the design and planning process provide a mechanism for more equitable approaches to urban development (Pineo 2020).

*Aim 2: Achieve healthy and sustainable agriculture and food systems*

**Objective 5) Ensure healthy sustainable agriculture**

*Conduct all activities within the agri-food system, including production, processing, packaging, distribution and consumption, such that they remain within planetary boundaries in proportion to yields, and do not cause other harms such as increasing animal/human contact.*

**Interventions**

The agri-food system contributes to human health through the production of food, raw materials for pharmaceuticals, and many other products, but farming of crops and livestock often causes damage to ecosystems, through excessive use of land and water, direct effects of fertiliser and chemical run-off, carbon emissions, and other mechanisms. These harms need to be considered in relation to the potential impacts of alternative forms of land use, which may include lower intensity farming or the use of that land for ecosystem restoration and carbon drawdown. Any assessment of such impacts needs to be considered in terms of the outcomes at scale. There is a finite land area available globally and the multiple demands placed upon that land for human habitation, agriculture, wider economic and human activities, and the need for carbon sinks and protected ecosystems mean that all land use carries an opportunity cost. Therefore, while a single low intensity smallholding may have minimal or even beneficial environmental impact, it should be assessed in terms of the impacts that such an approach would have if these kinds of low yields were replicated at scale, and assessed against the overall environmental impacts of alternative uses for that land, which might include more intensive and higher yield agriculture, or setting aside for ecosystem restoration.

A range of approaches will be needed to drive both rapid reductions in the carbon-intensity of agriculture medium/long term changes in the mix of food system activities. These could include the application of fiscal disincentives such as carbon pricing to environmentally damaging practices, and reassigning funding away from practices that harm health and/or environment to agricultural practices that benefit health and/or environment.

Life cycle assessments, and carbon pricing, of agricultural products should include the opportunity cost of missed potential for using land for carbon drawdown through the retention or restoration of natural habitats, in addition to direct carbon emissions (Schmidinger 2012, Searchinger 2018).

Multiple supply side measures are required to reduce the impact of agriculture on the environment, ranging from banning toxic chemicals to controlling discharge of farm effluent into water supplies. These need to be complemented by demand side measures to reconfigure diets, including pricing, regulation (eg banning trans fats), and restrictions on

marketing and promotion of unhealthy and/or environmentally damaging products. Activities such as production of biofuels need to be considered at systems level in terms of health opportunity cost relative to other uses of that land, and consequences for food pricing and availability, especially in terms of harmful equity impacts of any such outcomes.

### **Mitigation of harms**

These interventions carry the risk of increasing the costs of food. In addition to this regressive impact, effects will be differentially distributed across society and between nations, with the potential for some groups to be particularly disadvantaged. This could be addressed through subsidies on staple products as well as wider mitigation measures such as minimum wage regulations and redistributive taxation.

Smallholder farmers, many of whom are women, are excluded from \$540bn global subsidies given to farmers each year, 90% of which “harm health, fuel climate crisis, destroy nature and drive inequalities” (FAO 2021). Addressing this inequity, for example through targeted subsidies for smallholder farmers, could address the associated gender and social inequalities and, where smallholder farming approaches are able to achieve this, mitigate the health and environmental impacts of agriculture.

#### **Objective 6) Provide healthy and sustainable food for all**

*Design production and distribution systems to ensure access to sufficient nutritious fruit and vegetables for everyone on the planet; minimise waste through supply side and demand side mechanisms; and reduce/eliminate environmentally harmful products.*

### **Interventions**

The production of foods to support current diets globally are not only a major cause of NCDs, but are also the single largest driver of environmental degradation, and transgression of planet boundaries (EAT Lancet 2019). Over-nutrition is particularly concentrated in high income countries, but malnutrition - in terms of both over- and under-nutrition - is prevalent in countries at all levels of development. Stunting (failure to reach growth potential) affects almost 150 million children under 5 years of age worldwide, while over 45 million children experience acute malnutrition in terms of weight that is too low for their height (Global Nutrition Report 2021). Addressing these and other nutrition-related challenges requires changes to the food system to ensure that all children and adults have affordable access to adequate quantities of nutritious food.

National and local food buying standards should mandate that the public sector, voluntary sector, and corporations purchase and provide only healthy and sustainably grown food. National food system data programmes should support effective and accurate mandatory reporting of health and environmental impacts of the agri-food system in each country. The metrics used for such reporting are extremely important. For example, reporting impacts in terms of unit area ignores the fact that some systems of farming require much greater land use than others to produce equivalent yields, with consequences for the environmental impact of those approaches in terms of the opportunity cost in relation to alternative uses

for the land used for farming. Reporting impacts per tonne of product can avoid this problem.

Subsidies should be removed from livestock and other forms of environmentally damaging farming, with carbon pricing and other fiscal measures applied to ensure that harmful or polluting businesses are liable for the full health and environmental costs of their activities, thus correcting uninternalized externalities within agri-food systems. Carbon pricing applied to the agri-food system is discussed in Section 2.2.2 below/ in Section 4.

### **Mitigation of harms**

These interventions may increase prices, preventing those on low incomes from buying adequate quantities or quality of food. This needs to be addressed through measures specific to the food system, such as subsidies on nutrient-rich, locally growable staple products, as well as wider mitigation measures such as redistributive taxation. In some countries rearing of certain produce is banned (eg. pigs in a number of Muslim countries, beef in India). Policymakers should be clear and careful about respecting cultural preferences while not vilifying communities or formulating bans that do not in fact reduce ecological harm, but instead may incite violence or discrimination. Additional measures include supportive welfare systems, which were part of the package of measures used to support removal of fossil fuel subsidies in Indonesia (see Section 3). Promoting indigenous agricultural and land use practices, through measures such as land tenure reform and targeted financial support, may help prioritise retention of natural habitats while also supporting livelihoods (Balmford 2021).

#### ***Objective 7) Minimise harmful produce***

*Minimise production and consumption of alcohol, tobacco, ultra-processed foods, animal-sourced foods, and other produce that harms health and the environment.*

### **Interventions**

The corollary to the need for adequate provision of healthy and sustainable food for all described above is the need to reduce production and consumption of alcohol, tobacco, ultra-processed foods, and other foods that harm health and the environment including animal-sourced foods. However, the distribution of consumption of such produce varies greatly both within and between global regions and population groups. For example, while consumption of animal products is highly excessive among many groups in high income countries, in many low and middle income countries there are population groups which might benefit from increased consumption of animal products. Improving dietary health at population level therefore requires a wide range of changes, which need to be appropriate for the context of the relevant populations of concern (EAT Lancet 2019).

It has been estimated that the cost of externalities from the global food system are almost US\$20 trillion, of which over half are costs to human health. If the true cost of the food system was reflected in pricing food would cost perhaps three times as much as it currently does (Hendricks et al 2021). Market failures whereby harms caused by goods and services

are borne by society should urgently be corrected. Any external costs imposed by these harms should be internalised into their pricing, thus ending *de facto* subsidies to activities that harm health and/or environment.

Reducing the harms caused by these unhealthy commodities requires action to reduce their affordability and availability through both supply and demand side measures, acting upon different types of unhealthy environments (eg physical, and economic), and at different scales (Hollands et al 2017, Marteau et al 2021, Marteau BMJ 2022). This includes using retail licensing systems to limit the availability of outlets selling higher strength alcohol (Ekström K, Hansson 2011) and tobacco (Kuipers et al 2021) and reducing the density of healthier food outlets in neighbourhoods, as well as altering/limiting the availability of health-harming options to purchase within such outlets (could ref e.g. Hollands et al, 2019; Marteau et al 2022; Clarke et al, 2022). Fiscal and economic interventions can make these harmful products less affordable, and could be combined with legislation to restrict or ban their advertising and marketing (Marteau et al 2019).

The transnational corporations that dominate the production and distribution of these unhealthy commodities exert powerful influence over government policy, requiring substantive action on the three main factors influencing their sales and consumption - price, availability, and marketing (RCP 2021; Barlow et al 2018; Granheim et al 2017; Mialon 2016) (see Section 3 for further elaboration).

Reducing the affordability and availability of these products improves health the most among disadvantaged groups, directly through reducing their consumption, and indirectly through increasing household incomes and boosting local economies in poorer communities (Marteau, Rutter, Marmot 2021, Bloomberg 2019).

### **Mitigation of harms**

Reducing availability and affordability of harmful products will have knock-on effects on the overall costs of healthy diets. It may be necessary to increase the affordability of healthy foods for people on low incomes, for example through subsidies or other forms of economic intervention. Reduced consumption of these harmful commodities will result in job losses within these industries (ILO 2003). Section 3 describes how retraining and re-employment can help, using the tobacco industry as a case study.

#### ***Objective 8) Ensure sustainable land use***

*Protect and/or restore land and marine ecosystems, including through reforestation, rewilding, and reintroduction of native animals.*

### **Interventions**

Ensuring that ecosystems are both protected and restored requires multiple approaches, ranging from the creation of national parks and other forms of setting aside protected areas for large scale rewilding; regulations to protect ecosystems from commercial exploitation and other forms of interference; and financial and other incentives to restore damaged systems, such as subsidies for agricultural activities that promote protection and restoration

of ecosystems (ref). Traditional, sustainable approaches to designing the physical environment should be applied where relevant and effective (ref).

### **Mitigation of harms**

Rewilding and other forms of land restoration may alter interactions between animal species, and between animals and humans, changing host-pathogen interactions in ways that may drive the emergence of novel zoonotic diseases similar to those seen from the pressures imposed by damaging forms of environmental change (Carlson et al 2022, Brooks et al 2021, Rupasinghe et al 2022). Mitigation may require behavioural adaptations by people interacting with these environments to minimise the risk of transferring any such diseases into human society.

These interventions will result in job losses within industries that destroy or damage ecosystems, to be mitigated by retraining and re-employment wherever possible, and alternative forms of support where not. This is discussed in more detail in Section 4. Supporting indigenous people to act as custodians is one of a number of mechanisms to avoid people being displaced by ecosystem restoration or preservation (ref). Equitable responses should be promoted by a requirement not to widen, and wherever possible to narrow, inequalities when protecting and restoring ecosystems, and by incorporating health in prospective impact assessments (WHO 2014).

Global accounting systems and other mechanisms are required to prevent perverse incentives that make it more profitable to destroy and then restore an ecosystem than merely to preserve it (ref). Assessing impacts globally also reduces the risk of ‘offshore effects’, where a harmful activity is simply displaced to a different location, potentially with fewer controls, ultimately causing greater harm. If high income countries engage in substantial rewilding there is a risk that the food or resource production forgone by taking land out of farming or forestry will simply shift to poorer but more biodiverse countries with more carbon-dense landscapes. Without compensatory domestic yield increases or demand reduction, rewilding in richer countries is thus likely to cause net harm to biodiversity and the global climate.

### *Aim 3: Achieve healthy and sustainable energy systems*

#### **Objective 9) Achieve zero carbon energy**

*No new fossil fuel exploration, extraction, or power stations. End all fossil fuel use while ensuring a just transition and energy security, and replace it with net zero carbon energy sources.*

### **Interventions**

Carbon emissions from fossil fuel extraction and use need urgently to end (IPCC AR6). Having failed to meet their 2012 pledge to provide \$100 billion to developing nations by 2020 (Timperley 2021), high income countries, which have been and remain the main emitters of pollution, must make bolder and more rapid commitments to this end. Planning laws should be instigated to forbid new fossil fuel power plants, tight legal limits imposed on

carbon emissions from existing power plants during an accelerated transition away from fossil fuels to zero carbon energy, and regulations enacted to prevent further exploration for fossil fuels. The planning approval process for sustainable energy infrastructure should be simplified and shortened.

Existing subsidies to the fossil fuel and associated industries, and other industries that harm health and/or environment, should cease and be reallocated to sustainable energy production, alongside other measures such as feed-in tariffs for green energy to encourage energy transition. This is discussed in detail in Section 3.

High-income countries must provide financial and other support to low- and middle-income countries in the move away from fossil fuels, in order to ensure that the transition reduces poverty rather than exacerbating it (Newell and Simms 2020). The agreement at the COP27 conference in 2022 to establish a loss and damage fund to support countries that are particularly vulnerable to climate change is an important step towards this (UNFCCC 2022). Wherever possible, states should fund national and international research and implementation collaborations with industrial partners, developing sustainable energy generation and storage and supporting demonstration projects, with the state bearing a proportion of the risk to encourage innovation. Evidence generated from these activities should be shared openly to maximise the potential for uptake of innovation globally.

These actions will also promote energy security through rapidly increasing reliance on sustainable energy, which is much less vulnerable to supply shocks and price volatility than fossil fuels. The importance of this has been highlighted by the war in Ukraine.

### **Mitigation of harms**

During the transition to zero carbon-intensive energy will become more expensive, and even a very rapid switch to sustainable energy will still take many years. Energy use itself therefore needs to be disincentivised, for example through pricing, in order to maximise capacity of the developing clean grid. All this risks increasing fuel poverty, which may be exacerbated by high costs of insulation and other energy-saving measures, as well as of energy itself. Some of these costs are unavoidable and should be addressed by measures such as stepped pricing (ie essential levels of use are cheap, but higher levels of use become progressively more expensive), redistributive taxation and welfare benefits. Measures to increase energy efficiency, including those described under Objective 4 above, will help to mitigate harms. For example, although applying relevant standards, regulations, and pricing mechanisms may increase the up-front cost of housing, mandating those standards should drive economies of scale, and many of the measures are likely to reduce running costs, which will save money over the long term. Grants and subsidies for both capital expenditure and recurring costs can make the measures more affordable.

There will also need to be re-employment programmes to support the 6 million people globally who currently work in fossil fuel and related industries (ref). The development, construction, and implementation of sustainable energy generation, use and supporting infrastructure will provide major new areas of employment growth that are projected significantly to outweigh jobs lost from fossil fuel and related industries (IRENA and ILO

2021). This is discussed in more detail in Sections 3 and 4.

**Objective 10) Healthy sustainable energy production**

*Minimise health and environmental harms caused by energy production, and from equipment for its storage and use. Reduce production and consumption to minimise energy related harms during and after the energy transition, including any harms related to sustainable energy.*

**Interventions**

In 2021 fossil fuel subsidies globally were almost \$700bn (OECD 2021). Removing these subsidies could reduce projected CO2 emissions to 36% below business as usual projections by 2025 (Parry et al IMF 2021).

Sustainable energy generation should be constructed and run in ways that minimise environmental costs. This covers all aspects of sustainable energy, from the mining of minerals for batteries, to flooding valleys in the creation of hydro-electric power schemes. Governments should support national and international research and development consortia working to maximise the benefits and minimise the harms of sustainable energy.

Demand side measures to reduce energy use include carbon pricing, with a price escalator to incentivise radical and rapid reductions. Such measures will also help drive supply side changes towards generation of zero carbon energy.

The transition must minimise the harms from ongoing fossil fuel extraction and emissions. This involves a range of approaches, including increasing energy efficiency while also managing demand in ways that avoid Jevons' paradox.

OECD countries are overall net importers of embedded carbon while non-OECD countries, in aggregate, are net exporters (OECD TeCO2 database 2021). Statistics that fail to take account of these kinds of CO2 transfers provide a misleading picture of the true environmental impact of trade and consumption within a country. The environmental footprints of sectors, organisations and nations should take account of embedded emissions and other environmental costs across the relevant systems, as well as the carbon opportunity cost in terms of alternative uses of land and other resources, to ensure that the full environmental costs of goods and services are accounted for.

**Mitigation of harms**

The generation, distribution and storage of sustainable energy is not without environmental costs. Current methods for producing steel and concrete used in construction, as well as photovoltaic panels, have large carbon footprints. The constituents of batteries are obtained via large scale mining and extraction, and hydro-electric power schemes may require flooding of habitations or important ecosystems.

In mitigation, planning laws can control the development of mining and extraction facilities, with tight regulation of waste disposal. Regulations should require recycling and reuse of

raw materials to the greatest extent possible, for example by recycling the components of batteries used in electric vehicles. This should be supported by pricing mechanisms to promote recycling and re-use of raw and processed materials used for energy generation and storage. Demand side measures such as road user pricing that incentivises smaller, more efficient electric vehicles will lead to lower demand for natural resources as well as lower energy requirements.

Cost pressures will incentivise HICs to outsource unwanted aspects of sustainable energy generation to LMICs, moving the harms from one location to another. These pressure can be reduced by global co-operation on transparency and reporting mechanisms, aligned with national agreements on restrictions to embedded emissions and other externalities.

### 2.1.3 Prioritising Interventions

All the proposed interventions and mitigations described above are necessary, as are many more, but they cannot all be implemented simultaneously. There will, inevitably, be a need to prioritise the focus and phasing of actions contingent on local context, resources, priorities, and considerations of local, national, global and intergenerational equity. For example, the changes required to create healthy built environments will differ between places with high levels of active travel such as Amsterdam and megacities such as Manila, while those to ensure healthy sustainable diets will differ between northern Europe and central Africa, the former requiring meat consumption to fall substantially, the latter potentially for it to rise slightly.

However, some of the proposed actions are sufficiently important in terms of impact and equity that they should be applied globally. Many harmful goods and services impose costs in the form of worsening health or environmental harm, but these costs are currently externalised (paid for by society) not internalised (borne by the producer and reflected in the price). Various mechanisms can internalise those external costs, such as carbon pricing sufficient to drive major changes in supply and demand, or ending subsidies to sectors such as the fossil fuel and ultra-processed food industries that cause health and environmental damage.

Successful implementation and maintenance of the proposed interventions and mitigations requires effective governance structures and implementation mechanisms including international treaties with legally binding commitments, and strengthened global structures to support regulation, monitoring and accountability.

Table 2.2: Summary of objectives, interventions, and mitigations

<b>Aim I: Achieve healthy and sustainable physical environment and transport systems</b>		
Objectives	Proposed interventions	Mitigating potential harms
Objective 1 Ensure healthy and sustainable transport	Prioritise and invest in active travel infrastructure and public transport  Make public and active transport more affordable, and convenient than private cars	Car ownership is strongly socially patterned so removing advantages of private car use, and providing safe, affordable, accessible, reliable public and active transport alternatives, reduces inequalities
Objective 2 Reduce the need to travel	Prioritises active travel and sustainable mobility over private car use;  Reallocate subsidies from harmful sectors to beneficial ones	Designing urban systems that prioritise walking, cycling, and free or low-cost public transport over private motorised travel reduces transport-related inequalities.
Objective 3 Protect urban ecosystems	Planning and transport policy designed to generate health, environmental and sustainability benefits.	Incentivise biodiversity preservation in lower resourced contexts.  Mandate requirement not to widen social, health or other inequalities when protecting and restoring ecosystems.
Objective 4 Ensure sustainable construction	Planning and building regulations that prioritise sustainability, health, and resource efficiency  Pricing to disincentivise high resource use and incentivise sustainable practice	Mandating standards drives economies of scale. Grants and subsidies for people on low incomes.  Per capita limits on resource use

<b>Aim II: Achieve healthy and sustainable agri-food systems</b>		
Objective 5 Ensure healthy sustainable agriculture	<p>Regulation to reduce the impact of agriculture on the environment, based on robust and appropriate metrics.</p> <p>Pricing to drive rapid and long term reductions in carbon intensity</p> <p>Reallocate subsidies from harmful sectors to beneficial</p>	<p>Increases in prices of food should be addressed through food system and wider mitigation measures, such as welfare systems and redistributive taxation.</p> <p>Maintain support for indigenous people’s land use and food practices, and traditional forms of agriculture, where these are beneficial in terms of health and environmental outcomes relative to relevant alternatives.</p>
Objective 6 Provide healthy and sustainable food for all	<p>Mandate food buying standards for healthy and sustainably grown food for public and private sector.</p> <p>Mandatory reporting for large food companies</p> <p>Reallocate subsidies from harmful sectors to beneficial ones</p>	<p>Increases in prices of food should be addressed through food system and wider mitigation measures, such as redistributive taxation.</p> <p>Maintain support for indigenous people’s land use and food practices, and traditional forms of agriculture, where these are beneficial in terms of health and environmental outcomes relative to relevant alternatives.</p>
Objective 7 Minimise harmful produce	<p>Regulate to reduce production, availability, and marketing of these products</p> <p>Fiscal and other pricing measures to reduce affordability</p>	<p>Provide retraining and re-employment for people who lose employment in industries producing these harmful products.</p>
Objective 8 Ensure sustainable land use	<p>Large scale rewilding, protect pristine ecosystems, and incentivise restoration</p>	<p>Retraining and re-employment for people who lose employment in industries that destroy or damage ecosystems. Support indigenous people to act as</p>

	<p>Subsidise agricultural activities that promote ecosystem protection and restoration, based on robust and appropriate metrics.</p> <p>Purchase land to create areas for restoration.</p>	<p>custodians.</p> <p>Global accounting systems and other mechanisms to prevent perverse incentives</p>
<p><b>Aim III: Achieve healthy and sustainable energy systems</b></p>		
<p>Objective 9</p> <p>Achieve zero carbon energy</p>	<p>Ban new fossil fuel power plants. Rapidly reduce emission limits. Accelerate construction of sustainable energy generation infrastructure.</p> <p>Escalate carbon and other pricing measures.</p> <p>Reallocate subsidies from harmful sectors to beneficial ones.</p>	<p>Protect households from fuel poverty, for example through welfare programmes and reallocating subsidies.</p> <p>Mandating the relevant standards should drive economies of scale.</p> <p>Re-employment programmes for the 6m people globally working in fossil fuel and related industries.</p>
<p>Objective 10</p> <p>Healthy sustainable energy production</p>	<p>Control development of mining/extraction, tight regulation of waste disposal. Require recycling and reuse of raw materials,</p> <p>Pricing measures to promote recycling and re-use of raw materials.</p> <p>Disincentivise energy use.</p>	<p>Global co-operation on transparency and reporting mechanisms, aligned with national agreements on restrictions to embedded emissions and other externalities, can help reduce these pressures.</p>

## 2.2 Case study: economic analysis of carbon pricing applied to urban land transport and the agri-food system

Pricing interventions have large potential to shift the supply and demand of goods and services in ways that benefit population health and the natural environment. There is an appreciable body of evidence on the impact and benefits of health taxes (WHO 2019, [Bloomberg] Task Force on Fiscal Policy for Health 2019), and carbon pricing has been highlighted as a key potential lever in global efforts to improve health and reduce emissions from both the transport sector (IPCC 2018, IPCC 2022) and the agriculture, food and other land use (AFOLU) sector. As of 2021, more than 60 carbon pricing initiatives have been implemented, covering more than 20% of global greenhouse gas emissions (World Bank 2022). Many countries are considering applying carbon pricing or other trade or regulatory measures to reduce emissions.

Carbon pricing acts to reduce carbon emissions and other forms of environmental damage through effects on both supply and demand. In the case of the land transport and agri-food systems, carbon pricing has the potential to drive changes in transport and dietary behaviours, increasing the likelihood of healthier and more sustainable patterns of travel and diets. These changes lead in due course to a range of direct and indirect health benefits.

Carbon pricing is, however, likely to lead to appreciable unwanted unintended consequences, especially the risk of making transport and food unaffordable to people on low incomes, and creating job losses as industries restructure. Indeed, carbon polluting industries have strongly resisted carbon pricing through what has been described as ‘double representation’ by both workers and their bosses, with unions raising the spectre of job losses, and businesses arguing against policy costs (Mildenberger 2020).

Some of the responses to mitigate these harmful unintended consequences will be universal, but many will depend on local circumstances, with important differences between the ways in which high, middle and low income countries should respond. It should not be assumed that mitigating measures that are effective in high income countries will be either effective or appropriate in low or middle income countries. Possible approaches to mitigating these impacts on employment are discussed in Section 3.

### 2.2.1 Modelling approach for economic analysis

We conducted economic modelling and complementary quantitative analysis of the extent to which carbon pricing could improve human health, for example by incentivising dietary and physical activity patterns that lower the risk of NCDs, and reducing the risk of emerging infectious diseases by reducing the conversion of ecosystems. This work was intended to consider ‘what-if’ scenarios to generate indicative findings of the potential impacts of carbon pricing, and illustrative examples of ways in which a policy tool such as carbon pricing may have the potential to generate a number of co-benefits (health benefits alongside environmental benefits), as well as possible harmful unintended consequences that would require mitigation.

There were two components to the work, both of which used a high ambition scenario with a carbon price aligned with 1.5°C of warming above pre-industrial levels (\$560/tCO<sub>2</sub> in 2050), and low ambition scenario aligned with a 2°C pathway (\$385/tCO<sub>2</sub> in 2050).

### **Urban land transport**

In the second part of the work we assessed the effect of a carbon price levied on fuel to estimate how individuals might change modes of urban land transport from private motorised travel towards active travel, public transport and shared mobility. The modelling estimated the resulting benefits to health through air pollution, road fatalities, and physical inactivity. For this part of the modelling we used the concept of ‘flexibility’ to capture consumer responsiveness to changes in fuel prices, contingent on factors such as the availability of high-quality infrastructure or urban design that would facilitate a shift away from private car use.

Our modelling focused on the impact on environment and health of carbon pricing levied on the use of internal combustion engine (ICE) vehicles in urban areas. An important limitation of this work is that it was not able to consider aviation, shipping, freight, rural transport, indirect emissions including from the electricity used to charge electric vehicles, or emissions from vehicle manufacturing.

### **Agri-food system**

In the first part we used MAgPIE (<https://www.pik-potsdam.de/en/institute/departments/activities/land-use-modelling/magpie>), an equilibrium-based, open-sourced, land-use modelling platform, to model the consequences on land-use, agricultural production, food prices of environmental policies, shifts in dietary demand, and policies that could manage effects on equity, such as using revenue from such taxes to support societal objectives (‘revenue recycling’). The modelling considered the difference between the carbon prices required to meet the 1.5°C and 2°C trajectories (described as ‘high’ and ‘low’ ambition), as well as two alternative scenarios for consumer responsiveness and readiness to change diets (described as ‘flexible’ and ‘inflexible’), based on evidence of how consumers have responded to taxes on tobacco over multiple decades.

From food prices, it is possible to estimate changes in relative dietary intake and therefore the impact on non-communicable disease risk. From the changes to land-use (including changes in the intensity of agriculture), it is possible to assess the impacts on biodiversity. Subsidiary analyses were used to infer the extent to which changing land-use (forestation, deforestation, livestock demand) could influence the risk of new infectious diseases (Morand and Lajaunie 2021). Economic benefits were assessed by converting nutrition profiles into disease incidence, and translating disease outcomes into costs and benefits. Based on analysis of social, health, and distributional impacts we identified potential policy approaches to mitigate the distributional health and social consequences of carbon pricing for vulnerable consumer groups in order to achieve a just transition.

### Box: Summary of economic analyses of carbon pricing on land transport and food systems

- Carbon pricing in the range \$385-\$560/ tCO<sub>2</sub> by 2050 has the potential to
  - reduce urban land transport emissions by up to 25%
  - reduce land use emissions by up to 85%, relative to business as usual
  - reduce up to 200 million incident cases of non-communicable diseases by 2050, largely driven by increased physical activity and reduced red meat consumption
  - save more than \$12 billion per year in healthcare expenditure from Type 2 diabetes alone
  - reverse biodiversity decline and reduce environmental risk factors for zoonotic diseases, water pollution, and antimicrobial resistance
- Achieving these impacts on transport and agriculture is highly contingent on the suitability and availability of alternatives to existing, carbon-intensive, transport and diets – and also on people’s willingness to change their behaviours
- The higher the price the lower the emissions, but the greater the unwanted harmful impacts
- Higher prices are subject to diminishing returns: as prices increase the benefits in terms of emissions reductions fail to keep pace
- Even very high levels of carbon price will not reduce carbon emissions as much as is required to achieve net zero targets
- Achieving the additional reductions in emissions necessary to achieve net zero will require much more ambitious policy responses than any governments have planned across land transport, agri-food, and multiple other systems
- Carefully designed pricing policies and packages of measures will be needed to mitigate any unintended consequences for low income or vulnerable groups, tailored to different global regions and levels of development

#### 2.2.2 Effect of carbon pricing on urban land transport

The transport sector accounts for almost a quarter of global energy related CO<sub>2</sub> emissions. High use of private vehicles is linked to rising greenhouse gas emissions, biodiversity loss through the impact of infrastructure on land-use, and increasing health problems such as physical inactivity, traffic deaths and injuries, and air, land and water pollution (ref). Carbon pricing could encourage low-carbon options such as active travel and public transport, alongside electrification of vehicles powered from a decarbonised grid.

Achieving net-zero emissions by 2050 will require emissions from the road transport sector to fall to at least 3.9 GtCO<sub>2</sub> by 2030, and less than 0.37 GtCO<sub>2</sub> in 2050 (a 90% reduction compared to 2020 levels) (IEA, 2021b). At the same time, demand for mobility is likely to grow significantly in low and middle income countries, driven by economic and population growth. LMICs are expected to account for around 90% of the increase in global transport-related emissions, mostly from private vehicles and freight (Rode et al, 2014).

A carbon price that rises to between \$400-600/tCO<sub>2</sub> by 2050 levied on private motorised vehicles in urban areas could reduce global urban land transport emissions by between 10-40% (110-410 MtCO<sub>2</sub>) as a result of changes in travel behaviour; this would be insufficient on its own to reduce emissions in line with a 1.5°C temperature pathway. A carbon price on urban land transport could shift consumers away from using private cars and towards transport modes with a lower carbon impact, such as public transport, active travel, electric vehicles, and shared mobility. A large share of carbon reduction comes from a shift to more fuel-efficient vehicles (including electric vehicles). Projected changes in demand for travel differ substantially across the world, with the largest emission reductions in regions where private car use accounts for a large share of distances travelled, such as North America. These differential impacts of carbon pricing across different regions and socio-economic groups will require careful policy design to mitigate potential negative impacts on low income households.

Electric vehicles generate substantial indirect emissions that depend on the carbon intensity of the power sector, vehicle manufacturing processes, and emissions from mineral extraction and battery assembly, in addition to other non-exhaust emissions and environmental pollution from tyres and brakes (Harrison et al 2021, Gillis et al 2022, Air Quality Expert Group 2019). Changing the fuel of a vehicle from fossil fuel to electricity does nothing to diminish the wider harms caused by private cars, including the enormous global burden of road deaths and injuries, the health impacts of sedentary living, the land use occupied by roads, and the busy roads disrupting social networks (Appleyard and Lintell 1972, Boniface 2015, Mindell 2012).

A shift to active travel and public transport can deliver important health benefits, mainly due to decreased air pollution, road fatalities and physical inactivity. Our modelling shows that the cumulative contribution of carbon pricing to a shift to active travel and public transport from 2025-2050 could avoid up to 21 million deaths globally, with improvements in physical activity accounting for over 70% of health benefits.

However, reducing emissions in line with even just a 2°C temperature pathway, let alone a 1.5°C pathway, will require much more ambitious policies than carbon pricing alone. There are three broad categories of complementary policies that amplify the effectiveness of carbon pricing on land transport:

- Policies that support active travel and public transport: for example, creating a safe road environment for cyclists and pedestrians is crucial to increasing uptake of active transport modes
- Measures such as road pricing and reduced availability of parking spaces to disincentivise driving. Most urban journeys are only a few kilometres long. Even a carbon price of over \$500/tonne will increase the marginal cost of motoring by only a few cents per kilometre, which is likely to be less than \$1 for a typical journey, so it is unsurprising that road pricing such as the London congestion charge, which costs around an order of magnitude more than that (£15/\$18), can have a greater effect
- Sustainable urban design, for example creating walkable cities by co-locating residential, commercial, and educational areas, and reallocating road space from cars to sustainable modes of transport. This should be a priority for action, especially in countries that are rapidly urbanising, as poorly planned development involving urban sprawl, poor

transport connectivity, and high private vehicle use commits countries to carbon-intensive patterns of behaviour that may take decades to reverse.

### 2.2.3 Effect of carbon pricing on the agri-food system

The food system has important impacts on biodiversity, climate change, and nutrition. For example, red meat consumption is linked to cancers, diabetes, and cardiovascular diseases, while also being a major contributor to habitat destruction and greenhouse gas emissions through large scale commercial farming of livestock, and through growing food for those animals (Godfray et al 2018, Xu et al 2021). Carbon pricing applied to the agri-food sector could substantially support global ambitions on climate change, biodiversity, and public health through driving reductions in the production and consumption of a number of carbon intensive foods. The greatest impact would stem from a high ambition carbon price combined with high levels of consumer flexibility resulting in substantial changes in diets. This could drive reductions in land-use carbon emissions as high as 85%.

A key finding of this analysis is that the impact of carbon pricing depends strongly on the sensitivity of consumers to changing food prices through the availability of appealing alternative foods, and flexibility in terms of habits and norms. This points to a central role for complementary policies - such as subsidies for fruit and vegetable production, taxes on high carbon foods such as ruminant meat, and funding research into sustainable alternatives to animal protein - that facilitate or encourage dietary shifts, their effectiveness, and equity implications.

Accounting for health impacts in addition to carbon impacts enhances the case for carbon pricing, highlighting an opportunity to address a shared driver of both environmental degradation and poor population health. However, increasing the cost of food has potentially catastrophic impacts on the diets of people on low incomes, especially in the world's poorest countries. Measures to protect consumers from the effects of increased prices are thus essential to avoid widening inequalities. These are described in more detail in Section 3.

### 2.2.4 Conclusion

In conclusion, governments need to implement interventions that contribute to the creation of healthy and sustainable systems that protect and promote population health and the natural environment, and to stop policies that harm the health of populations and the natural environment.

Examples of these beneficial interventions include carbon pricing at a level that is sufficient to transform agri-food, transport and energy systems, requiring prices in the hundreds of dollars per tonne of CO<sub>2</sub>; protecting and restoring natural ecosystems at scale; and building healthy and sustainable urban environments that promote active travel. All such measures need to be introduced in ways that ensure the poorest are protected from any unwanted impacts eg through welfare systems, and with proceeds directed towards protecting health and the natural environment eg by investing in low-carbon travel and energy. These kinds of mitigations will also maximise public support for the measures.

Governments should stop and re-direct an estimated \$6 trillion in subsidies away from fossil fuel extraction and livestock farming, directing them instead towards renewable energy and plant-based agriculture; regulate to stop the production and consumption of harmful products including tobacco and ultra-processed foods; and legislate to address sources of air, land and water pollution from multiple sources that include industrial processes, transport, and the retail industry.

Implementing these measures has the potential to drive large and meaningful reductions in carbon emissions across both the land transport and agri-food systems. The resulting environmental benefits would be accompanied by health benefits resulting from a range of beneficial outcomes, including increased physical activity, cleaner air, and healthier diets. However, even carbon prices set far higher than current norms would be insufficient to meet a 1.5°C trajectory, and would need to be accompanied by a range of other measures to achieve that goal.

These benefits would also risk being accompanied by a number of likely regressive effects, with people living in poverty experiencing the greatest harms. In order to avert these unwanted impacts a number of important mitigation measures would need to be put in place to ensure affordable, equitable access to healthy diets and appropriate transport for everyone.

Effective approaches for achieving the interventions described in this section are outlined in Section 3, below.

## Section 3 Enabling Recommended Actions

Implementing the Commission’s proposed interventions and mitigations to improve population health will require actions by three key sets of actors: governments, private sector organisations and civil society, at local, national and international levels. These actors can also contribute to and benefit from enabling conditions to ensure that actions are effective, synergistic and fair.

Three enabling conditions were identified by the Commission:

- i. state institutions and political leaders act now in ways that will achieve long term improvements in population health, and that those actions be maintained over the long term
- ii. businesses act in line with effective regulations and policies for improved population health
- iii. civil society and community coalitions become more engaged and empowered

These enabling conditions do not currently exist comprehensively or systematically within countries or at an international level. Promising practices need to be identified and applied more widely, and barriers to effective, synergistic and fair actions identified and addressed. Although many of the barriers have been described before (eg Swinburn 2019; Buse et al 2022) they remain largely unaddressed. We have reviewed them through the lens of improving population health with a focus on three sets of actors – governments, businesses and citizens – and what they can each do to mitigate these barriers, summarised in Table 3.1.

It was beyond the scope of this Commission to consider one of the most significant changes needed namely the transformation of economic systems from those that privilege growth at any cost including harm to population health and the natural environment, to economic systems that privilege wellbeing of populations and the natural environment, being both regenerative and redistributive (Buse, 2022; Wellbeing Economy Alliance, 2021; [Doughnut Economics Action Lab](#)).

### 3.0 Identifying facilitating conditions, barriers and how these might be addressed

Our analysis is informed by responses to the expert elicitation exercise described in *Sections 1 and 2*, as well as by existing analyses of political and other barriers to systems change to improve population health. It was developed through workshop discussions amongst Commissioners informed by expert knowledge of different salient literatures – including legal systems, political, behavioural and economic sciences - to identify key themes. Drafts were then reviewed by the Commission to reach a consensus. Our analysis of engaging citizens and civil society was informed by a systematic review of public acceptability of carbon and other pricing measures (see Box 4).

### 3.1 Effective state institutions and political leadership

“Health is a political choice” (Kickbusch 2015). Improving population health requires that effective state institutions and political leadership at local, national and international levels act now to achieve this longer-term objective. We identified four sets of barriers to achieving this and possible ways to address them.

#### **i. Barrier: Competing ideologies and interests**

The interventions proposed by this Commission require actors to work across sectors that are characterised by varying – and sometimes conflicting - ideologies and interests. These ideologies and interests can compete in ways that impede progress towards goals for improved population health (Buse et al 2022). They compete within governments creating challenges for policy coherence, for example where trade policies reflect tensions between departments or ministries focused on economic growth and those focused on protecting health (Thow et al 2022).

A key concern is the extent to which the proposed interventions can be achieved in the absence of a radical redistribution of power and resources. This is difficult given that the past four decades have seen the ascendancy of neo-liberal policies in many countries, with a strong ideological commitment to market-forces, deregulation and individualism facilitating the influence of powerful vested interests in public policy (Friel et al 2021; Sell & Williams 2020). In many cases, these policies perpetuate relationships of dependence and debilitating power asymmetries between and within nations.

Two possible ways to help protect against such competing ideologies and interests are described below.

#### **Addressing the barrier**

##### *Coalitions of leaders and stakeholders to generate a common vision*

The formation of coalitions of leaders and other stakeholders at local, national, and international levels to generate a common vision and clear goals to improve population health would go some way to protect against competing ideologies and interests (Misyak et al 2014; Friel 2020). Examples include C40 Cities – a global coalition of over 100 mayors taking urgent action to address climate change, creating a global agenda for ambitious change and demonstrating that this is possible through changes to transport, food, and energy systems (<https://www.c40.org/>). Such coalitions can hold governments to account by monitoring their progress towards shared goals including the Sustainable Development Goals. Their effectiveness can be enhanced by involving grassroots organisations such as the SOIN Network in Eastern Europe <https://soin-network.org/en>, especially with support from non-state organisations already working with governments to address the power asymmetries and other challenges in working alongside these authorities (Flores et al 2019). Providing global platforms, such as UHC2030 for Universal Health Coverage, can also be a powerful way of connecting multiple stakeholders to influence national and international commitments (<https://www.uhc2030.org/>) as well as connecting

grassroots organisations through the platforms such as UHC2030's Civil Society Engagement Mechanism. [See Box 3].

*Create and strengthen existing governance and regulatory frameworks*

Governments creating and strengthening their governance and regulatory frameworks could also help protect public policies from competing ideologies and interests. This requires regulatory practices for trade and investment that balance transparency and cooperation with the reduction, and ideally elimination, of the influence of vested interests on government policy and international agreements (Thow et al 2022).

Multinational corporations have been increasingly implicated in the deterioration of public health and the environment (Freudenberg 2021; Maani et al 2022). Some have acquired immense economic power. They have also used trade liberalisation and foreign direct investment opportunities to increase their reach beyond high income countries where they tend to have their headquarters. They have used their resulting political influence extensively, directly lobbying governments to engage in public-private partnerships and thereby refrain from adopting legally binding measures, including those associated with healthier environments (Swinburn et al 2019), whilst reducing their tax contributions (Wood et al 2021). Consequently, industry-led voluntary pledges have flourished as part of corporate social responsibility commitments, shown to be ineffective (Knai et al 2018), while population health and the natural environment continue to deteriorate.

In areas where the tide is turning and robust legislative packages are being adopted and implemented, multinational corporations have increasingly invoked legal arguments as part of their lobbying strategies, specifically arguments grounded in international and investment trade law (Garde et al 2020; McGrady et al 2011). [see Box 1 and Box 3]. International trade and investment law is not designed to promote trade liberalisation, devoid of any regard for public interest concerns, and recognises the right of nation states to regulate on public health and other legitimate grounds. The responsibility for determining both the level of public health protection and the means to achieve it rests with states. Thus, states must ensure that their health policies comply with the principles underpinning trade and investment law, and particularly the principle of necessity. Measures can restrict trade (contrary to what industry interpretive capture of international trade law could suggest (Dorlach 2022)), but they must not be "unnecessarily trade restrictive". Determining whether a measure is necessary requires answers to two questions: first, is the measure likely to achieve its public interest objectives, which must be defined in the light of existing evidence (Mellilo 2020; Voon 2015); second, is it proportionate, *i.e.* could other less restrictive measures achieve the objectives. Industry actors often argue that providing consumer education and information could be less restrictive of trade than requirements for labelling or marketing (Barlow et al, 2018; Barlow, Gleeson et al, 2022; Barlow, Sanap et al, 2022). But education campaigns are no substitute for marketing restrictions which are more effective at reducing sales of products that harm health or the natural environment (Marteau, White et al 2019). Ambitious, precautionary and even experimental measures can be included under international trade and investment law (Garde, 2018; O'Brien and Mitchell, 2018; Garde and Zrilic, 2020; Mitchell and O'Brien, 2020; Messenger, 2020; Sattorova, 2020; Thow et al, 2022), as shown most strikingly by unsuccessful challenges against

legislation on standardised packaging of tobacco that withstood legal challenges in the UK and Australia (e.g. Mitchell, 2022). The limits of industry arguments need to be better understood and scrutinised in legal and political fora.

Countries that have carried out decentralisation reforms - *i.e.* devolution of funds and functions to lower subsidiary levels – provide examples of effective policymaking in relation to health. In Indonesia, decentralisation reforms resulted in greater local funding autonomy, aligned more closely to population needs, particularly those facing social, economic and other forms of vulnerability (Sparrow, 2008). In the southern Indian state of Kerala, decentralisation reforms resulted in local government leaders having a platform for introducing reforms related to population needs, while also creating a locus of convergence for coalitions to emerge within and beyond the health sector (<https://www.georgeinstitute.org/witness-seminar-reports>). During the COVID-19 pandemic, for example, locally co-ordinated self-help group in Kerala, India, rapidly put together community kitchens to help provide nutrition at people’s doorsteps, as well as volunteer groups that assisted with contact tracing, delivering medicines, and even funeral arrangements (Nambiar 2022).

**ii. Barrier: Corruption and state capture by businesses and elites**

Businesses and elites can capture policy makers and their policies, privileging a few rather than benefiting the entire population (World Bank Group 2021). Because this is inequitable it is ineffective economically and socially, lowering productivity, reducing job creation and harming population health in the long term (World Bank Group 2021).

**Addressing the barrier**

*Create and strengthen existing governance and regulatory frameworks*

Effective governance should include frameworks that are resistant to privilege. One such framework is described in a report for the World Bank Group (2021), based on an analysis of eight countries in the Middle East and North Africa on what makes these countries prone to capture by the privileged few through corporate influence. Building on work by the World Bank and other development organisations it provides a conceptual framework to help those developing policies to identifying a country’s vulnerabilities, its legal framework and enforcement mechanisms [see Figure 1]. This framework remains unevaluated and agnostic on the vexed history of the enabling environment for such “elite capture” which was part of the post Cold War neoliberal turn. Mindful of this it could nonetheless be a good starting point with which to approach this barrier.

**iii. Barrier: Lack of capability and relevant expertise within governments**

Tailoring the proposed interventions within policy packages will require combining technical expertise and knowledge with political acuity and opportunism which most if not all local or national governments will struggle to achieve consistently.

**Addressing the barrier**

*Establishing a platform for actionable evidence*

This barrier could be addressed by a platform resourced to collect, collate and share evidence and expertise on implementing effective policies. An example of such a platform albeit one focused only on population health – is the Global Action Plan for healthy lives and wellbeing for all (GAP) Initiative (WHO 2020; Buse 2022). Members include multilateral health, development and humanitarian organisations – WHO, GAVI and World Bank – that support countries to accelerate progress towards Sustainable Development Goal 3, Good Health and Wellbeing <https://sdgs.un.org/goals>. We discuss below two further functions such a platform might include – namely supporting the protection of policy-making from corporate interference, and evaluation of policies as they are implemented - as well as UN bodies best placed to discuss whether and how such a platform could be funded and co-ordinated.

In addition, as highlighted in Section 1, effective responses to complex problems require engagement with complex systems approaches that address the links, interdependencies and interactions within systems over time (Rutter 2017). One initiative attempting to increase systems thinking across regions of the world is The Alliance for Health Policy and Systems Research which has a Systems Thinking Accelerator, SYSTAC (WHO AHPSR 2022). However, traditional siloed approaches to generating and interpreting evidence, and to policy responses, remain dominant, with little integration, for example, between policies to tackle NCDs, infectious diseases, and environmental degradation. In part this reflects a lack of expertise in systems approaches amongst policy-makers and researchers. Addressing this lack of capacity will therefore be important for generating, as well as collating and sharing, evidence and practice to protect and improve population health and the natural environment. Achieving this will require governments and other agencies to support the development of these skills and capacity through universities, schools and other educational institutions. This will require funding research to develop methods for evaluating system-level impacts of interventions and developing and supporting international collaborations to share and develop best practice.

There is also a need to generate evidence of effective intersectoral collaboration practices in public policy (Chircop 2015). A framework was developed to map the process of multisectoral collaboration in tackling HIV and AIDs in South Africa (Mahlangu 2019). Lessons learned from this and similar other initiatives suggest that effective intersectoral collaboration requires political commitment, and active participation of the community.

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**iv. Barrier: Prioritising short term over longer term objectives including population health**

Policy makers who are subject to elections face political risks in dealing with long term systemic problems including improving population health. (King & Crewe 2014). This electoral liability may arise from the opportunity costs of focusing on problems that are unlikely to progress within short electoral cycles. In addition, the political costs of inaction or policy ambitions without effective action are low (Kings & Crewe 2014).

**Addressing the barrier**

*Agreed metrics of long-term wellbeing to measure progress towards a common vision and goals*

While measurement alone won't lead to change, it can contribute to the momentum for change by raising awareness of the gap between a common vision and goals and the current state. Measures of that can capture longer-term objectives that would improve population health equitably include the World Economic Forum's Inclusive Development Index, which includes intergenerational equity and sustainability as one of its three core pillars (WEF 2018).

The political risks of prioritising long-term action could also be lowered if policy makers engaged in more deliberation with opposition and other parties as well as with citizens, as outlined below. Decisions made in this way have the added benefit that they may endure when a new government is elected (King & Crewe 2014).

Three further changes, described below, have the potential to amplify the impact of the actions described above to address the four barriers.

*Requirement for governments to consider future generations in all their policies*

Several countries have formally incorporated longer term perspectives into their policy making (Owen 2020). The earliest was the Finnish Committee for the Future, established in 1993 by the Government of Finland as a standing committee of the Finnish Parliament, with a mission to 'generate dialogue with the government on major future problems and opportunities' (Parliament of Finland 2022). But to date, Wales is the only nation to have embedded the protection of future generations in law (Owen 2020). The 2015 Wellbeing of Future Generations Act established by the Welsh Government 'requires public bodies in Wales to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change' (Future Generations Commissioner 2022). It has been cited as the reason for the rejection in 2019 of a 14-mile motorway in Wales, in order to protect the environment and consider the needs of future generations (Howe 2019). *Buen Vivir* – roughly translated as collective well-being – is a non-government initiative started in Latin America that articulates a future that is biocentric, against growth and extraction (Salazar 2015). In Ecuador and Bolivia *Buen Vivir* and the Rights of Nature have been inscribed in their constitutions (Salazar 2015).

The core obligation of States enshrined in the UN Convention on the Rights of the Child to take the best interests of the child as a primary consideration in all actions that concern them (Article 3(1) CRC) holds much potential to promote the longer-term interests of future generations. In their 2019 complaints against five States (Argentina, Brazil, France, Germany and Turkey) to the Committee on the Rights of the Child, a group of 16 children argued that 1) climate change is a children's rights crisis; 2) that the State party, along with other states, has caused and is perpetuating the climate crisis by knowingly acting in disregard of the available scientific evidence regarding the measures needed to prevent and mitigate climate change; and 3) that by perpetuating life-threatening climate change, the State party is violating the authors' rights to life, health, and the prioritization of the child's best interests, as well as the cultural rights of the authors from indigenous communities' ([CRC/C/88/D/104/2019](#), at paragraph 3.8). Even though it ruled that the complaints were not admissible on procedural grounds, the Committee

nonetheless found that States can be held responsible for the negative impact of their carbon emissions on the rights of children both within and outside their territory. More specifically, it considered that children were particularly impacted by the effects of climate change, both in terms of the manner in which they experience such effects as well as the potential of climate change to affect them throughout their lifetime, in particular if immediate action is not taken. Due to the particular impact on children, and the recognition by States parties to the Convention that children are entitled to special safeguards, including appropriate legal protection states have heightened obligations to protect children from foreseeable harm. It thereby highlighted the need for governments to promote intergenerational justice for children (Nolan, 2022).

*Requirement for governments to increase the representation of women in parliaments*

There is growing evidence that countries with a higher proportion of women parliamentarians enjoy better population health and stronger policies addressing climate change. This is reflected in greater spending on health (Bhalotra and Clots-Figuera, 2014; Mavisakalyan, 2014) and education (Svaleryd, 2009; Funk & Phillips 2019) and in turn greater population wellbeing (Salahodjaev 2021). Outcomes from the COVID-19 pandemic were more favourable in countries and local areas led by women (Garikipati & Kambhampati 2021; Sergent & Stajkovic 2020; Bruce et al 2022). Climate change policies are more effective with correspondingly lower emissions in these countries (Mavisakalyan A, Tarverdi 2019), in part because of women's higher concern for the environment and effectiveness at reducing corruption (DiRienzo & Das 2019). These countries also make more progress towards SDGs (Mirziyoyeva & Salahodjaev 2021), have higher economic growth (Jayasuriya and Burke, 2013) and lower corruption (Dirienzo & Das 2019). These differences are likely to reflect different values, experiences and expectations of women in a gendered world. Efforts to increase the number of women entering parliaments include the use of quota systems (Panday 2008), campaigns to achieve gender parity in children's education – still achieved in only 49% of countries at primary school level and only 24% at secondary level (UNICEF <https://www.unicef.org/education/girls-education>), and initiatives to achieve gender parity in parliaments through campaigning and supporting women to stand <https://5050parliament.co.uk/about-us/>. Women in leadership also face myriad challenges from the patriarchal nature of most institutions thus requiring more support to overcome these systems (Nambiar 2022) until such time as they are transformed when more women are in leadership positions. While there has been some increase in the number of women heading nations and governments as well as women ministers and parliamentarians, progress is slowing, and the number of states without any women ministers increased from nine to 12 between 2020 and 2021 <https://www.ipu.org/news/women-in-politics-2021>

*Legally binding commitments to policy outcomes*

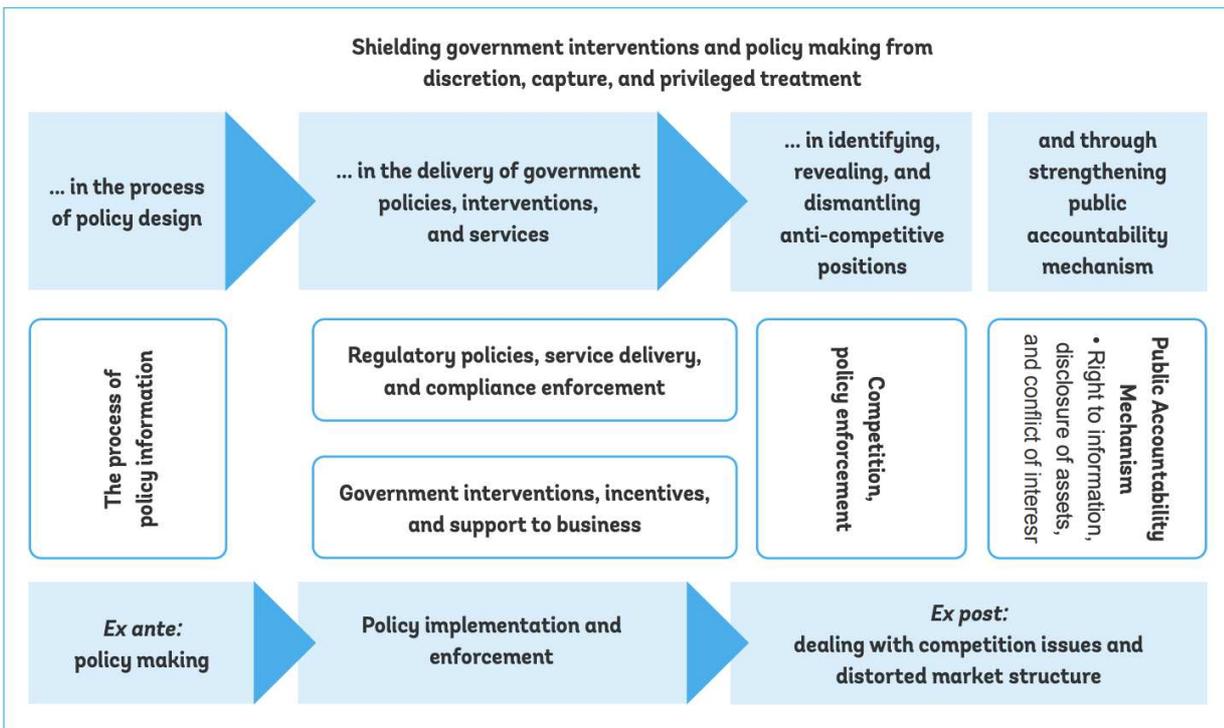
Legally-binding commitments, with appropriate processes to oversee progress, may be a powerful mechanism for governments to bind themselves and their successors to achieve a shared significant objective. Examples include the UK's Climate Change Act 2008, amended in 2019 in response to the Paris Agreement, which now incorporates a statutory duty on the Secretary of State to ensure that "the net UK carbon account" for 2050 is at least 100% lower than the baseline in 1990 for CO<sub>2</sub> and other greenhouse gases. In keeping with this, the Act requires that the Secretary of State "prepare such proposals and policies" as they consider will

enable each five-year carbon budget to be met. After setting the carbon budget, the Secretary of State is required to lay before Parliament a report setting out proposals and policies for meeting the current and future “budgetary periods” up to and including that budget. To date, targets set in the first two carbon budgets in the UK have been met, and the government is on track to meet the targets set in the third carbon budget by 2022. But the budgets set until 2037 are off-track (Climate Change Committee, 2022). Following the publication of the UK Net Zero Strategy in October 2021 several UK NGOs – Friends of the Earth, ClientEarth and The Good Law Project - requested a judicial review on the grounds that the UK government was not complying with the 2008 Act as the proposals in the strategy didn’t include sufficiently detailed policies to see how the carbon budget would be met. The High Court found the Secretary of State responsible for the policy to be in breach of his obligations under the Act and ordered him to revise the government’s proposals and policies as detailed in the UK government’s Net Zero Strategy to include these quantified analyses (Net Zero Strategy 2021):

*The statutory objective of transparency in how the targets are to be met extends beyond Parliament, to local authorities and other statutory authorities, NGOs, businesses and the general public.* (Royal Courts of Justice, 2022).

**Figure 3.1 Conceptual framework for analysing discretion, privilege and capture**  
 to include with permission from World Bank Group 2021

**FIGURE 1 - Conceptual framework for analyzing discretion, privilege, and capture**



## 3.2 Businesses acting in line with regulations and policies for improved population health

Improving population health requires not only effective regulations and policies but also that businesses act in line with these. While some do, many don't - as described below - to the detriment of population health and the natural environment. We identified three sets of barriers to achieving this compliance and possible ways to address them.

### i. **Barrier: Stopping business interference in policymaking**

Business interference is a major threat to policy making that has the potential to protect and improve population health and the natural environment. It can be used to cast doubt on the scientific evidence for a policy and the scientists generating it, with a view to preventing and delaying the introduction of effective policies and circumventing those that are introduced (Oreskes & Conway 2011; Lee & Freudenberg 2022; Mann 2021). This interference can take the form of lobbying to stop national and local governments and international organisations introducing effective policies (Lauber, Rutter et al 2021, Lauber, Hunt et al 2021) and misinforming the public about the evidence for the effectiveness of proposed policies. Lobbying has severely limited the implementation of carbon pricing (Mildenberger 2020). A recent IPCC report describes, with high confidence, countermovement coalitions working to oppose climate mitigations, citing opposition to climate action by broad based, highly organised, extensively lobbying, carbon-connected industries (IPCC 2022; Cory et al 2021). Interference also includes tactics to undermine the effectiveness of existing policies. For example, tobacco companies minimise the impact of taxes on sales by absorbing the tax increase on their cheapest products and smoothing price increases throughout the year. This avoids sudden large increases in price that might lead smokers to quit (RCP 2021).

There has been a concerted effort by multiple corporate sectors to control the framing of responsibility for environmental damage. Their aim has been to place the onus for action onto individuals and to absolve corporations from responsibility for the consequences of their business practices (Supran and Oreskes 2021). In 2004 the oil company BP hired the Ogilvy & Mather advertising and marketing agency to convey 'the message that consumers of oil and natural gas bear the responsibility for their greenhouse gas emissions, not the producers of the oil and gas they use.' (Bastidas 2021). This led to BP developing a 'carbon footprint calculator' which has been widely promoted and has helped frame the discourse around responsibility for carbon emissions in ways that favour the fossil fuel industry (Bastidas 2021). The tobacco industry has developed anti-litter programmes to reduce the impact of cigarette litter on the social acceptability of smoking (Smith and McDaniel 2011), in the same way that the 'Keep America Beautiful' anti-litter campaign was instigated and developed with support from the food and drink industries (Royte 2005, Rogers 2005). Likewise, Coca-Cola funded and supported the Global Energy Balance Network in an attempt to be portrayed as an "honest broker" amidst a 'growing war between the public health community and private industry' about obesity (Barlow et al 2018).

Another form of interference is obfuscation, using misrepresentation of complexity to campaign against regulation of the food, drink, alcohol and gambling industries. There are multiple examples of actors from these industries arguing that they should not be regulated as they represent only one of multiple complex factors causing harm (Petticrew et al 2017; Maani et al 2022). For example, Coca-Cola has stated that “Taxes and actions focused very narrowly on one category are unlikely to solve a large complex problem (Johnstone 2019) Obesity is indeed a complex problem which, by definition, cannot be ‘solved’ (Rittel and Webber 1973). Rather than this framing, the question should be whether and by how much taxing sugar-sweetened drinks can contribute to reducing obesity as part of a mix of measures, and not whether it could singlehandedly ‘solve’ it.

In their efforts to deter litigation and regulation, major corporations from various industries have over many years used strategies to create confusion about product harms and interventions to address them (Michaels 2008, Legg et al 2021). They have influenced the production and dissemination of evidence, via corporate funding for research that is favourable to their products, and by setting up faux-conferences and industry-driven journals (Lundh et al 2017, Legg et al 2021).

Our focus here is upon private-for-profit businesses involved in the supply, production and retail of products and activities that are part of the three systems on which this Commission is focused for improving population health. Also important are private not-for-profit businesses such as foundations and trusts that fund a significant proportion of global health research. Many of these foundations and trusts contribute positively to global population health such as through the development of vaccines. But through their close relationships with governments and UN bodies they have been criticised for working to shift governance structures at global and national levels in the health domain to favour corporate elites (Stuckler 2011, Dentico 2019, Youde 2020). Proposed solutions include strengthening governance systems across government (as discussed in the previous section), and regulations to prevent not-for-profit businesses as well as those that are for-profit interfering in policy making.

## **Addressing the barrier**

### *Packages of regulations including the use of criminal law*

Packages of regulations are needed to prevent businesses from interfering in public policymaking and misleading the public. They should also exclude businesses from involvement in setting policies, as exists for the tobacco industry under article 5.3 of the Framework Convention on Tobacco Control (FCTC 2013). Establishing registers that record the lobbying activities of businesses, including donations, should also be considered by international bodies including UN bodies, as well as national and local governments.

Strategic litigation might be used as part of human rights-based approaches to protecting population health [Box 1, Box 2]. The introduction of an international convention on the crime of ecocide is one of several ways of implementing principles of ecological justice (Stop Ecocide 2022), and extending rights that currently apply to humans to include other animals and the natural environments (Bhakuni 2021; Ferdowsian, 2021). Other measures to stop business practices undermining public policy include caps on political donations alongside effective state funding of political parties and politicians (Gov UK 2007).

## **ii. Barrier: Incentives for businesses to harm health and the natural environment**

It is estimated that around 2% of global GDP - \$1.8 tn each year– is spent on subsidising industries that are harming health and the environment (Koplow & Steenblik 2022). Top amongst these are fossil fuel industries – receiving around \$700bn per year (OECD/IEA 2021) - and agriculture – receiving \$540bn a year (FAO 2021). Of the agricultural subsidies, the largest are given for beef and milk farming largely in the Global North, which are agriculture’s biggest source of greenhouse gas emissions (FAO 2022).

### **Addressing the barrier**

#### *Removing subsidies on products and activities that harm health and the natural environment*

Removing or reforming these subsidies would have multiple mitigating benefits, including freeing up substantial government money to invest in population health and sustainable activities. It would also encourage investors and producers to speed up innovation for healthier and more sustainable activities and products. Subsidy reform should improve transparency, for example through obligatory disclosure of all subsidies, and should redirect current subsidies towards state and business activities that benefit societies, as measured through progress towards achieving SDGs. Reform would need to tackle industry lobbying, which works to maintain producer subsidies and to highlight adverse financial impacts of their removal on consumers (IPCC WG 3 page 2249, lines 7-16).

It should also aim to minimise these financial impacts, particularly for the poorest households, which have low carbon footprints but face disproportionate fallout from removal of subsidies. Failure to protect the poorest households during subsidy reform has led to public protests resulting in the abandoned of such reforms in several countries including Yemen (2005 and 2014), Cameroon (2008), Bolivia (2010), Nigeria (2012), Ecuador (2019).

#### *Strengthening incentives for businesses to stop harming health and the natural environment*

Since Pigou’s (1920) ground-breaking work, a fundamental tenet of welfare economics is that, as far as possible, industries should pay the cost of negative impacts on others, for example through taxation. But businesses whose activities harm health and the natural environment do not generally bear the cost of those harms, which are instead borne by people and the planet. For the food industry, such external costs include damage to the natural environment from intensive farming practices, and poor population health stemming from production and promotion of energy dense foods, which in turn lead to high healthcare costs from avoidable disease and premature deaths (Patterson et al 2020). Similar externalities have been well documented for the tobacco industry (RCP 2021). Externalities from road transport include traffic deaths and injuries, environmental and health damage from carbon and other emissions (Santos 2020), and the health impacts of sedentary lifestyles. In addition to these health and environmental harms, unhealthy commodity industries also contribute to economic inequalities, having distributed much less money to governments since 1980 and far more to shareholders

and investors, mostly in high income countries (Wood et al 2021). This has created a double burden of maldistribution: their externalised harms disproportionately affect disadvantaged population groups and governments in low-and-middle-income countries, whilst at the same time they increasingly transfer profits to a small elite (Wood et al 2021).

Internalising the true cost of activities and products would reduce their profitability as well as the levels of harmful activities and consumption. Various ways of pricing these externalities have been proposed, such as carbon pricing on land use (Section 2) and travel and charging for road use (Vascough & Lindsay 2022). For tobacco these include capping profits and legislating to require tobacco companies to fund policies to eliminate smoking (APPG 2021). Tax policies need to be reformed in many jurisdictions to stop unhealthy commodity industries accessing government tax incentives. For example, marketing of unhealthy commodities should not be a tax-deductible business expense as it is in the USA and UK (Wood et al 2021).

In addition to true cost accounting for harmful externalities, business activities could become healthier and more sustainable if corporations were subject to legally binding internationally standardised metrics. These would force companies to report on (a) research and development expenditure for sustainable and healthy innovations and (b) current practices, production and sales including spend on marketing (Global Reporting Initiative; Global Alliance for the Future of Food; Dimpleby 2021). Given the potential for businesses to manipulate or exploit the rules designed to govern a given system in an attempt to minimise any loss to profits, such a system would need to be monitored, with adjustments to ensure the reporting system is effective.

The actions described above addressing the barriers to businesses acting in line with regulations and policies for improved population health may be amplified by their investors.

### *Establishing networks of activist investors*

Networks of activist investors can hold businesses to account for long term impacts on health and environment (Mooney 2021; ShareAction 2021; Reuters 2021 Jack 2021; <https://engine1.com/>). Coordinated action by investors to disinvest from companies and sectors deemed to be harming human health and the environment is growing. For example, major institutional investors have publicly disinvested from companies producing tobacco products and have used “World Tobacco Day” to encourage public investors to follow their lead (The Guardian 2017). Shareholders exert pressure on banks to disinvest from new fossil fuel developments and threaten to disinvest from fossil fuel intensive companies if they don’t significantly reduce their emissions (Reuters 2021; Mooney 2021). Coordinated investor action has also been evident in calls to reduce the inappropriate use of antibiotics in food production. For example, in 2021 twelve institutional investors with \$7tn under their management joined the Investor Action for Anti-Microbial Resistance (AMR) Initiative which campaigns to reduce antibiotic use to tackle antimicrobial resistance (Jack 2021).

In addition, networks of progressive shareholders are increasingly pressurising corporations to tackle social and environmental harms through passing resolutions at annual shareholder meetings. In 2020, the Financial Times reported that such resolutions (addressing issues from climate change to diversity) had quadrupled in just three years (Financial Times, 2020).

This type of coordinated action by investors is being facilitated by organisations such as ShareAction, which was founded in 2005 and initially focused on supporting the UK's largest pension provider - the Universities Superannuation Scheme - to adopt a responsible investment policy. It has now grown substantially and works with a wide range of public and private institutional investors to “push for action on key issues, including climate change, workforce equality and health, and to build networks and coalitions of like-minded asset managers and owners to engage with companies on these topics” (ShareAction 2022) Recently this action included submitting a successful shareholder proposal to the annual general meeting of Unilever, which resulted in the company agreeing to publish annual assessments of the healthiness of its products on a global basis as well as for 16 key strategic markets, in line with government-endorsed nutritional criteria. The first report was published in October 2022 (ShareAction 2022). Legislating for the publication of such assessments annually should be considered.

### 3.3 Engaged and empowered citizens and civil society

Implementing the Commission's proposed interventions will also require engaged and empowered citizens as well as civil society. Civil society engagement has been notable in demands for governments and businesses to act on climate change in social movements such as Fridays for Future (@fridaysforfuture). Started by Greta Thunberg in 2018, Fridays for Future has become a global movement including in the Global South where it has joined with existing national youth environmental networks (Pousadela, 2020). Extinction Rebellion (XR), also started in 2018, is now a global environmental movement that aims to use non-violent civil disobedience to compel governments to act to avoid tipping points in the earth's systems. This includes a call to governments to create and be led by decisions of a Citizen's Assembly on climate and ecological justice (<https://rebellion.global/>). Social movements such as the two mentioned here face greater challenges to participation particularly in countries with authoritarian and repressive regimes. Greater support and solidarity from allies in the Global North would go some way to addressing these barriers (Dewi, 2022).

It has been estimated that such movements have the potential to change governments once around 3.5% or more of a population are actively engaged (Chenoweth, 2021). The power of these movements is reflected in the increase in misinformation from industries - whose profits are threatened – attempting to quash this power (Royal Society, 2022). The social movement *Gilets Jaunes* initially arose in protest against a climate policy that raised prices of fuel but evolved to reflect a broader sentiment of distrust in politicians (Copland 2020). It led to a climate change assembly in France which resulted in some but not all the promised legislation for key recommendations (Climate Home News 2012). Health systems reform and local action on the determinants of health have received great impetus through social participation, which typically requires facilitation by Civil Society Organisations (CSOs). WHO, 2021; Nambiar et al 2015)

We identified four sets of barriers to achieving engaged and empowered citizens and possible ways to address these.

#### i. **Barrier: Disengagement**

Voter turnout has been declining globally for the past 30 years (International IDEA 2016). Dissatisfaction with democracy has risen to its highest for 25 years (Foa et al 2020). Based on data from four million participants from over 154 countries, dissatisfaction grew globally since the 1990s by about ten percentage points from around 48% to 58%, being largest in high income countries. There has also been a rise of authoritarian rule within democracies, leading to more countries losing freedoms than gaining them over the past 16 years (Repucci & Slipowitz 2022). Failures of democratic institutions to address major threats including climate change and economic instability are seen as contributing to this decline.

Two approaches to addressing this disengagement are first, protection against misinformation that encourages inactivism, and second, better communication by governments and trusted sources of information describing the benefits of policies.

### *Protection against misinformation*

The decline in voter turnout has occurred in parallel with an increase in other forms of citizen engagement, including mass movements and protests against governments' inaction on climate. This form of engagement requires protection against the rising online and offline misinformation that encourages climate inactivism (Royal Society 2022). Such protection could include regulation (eg gov.uk 2022) and increasing digital and information literacy to build resilience against harmful misinformation (The Royal Society 2022; Traberg et al 2022). More fundamentally, the right to peaceful protest needs to be protected by law.

### *Communicating effectiveness and fairness of policies*

Better communication of the effectiveness and fairness of policies may also help to mitigate disengagement by increasing public support (Reynolds 2020; Martin et al 2022). For example, in a review of 36 studies across policy domains, communicating information about the effectiveness of a policy increased support for it by approximately four percentage points, while communicating information about a policy's ineffectiveness decreased support by a similar amount (Reynolds et al 2020).

## **ii. Barrier: Distrust**

Reflecting low voter turnouts, trust in governments globally is low, with only about half of people in OECD countries trusting their governments when surveyed in 2020 (OECD). Trust not only affects social cohesion but also citizen responses to policies and programmes. During the COVID-19 pandemic, trust emerged as an important predictor of infection rates: high levels of trust in governments were associated with higher vaccine uptake, associations seen in high-and-middle-income countries where vaccines were more readily available (Bollyky et al 2022). Distrust in politics and a growing anti-political sentiment can help explain the failure of governments to implement carbon pricing (Copland 2020). This anti-political sentiment has been used cynically by politicians with vested interests in not implementing policies in line with the Paris Climate Agreement, for example, in Australia and the US. Notwithstanding this, such anti-

political sentiment reflects a genuine public concern about the failure of states to govern in the interests of their citizens (Copland 2020).

### **Addressing the barrier**

#### *Leaders behaving in ways that engender trust*

For trust to increase, politicians and other community leaders need to behave in ways that engender trust (O'Neill 2003). OECD (<https://www.oecd.org/gov/trust-in-government.htm>) identifies five main drivers of trust in government institutions: responsiveness, reliability, acting with integrity, openness and fairness. These capture the extent to which governments are responsive and deliver on long term interests in a fair way that is open to public scrutiny. Increasing representation of women in national and local governments as well as at international levels could also increase trust, given that women leaders can be more effective than men at reducing corruption (DiRienzo & Das 2019) and are perceived to be more empathic (Sergent & Stajkovic 2020).

### **iii. Barrier: Low acceptability of interventions**

Public acceptability of any government intervention informs its political acceptability and therefore the likelihood that the policy is implemented (Cullerton 2016; Freudenberg 2014). The importance of public acceptability is illustrated by protests in many countries leading to the abandonment of reforms to remove subsidies from fossil fuels (Mahdavi et al. 2020; Rentschler and Bazilian 2017). The generation of public support for soda taxes, important policy interventions for NCD prevention, was key to their successful implementation in Mexico (Batis et al 2016) and seven jurisdictions in the US (Paarlberg et al 2017, Friel 2021).

### **Addressing the barrier**

#### *Communicate evidence of policy effectiveness and fairness*

Perceived effectiveness and fairness – procedural and distributive - predict public support for a wide range of policy interventions in health, the natural environment, education and crime (Bos et al 2015; Lam 2015; Mazzochi et al 2015; Petrescu et al 2016; Storvoll et al 2015); Reynolds 2020; Carmichael et al 2021; Reynolds 2021; IPCC 2018). Communicating evidence of a policy's effectiveness increases its public acceptability (Reynolds et al 2020; Mantzari et al 2022). Simply asserting a policy's effectiveness seems to have the same effect on acceptability as presenting the supporting evidence. It is important to note that support for policies is tempered by a general reluctance to change the status quo.

The design of policy interventions also influences their perceived effectiveness and in turn public support for them. Low public support for taxation and other pricing measures is associated with mistrust about how governments will use these taxes (Somerville et al 2015; Thomas-Meyer et al 2017). Reflecting this, public support for carbon and other pricing measures is higher when the revenues raised are used for environmental purposes (Beiser-McGrath et al 2019; Muhammad et al 2021; Maestre-Andres et al 2021; Carattini et al 2018; Drew & Van den Bergh 2016).

Within these, 36/59 comparisons reported increased support if the revenues went towards tax rebates, 14/18 if the revenues were earmarked for environmental purposes, and 7/26 if earmarked for non-environmental purposes. There was no increase in support in any of the 16 comparisons where revenues were allocated to general state funds.

Support is also higher when taxes raised are returned to citizens directly in the form of rebates, and when they are earmarked for other non-environmental purposes [See Box 4 for a summary of a review on public support for carbon and other pricing measures].

Regarding procedural fairness - the process through which a policy is designed, decided upon and implemented – policies that are designed with public engagement are seen as fairer and attract more public support (Martin et al 2022). Distributive fairness concerns how the benefits of any intervention or policy are distributed across society (Dreyer & Walker 2013). Using expert elicitation methods described in Section 1, we identified two sets of distributional harms from interventions intended to reduce threats to health and the environment: first, pricing some groups out of goods and services; and second, removing livelihoods currently made from goods and services that damage health and the natural environment.

Indonesia's initial success at reducing fossil fuel subsidies was in part due to the introduction of a social welfare programme to compensate the poorest for the indirect economic consequences of subsidy reform (Chelminski 2018). But despite this initial success from 2012 onwards, the Government of Indonesia began to increase its fossil fuel subsidies from 2016, with an important hike in 2020 as part of economic recovery packages ([ref 1](#); [ref 2](#)).

Replacing livelihoods that will be lost is essential to achieving a fair transition. Case studies of replacing livelihoods for those currently farming tobacco and working in the coal industries are described in Box 3.

#### **iv Barrier: Exclusion and marginalisation of civil society actors and interests**

There are increasing attempts in both democratic and non-democratic states to suppress activists and social justice organizations, including those fighting for racial gender and climate justice (Transnational Institute 2017). This reflects the rise in authoritarian rule (Repucci & Slipowitz 2022) with illiberal governments fearing the power of civic activism (Brechenmacher 2017; Baydas 2017). This is important not only for social justice but because policies developed without engaging civil society organisations (CSOs) are less effective than those that do engage them (Abrahamson et al 2019).

#### **Addressing the barrier**

##### *Funding civil society organisations to engage meaningfully in policy development*

Funding may come from different sources with different objectives. Enlightened donors could support civil society organisations to build capacity in monitoring government and other salient programmes and conducting their own research. Investing in partnerships between civil society

organisations and academic partners could also enhance the contribution of evidence to and documentation of advocacy efforts. Donors with influence could put pressure on governments to establish legal rights for civil society organisations (McDonough & Rodríguez 2020).

*Effective government engagement with civil society organisations*

An analysis of civil society engagement in the UK identified three principles for effective engagement between government and CSOs. These were to ensure early engagement in the policy process so as to be meaningful, to be inclusive (and transparent about those included and excluded), and to be deliberative by working in open discussion (Abrahamson et al 2019). CSOs also need access to funding through a fair and transparent process.

*Global solidarity initiatives*

Global solidarity initiatives can build strategies, collaboration and learning networks across settings to claim and occupy decision-making spaces and ensure that realities and priorities are made known. One such initiative is the *People's Health Movement*, with chapters all over the world, playing the role of a “watch” over proceedings and agenda-setting of the World Health Organisation and other multilaterals while also leading national and subnational campaigns on health issues and determinants. Another is the multi-stakeholder *Civil Society Engagement Mechanism* for UHC2030, which is playing a key role in documenting and institutionalising social participation in health reform at national levels, as well as through the United Nations system.

Two further changes have the potential to amplify the impact of the actions described above to address the barriers to engaging citizens and civil society.

*Embedding informed deliberative processes into policymaking at all levels of government*

The measures described above to address the barriers to engaged and empowered civil society might be amplified by governments at national and local levels incorporating deliberative processes into their policymaking. These range from more formalised, resource intensive procedures such as citizen assemblies (OECD 2019) to less formal online systems of engagement such as in Taiwan, where over 50% of the population of about 24m has visited one or more of the digital engagement platforms to suggest and discuss policy options (Tang 2021). The impact of such engagement is difficult to discern. Recent citizen assemblies on climate change in Ireland, France and the UK resulted in proposals that are likely to lead to greater carbon emission reductions than their governments' policies (Marteau, Chater, Garnett 2021). Since no democratic state has so far implemented a climate plan strong enough to meet the goals of the Paris Agreement, reform of democratic processes seems essential, and deliberative democracy processes may be the way to achieve this (Willis et al 2022).

*Widening suffrage*

A further possible amplifier to engage and empower civil society would be to widen suffrage, including by lowering the voting age to engage younger generations in political processes. This deserves particular consideration when considering how to ensure that the best interests of the child - both existing and future - are taken into account to achieve intergenerational justice.

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Preliminary evaluation from countries that have so far done this – mainly in Europe and South America – suggests that this has a positive impact on political engagement (Eichhorn & Bergh 2021).

**Table 3.1 Enabling Recommended Actions**

Enablers of Recommended Actions	Barriers	Addressing barriers	Additional actions to address barriers
Effective state institutions and political leadership at national, local and international levels acting now to achieve longer-term objectives to improve population health	<p>Competing interests and ideologies</p> <p>Corruption and state capture by businesses and elites<sup>3</sup></p> <p>Lack of capability and relevant expertise within governments and the research community</p> <p>Prioritising short-term over longer-term objectives including population health</p>	<p>Coalitions of leaders to develop a common vision and goals</p> <p>Effective governance frameworks</p> <p>Establish a platform to collate and share evidence and practices and build capacity in systems approaches</p> <p>Agreed metrics to measure progress against common vision and goals</p>	<p>Legally-binding commitments to achieve a common vision</p> <p>Requirement of governments to consider the rights and interests of future generations to a healthy environment</p> <p>Requirement of governments to increase representation of women in parliaments</p>
Businesses acting in line with regulations and policies to improve population health	<p>Business interference in policy-making through misinformation and other practices</p> <p>Incentives for businesses to harm health and the natural environment <i>eg</i> subsidies on harmful products and activities</p> <p>Insufficient disincentives for businesses harming health and the natural environment <i>eg</i> external costs not borne by businesses generating these harms</p>	<p>International adoption of packages that use regulation.</p> <p>Incentivise sustainable and healthy business activities and disincentivise unsustainable ones using fiscal and other regulatory measures including legally binding standardised metrics for business reporting.</p>	<p>Establishing networks of activist investors holding businesses to account for long term impacts on health and environment</p>
Engaged and empowered citizens and civil society	<p>Disengagement</p> <p>Distrust</p> <p>Low public acceptability of interventions</p>	<p>Protect against misinformation</p> <p>Leaders acting trustworthily, <i>i.e.</i> responsive, reliable, with integrity, openly &amp; fairly</p> <p>Communicate effectiveness &amp; design policies fairly</p>	<p>Embedding deliberative processes into policymaking at all levels of government</p> <p>Governments to widen suffrage by lowering voting age to engage younger generations</p>

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	Exclusion and marginalisation of civil society actors and interests by leaders and regimes	Empower and fund civil society organisations to engage meaningfully in policy development	
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## **Box 1 Strategic litigation to protect public health and the natural environment**

**NB Links in this section need to be taken out and replaced by standalone references**

Strategic litigation “[an intended impact beyond a particular case to influence broader change at the level of law, policy, practice, or social discourse](#)”.

Its goal is to expose and change the practices of industries that contribute to ill-health or environmental degradation, and/or to challenge the failure of governments to effectively regulate such practices in violation of human rights, not least the right to life, the right to the enjoyment of the highest attainable standard of health, the right to nutritious adequate food.

Specific population groups and civil society organisations are increasingly challenging governments for their failure to tackle climate change (Setzer 2021, Wilkinson 2022), air pollution, and unhealthy diets. Many of these cases are ongoing in a range of jurisdictions around the world. For example, litigation before the European Court of Human Rights, and more specifically [Duarte Agostinho and Others v Portugal and 32 Other States](#), [Senior Women for Climate Protection v Switzerland](#) and [The People v Norway](#)

Beyond legal disputes in courts of law, human rights fora are being led by citizens, including children, to complain against their governments for failure to respect, protect and fulfil their human rights. The most prominent example is the communication to the Committee on the Rights of the Child lodged by 16 children from around the world against five governments: [Sacchi, et al v Argentina, Brazil, France, Germany & Turkey](#)

In some cases, the impact has been tangible, leading directly to changes in policy or corporate practices E.g. ClientEarth’s challenges in 2011, 2015 and 2017 to the UK government’s air quality plans: [R \(on the application of ClientEarth\) No. 3 v SoS for Environment, Food, and Rural Affairs, SoS for Transports, Welsh Ministers, which resulted in...](#)

- E.g. Alana (a consumer protection organisation in Brazil) filed an amicus curia brief in support of the [Sao Paulo State Attorney in the challenge in 2016 against Pandurata Alimentos Ltd](#) for a misleading unhealthy food marketing campaign to children:

In other cases, less tangible but nonetheless significant impacts have raised awareness, established health problems as human rights concerns and therefore shed a light on the need to ensure State accountability for human rights violations, supported citizen participation (directly or indirectly through civil society organisations), and ultimately increased political will for interventions promoting better health for all.

The potential of human rights based approaches to population health and extended to ecological justice remains underexplored, although there is growing momentum, particularly in relation to [climate change](#) and [air pollution](#) (Bhakuni et al 2021).

## **Box 2 Human rights-based approach to commercial determinants of ill-health and environmental degradation**

The constant legal and political challenges to public health measures from industry or states sympathetic to industry call for a reconsideration of how the law, particularly human rights law, is used to promote better health for all. A human rights-based approach calls for compliance with human rights standards and principles, and in particular the principle of accountability. States must ensure that mechanisms are in place for right-holders, acting individually or collectively through civil society representatives, to hold States accountable for their actions or failures to act. There must be processes in place allowing right-holders to claim their rights and remedies allowing them to be compensated should these rights be violated. These processes can be judicial or extra-judicial (for example, an ombudsperson or other agency), and supported by civil society organisations.

The benefits of a human rights-based approach in regulating the commercial determinants of ill health and environmental damage include:

- **Accountability** – A human rights-based approach guarantees a degree of state accountability, making effective remedies more likely where rights are violated. This makes it easier for the commitments and obligations established in international human rights law to be translated into practicable, long-lasting and realizable entitlements, guaranteed by independent monitoring bodies, including courts and national human rights institutions.
- **Empowerment** – Once the concept of ‘rights’ is introduced into policy-making, the rationale for improving environments and preventing diseases comes from the fact that individuals have rights as well as *needs* – entitlements that give rise to legal obligations on the part of states.
- **Legitimacy** – Because human rights are inalienable and universal, there is an inherent legitimacy. Arguments based on human rights can ensure that an issue is given special consideration and that competing interests lose legitimacy if they are incompatible with human rights.
- **Advocacy and Participation** – An approach based on human rights provides an opportunity to build strategic alliances, coalitions and networks with other actors who share a similar vision and pursue common objectives. In particular, such an approach may draw in a broad range of actors who may not have previously envisaged the work of this Commission as a human rights-concern (e.g. human rights civil society organizations and human rights protection agencies). This is likely to help galvanize political will and increase pressure on states to comply with their human rights obligations and therefore address communicable and non-communicable diseases, as well as environmental degradation.

### **Box 3 Case examples of replacing livelihoods in tobacco**

In 2020, 51% of the world's tobacco was grown in China (39%) and India (12%)  
<https://beef2live.com/story-ranking-countries-produce-tobacco-263-212893>

#### **China**

In China, the tobacco industry is a state monopoly with annual production of tobacco determined centrally. Reflecting government policies to reduce smoking through increased taxes and anti-smoking campaigns, the area of land devoted to tobacco farming has reduced from a peak in 2013 of 1.55 million hectares to 1.01 in 2020 (National Bureau of Statistics, China, 2021). To our knowledge no government led programme has encouraged the farming of other crops. But in the Yuxi Municipality, collaborators from the Yuxi Bureau of Agriculture and the University of California at Los Angeles School of Public Health initiated a tobacco crop substitution project. At three sites, 458 farm families volunteered to participate in a new, for-profit cooperative model. Farmers at these three sites increased their annual income by between 21% and 110% per acre in comparison with farmers who planted tobacco. Grapes were the most lucrative crop. Since 2011, Yuxi Municipality Bureau of Agriculture has extended the project to other counties. Farmers themselves are taking the initiative to reduce tobacco cultivation in favour of other crops. From 2012 to 2015, the per capita net income of Yuxi Municipality grew by more than 3000 yuan (US\$484).

#### **India**

In India an important part of the tobacco industry is the production of cheap cigarettes in the form of *beedis* (more lethal than manufactured cigarettes, consumed mainly by the poor) (Cherian 2014). Women perform as much as 85% of the informal and highly exploitative work of beedi rolling (Mallick et al 2021). Programmes to develop skills for alternative livelihoods have been underway for over 20 years (ILO 2004), but only 0.06% of India's beedi workers are involved (Press Information Bureau, Government of India 2019).

Two southern states, Tamil Nadu and Karnataka, have been more successful (Satpathy et al 2022). A pilot project by the International Labour Organization in 2000 in partnership with local organizations and NGOs recruited 4500 women beedi workers to help build their skills and confidence, as well as to improve their status in their society. The project also identified other sources of income generation and linkages for marketing the products. Alternative activities, including jackfruit agriculture, tailoring and baking, have raised income levels for most of these women three or four fold. (ILO).

Far more action is still needed to help women move away from employment in an industry that disproportionately exploits and kills the poorest.

**Box 4            What factors affect public support for carbon and other pricing measures?  
                         A rapid review of the literature**

We conducted a rapid review of evidence on public support for carbon and other pricing measures. This was restricted to studies using experimental designs as described in a pre-registered protocol (Wabnitz et al 2022). The 37 studies included in this review were all conducted in high income, Western countries, so their generalisability to countries in other regions and with lower income remains unknown. Three principal aspects of policy design with potential to alter support were identified, concerning: price levels, perceived fairness, and the earmarking of revenues.

**Price levels**

Eleven studies assessed changes in public support with price level, reported in 27 sets of comparisons (Bannon 2007; Bechtel 2020; Dolšak 2018; Duncan 2020; Eriksson 2006; Harrington 2001; Jagers 2019; Jagers 2021; Krupnick 2001; Long 2021; Schitema 2008, Study 2). Most comparisons (19/27) reported a significant decrease in support with higher prices, with about a third (8/27) reporting no change. No studies reported an increase in support associated with higher prices.

**Perceived fairness**

Three of the 11 studies also assessed perceived fairness of pricing levels, each finding that lower perceived fairness was associated with lower support for higher prices (Eriksson 2006; Jagers 2019; Jagers 2021). One of these also assessed perceived effectiveness of higher prices (Eriksson 2006) finding it unrelated to public support. The extent to which loss of support for higher pricing levels can be offset if revenues are used for environmental purposes (particularly public transport) or rebates remains to be determined.

**Earmarking revenues**

20 studies assessed changes in support with revenue use, reported in 91 sets of comparisons (Bullock 2017; Dolšak 2020; Harrington 2001; Jagers 2019; Jagers 2021; Kaplowitz 2015, Studies 1-6,8); Mus 2022, Studies 1 & 2; Nowlin 2020; Schuitema 2005; Schuitema 2008, Studies 1 & 2; Schitema 2010; Ubbels 2005). Within these, 36/59 comparisons reported increased support if the revenues went towards tax rebates, 14/18 if the revenues were earmarked for environmental purposes, and 7/26 if earmarked for non-environmental purposes. There was no increase in support in any of the 16 comparisons where revenues were allocated to general state funds.

Of the six studies that examined revenue use for environmental purposes (Nowlin 2020; Dolšak 2020; Kaplowitz 2015 Studies 4, 5 6; Mus 2022 Study 1, across 17 sets of comparisons, energy efficient transport was the most frequently studied, with 10 of 11 comparisons showing increased support. The other environmental purposes examined were renewable energy investments (one comparison), and unspecified environmental purposes (five comparisons).

Four of these six studies (Mus 2022 Study 1; Shuitema et al 2005; Shuitema et al 2010; Ubbels et al 2005) found that support was in part explained by perceived effectiveness of the revenue use at improving environmental problems.

## Section 4: Discussion

This Commission addresses three major and growing, interconnected, global threats to population health post-COVID-19 - non-communicable diseases, infectious diseases and environmental degradation. Non-communicable diseases – including type 2 diabetes, cardiovascular and respiratory diseases, and many cancers – cause over 40 million premature deaths a year (WHO NCD factsheet). As obesity rates increase around the world the inevitable rise in type 2 diabetes alone is over \$865bn a year and set to overwhelm many healthcare systems (NCD Risk Factor Collaboration 2016). Infectious diseases – including COVID-19, TB, malaria, and HIV – continue to kill many more millions with malaria alone set to increase as global temperatures rise (Romanello 2022). Environmental degradation from air pollution is estimated to reduce global life expectancy by about one year in 2019 (UNEP 2022) through increasing rates of heart disease, many cancers, type 2 diabetes alongside mental health problems.

The interconnections between these three threats are illustrated by the clearance of vast areas of land globally to support high levels of red meat consumption. The resulting clearance reduces the capacity of the land to retain carbon while the livestock emit methane, a potent greenhouse gas. Excessive consumption of meat contributes to non-communicable diseases, which are major risk factors for morbidity and mortality from infectious diseases including COVID-19. At the same time, the destruction of ecosystems and the loss of habitats increases the likelihood of interactions between wild animals and humans, in turn increasing the risk of new zoonotic diseases developing, while global heating drives increases in disease vectors such as those for malaria and dengue, and air pollution is creating an epidemic of respiratory disease.

The drivers of these three threats are underpinned by political systems which privilege economic growth over population health and the natural environment, undermining economies through increased healthcare costs and reduced human productivity. Across all these threats it is the poorest people, and the poorest countries, that experience the greatest harms.

Reducing these threats requires a global shift in the behaviour of most populations including eating healthier and more sustainable diets, drinking less alcohol, not smoking, and increasing levels of physical activity. These behaviours are largely cued, reinforced and maintained by physical, economic, digital and social environments over which populations have little control. Exhorting individuals to change their behaviour is therefore an ineffective strategy for change of the magnitude and at the scale required. Changing these behaviours necessitates changes in the environments that shape them, requiring action largely by governments and business actors, and also by citizens, in order to transform the conditions that determine population health and the natural environment.

A potentially important measure to drive change is carbon pricing, which will require prices in the hundreds of dollars per tonne of CO<sub>2</sub> to transform physical environment and transport, agriculture and food, and energy systems. In the absence of compensatory measures these high prices would have major adverse effects on those in low income

households, but the high prices could provide an income stream that could provide social safety nets to mitigate these harms. The earmarking of such funds to improve the natural environment and population health will also increase the public acceptability of the measures. However, even extremely high levels of carbon pricing will not be sufficient to achieve the full transformation of these systems that is required, so additional interventions are needed to improve health and the natural environment.

The three threats addressed by this Commission are the results of failures of the three systems we focused on - physical environment and transport, agriculture and food, and energy – alongside many others, all of which are integrated both within and between themselves. All possible actions should be considered in terms of their impacts – both positive and negative - across systems and at scale.

We make three recommendations towards achieving this transformation that would create the triple win of protecting and improving the health of populations equitably, create stronger economies, and increase public support for government action to achieve these.

## Recommendations

### **2) Replace harmful policies and interventions with actions to improve population and natural environments**

The Commission identified many government policies that could contribute to improving population health and the natural environment, and many that cause harm. We describe multiple potentially beneficial interventions that should be instigated, and harmful ones that should be ended. Examples of these interventions are listed below, under each of the three system headings of physical environment and transport; agriculture and food; and energy. The sequencing and prioritisation of interventions will be highly contingent on the relevant local and national conditions and policy priorities.

Regardless of the strength of the evidence for intervention effectiveness, all policies should have robust evaluations designed into their implementation so that they can be monitored in real time and, when necessary, modified to achieve their aims or stopped if judged ineffective or counterproductive.

Among the most harmful policies of governments globally are those underpinning almost \$700bn in subsidies to fossil fuel industries (OECD, IEA 2021) and \$540bn to agriculture (FAO 2021), much of which is for practices that harm the environment and generate foods that ultimately harm population health. The largest agricultural subsidies go to beef and dairy farming in the Global North, which are agriculture's biggest source of greenhouse gas emissions. We recommend that these subsidies are ended, with the money redirected to interventions that benefit health and the natural environment, such as plant-based agriculture, support for renewable energy, and ecosystem restoration.

#### ***Physical environment and transport***

- k. Design and build infrastructure in urban and rural areas to enable and prioritise safe, affordable, accessible, and convenient active travel and public transport.
- l. Design, build and manage urban and rural environments in which the need for vehicles is minimised.
- m. Design habitations and associated areas to foster biodiversity and to support and restore ecosystems, including where relevant the provision of accessible public green and blue spaces.
- n. Build and renovate buildings and infrastructure using sustainable and healthy materials and practices.

### ***Agriculture and food***

- o. Conduct all activities within the agri-food system, including production, processing, packaging, distribution and consumption, such that they do not contribute to exceeding planetary boundaries, or cause other harms such as increasing animal/human contact.
- p. Design production and distribution systems to ensure access to sufficient nutritious fruit and vegetables for everyone on the planet
- q. Minimise production and consumption of alcohol, tobacco, ultra-processed foods, and other foods that harm health and the environment including animal-sourced foods.
- r. Protect and/or restore land and marine ecosystems in rural areas, including through reforestation, rewilding, and reintroduction of native animals

### ***Energy***

- s. No new fossil fuel exploration, extraction, or power stations. End all fossil fuel use while ensuring a just transition and energy security, and replace it with net zero carbon energy sources
- t. Minimise harms caused by energy production, and from equipment for its storage and use. Reduce production and consumption to minimise energy related harms both during and after the energy transition, including any harms related to sustainable energy.

The interventions we propose in a-j above will meet enormous resistance from those with a range of vested interests, and achieving them at scale globally presents an enormous challenge. There are however examples of the successful introduction of several of the interventions. For example, Sweden has had a carbon tax on vehicle and heating fuel since 1991, currently set at around US\$ 134/tonne, and reduced or eliminated exemptions in 2019 (Swedish Ministry of Finance 2021; World Bank 2022). Many cities across the world are transforming their transport systems to prioritise walking, cycling, car-sharing, and public transport over private cars, with scores of cities being co-led to achieve this as part of just one global initiative by Bogotá and Barcelona (C40.org). Removing subsidies on products that harm health and the natural environment has proved a greater challenge to date. While Indonesia did manage to do this between 2012 and 2016, the policy did not endure in the face of an economic downturn. It is against these known difficulties for intervening at scale

that we make Recommendation 2 below, to create the enabling conditions to achieve these actions.

**2) Enhance the effectiveness of governments, commercial actors, and civil society to improve population health and the natural environment**

Achieving these transformations requires local, national and international action by governments, private sector organisations and civil society. The Commission identified three enabling conditions that would support this:

- d) State institutions and political leaders act now to strengthen and implement existing legal and regulatory governance structures to achieve policies that protect population health and the natural environment. This would contribute to achieving long term improvements in population health, and to embedding and maintaining these improvements over the long term.
- e) Businesses act in line with effective regulations and policies for improved population health. In order to achieve this, governments need to develop and strengthen systems to protect public policy making from harmful business practices, and in particular prevent corporate interference in public policymaking, including through misinforming the public.
- f) Citizens and civil society groups voice their demand and support for effective interventions to improve population health and their lack of support for ineffective interventions. They should take all opportunities offered by policy makers to engage in all stages of the policy-making process, including in the prioritisation of policies and the allocation of public resources. Such actions require governments and other bodies first to communicate the evidence for the (in)effectiveness of policies at achieving improvements to population health; second to protect against misinformation; third, to empower and fund civil society organisations to participate meaningfully in policy development; and fourth, for leaders in public office to act in trustworthy ways.

**4) Develop capability and capacity in systems level responses to the three threats**

To develop capability and capacity in systems level responses the Commission recommends first, that research funders including governments support the development of methods for systems level analyses to assess the impact of interventions; second, that governments, educational institutions and research funders increase the skills and those with these skills to apply such methods in policy settings; and third, that governments and other bodies implement mechanisms to support the design and implementation of policies to transform systems for better population health.

This would increase government capacity nationally and internationally to design, implement and evaluate policies that aim to transform systems, and to build the evidence base through research.

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