



Director of Public Health Annual Report | Bristol 2021

Pause, Breathe, Reflect

Lessons from COVID-19

CONTENTS

Acknowledgements	2
Pause, Breathe, Reflect: an introduction	3
1. Biology	4
Breathing	4
Breathing diseases	6
The role of vaccination	9
2. Behaviour	10
Smoking	10
Exercise	12
3. Environment	14
Indoors	14
Outdoors	16
Green and active spaces and places	18
4. Policy	20
5. Action	22
Appendices	23
Appendix 1	23
Appendix 2	23
Appendix 3	24
Appendix 4	25
References	26

ACKNOWLEDGEMENTS

My grateful thanks go to the many people without whom this report would not have come to fruition.

Andrea Dickens and Jennifer Davies for being editors-in-chief in the production for this year's report. To Alex Minshull, Kathy Derrick and Steve Crawshaw for information to support the environment sections. Thank you to Guy Fishbourne and Kate Cooke for the expert detail on physical activity, Charlie Williams and Karen Evans on children's health, Grace Davies and Alasdair Wood on healthy weight, Sophie Prosser for input on indoor air pollution and as ever our incredible team of public health specialists John Twigger, David Thomas and Magda Szapiel and public health consultant, Viv Harrison, who have all been part of the editorial team. And finally, to James Fry, Jack Smith and Bristol Design for their professional guidance in production.

This year's report is dedicated to the people of Bristol, all those who live or work in this great city. To those of you who have sheltered, volunteered, suffered, cared for others, protected, communicated, challenged, or simply just survived the last year. Thank you.



We look forward with hope.

Christina Gray
Director of Public Health,
Bristol City Council

PAUSE, BREATHE, REFLECT: AN INTRODUCTION

COVID-19 has been a reminder of many things that we have previously taken for granted. Contact with friends and family; freedom to travel where and when we choose; and a health and care system which can meet our needs.

As COVID-19 has ravaged around the world and through our city, we have had revealed our reliance on one another, both the things which bind us together and the divisions, differences and inequalities which separate us. Experiences have been mediated by the homes and neighbourhoods we live in; the security of our employment; the strength of our support networks, our age, ethnicity, wealth, and pre-existing health status. COVID-19 has brought into plain sight social and economic inequalities and how these impact on the health of individuals and communities. Most fundamentally of all, COVID-19 has reminded us of the importance of being able to breathe; the extraordinary process which involves the exchange of oxygen, breathed in from the atmosphere, which circulates our body nurturing every cell.

COVID-19 is simply the latest in a range of pathogens which cause diseases of the lungs. Tuberculosis, known as TB, is a bacterial infection which was prevalent in the 19th

century and- until the advent of antibiotics- was incurable. Isolation, sanatoriums and improved living conditions were the 19th century equivalent of 'hands, face, space'; with fresh air being then, as now, seen as an important protective factor.

Asthma and chronic obstructive pulmonary disease (conditions such as emphysema and chronic bronchitis) are common debilitating conditions of the 20th and 21st centuries. As with TB, the prevention and treatment of these conditions lies in the complex interplay between our biology, behaviours, wider environmental circumstances, living conditions and the advancements of medical science.

Smoking and unhealthy weight were identified early as additional risk factors for COVID-19. Smoking remains the biggest cause of lung diseases, heart disease and cancers; and is overall, the biggest identifiable cause of poor health and early death. Unhealthy weight is not far behind¹. Recent research at the

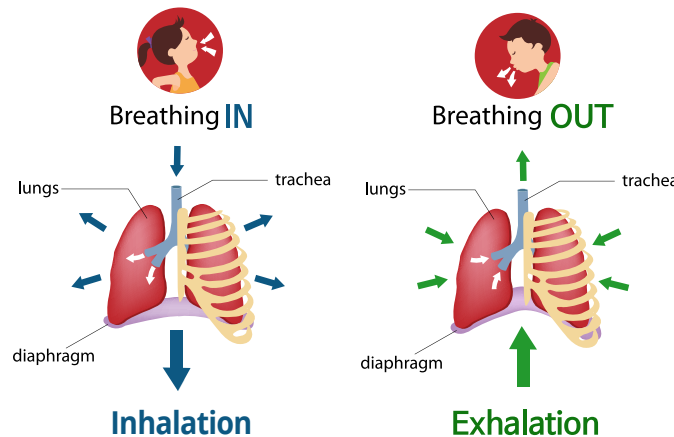
University of Glasgow found that in England and Scotland obesity now accounts for more deaths than smoking among people in middle and older age².

Both our innate biology and our everyday behaviours interact in complex ways within the social, environmental, and economic conditions in which we live; to either increase or reduce our likelihood of developing a disease. The overall pattern of health and disease across Bristol is clearly shaped by wider social and economic conditions. The distribution of health and disease is not equal.

In this, my second Director of Public Health Report for Bristol, and prompted by the experience of the past eighteen months of living with the COVID-19 pandemic, I have taken the opportunity to look more closely at the process of breathing, the fundamental and extraordinary process which is so important for quality of life and wellbeing, and which ultimately underpins life itself.

Breathing

Through the nose or mouth we inhale the air around us; a mix of roughly 79% nitrogen and 21% oxygen. These gases travel down the windpipe (trachea) and into the chest where the trachea divides into two bronchi which supply the left and right lungs. Just like the branches of a tree, each bronchus divides many times into millions of tiny passages called bronchioles. These end in many grape-like air sacs called alveoli. It is in the alveoli that gases are exchanged between the circulatory system and the lungs, through a very thin membrane covered in fine blood vessels called capillaries. Through this process, oxygen from the lungs moves into the bloodstream to be carried around our bodies to help fuel the work that our cells do to keep our body and organs working for us. As our cells use the oxygen, carbon dioxide is produced as a waste product which is transported back to the lungs to be removed from the body when we breathe out.



The process of breathing is controlled by the brain, the muscles in the chest and the diaphragm – a large sheet of muscle that separates the chest from the abdomen. The heart is the central pump which keeps the blood moving around the body.

If we make our bodies do more work, for example through exercise, our brain sends signals to the lungs that they need to work harder to provide more oxygen to our body as fuel for the extra work. We automatically start breathing faster and deeper.

Breathing exercises – the conscious control of breath – are used effectively by many people to help manage stress and anxiety, aid relaxation, and help improve sleep³.

If we inhale pathogens such as the chemicals in cigarettes or particulate matter from poor indoor or outdoor air quality for prolonged periods, we are at a greater risk of lung and other diseases.

One in five people in the UK⁴ have some form of lung disease. Lung diseases (also known as respiratory diseases) include asthma, influenza ('the flu'), tuberculosis (TB), pneumonia, and chronic obstructive pulmonary disease (COPD). COVID-19 sits alongside as a new and complex disease, associated with, among other things, a drop in blood oxygen levels and difficulties with breathing.

Lung diseases can severely damage a person's ability to breathe efficiently, and as a result leave people exhausted, uncomfortable and potentially not able to live freely, work or socialise as they would like to.

The cardiovascular system works in close partnership with our respiratory system. Together they can be referred to as the cardiorespiratory system. This is because of the combined work involved in the heart pumping oxygenated blood around the body via the circulatory system and then returning this deoxygenated blood back to the lungs to continue the ongoing exchange of oxygen⁵.

Cardiovascular disease is a term used to describe diseases affecting the heart or circulatory system, such as heart attack, stroke, and peripheral arterial disease⁶. Cardiovascular diseases commonly include the narrowing or blocking of blood vessels which restrict the free movement of blood and therefore oxygen, around the body⁷. We also know that a type of dementia – ‘vascular dementia’ – is a form of cardiovascular disease⁸.

Respiratory diseases and cardiovascular diseases are two of the most prevalent illnesses and leading causes of premature mortality worldwide⁹.



Breathing diseases

As we can see from the previous chapter, our entire biology is based on lung function and the circulation of oxygen around the body. Unhealthy lungs or poor oxygen circulation is a contributory factor, not only in respiratory diseases, but also cardiovascular diseases and lung cancers.

A premature death, defined as a person dying whilst under the age of 75yrs, is a particular indicator of inequality. Premature deaths account for 34.3% of all deaths in Bristol compared to the England average of 31.7%.

COVID-19 deaths* in 2020 account for 13% of all deaths of which 21% (85) were premature deaths of people aged under 75.

Overall, respiratory diseases are the third biggest cause of death in the UK after heart disease, dementia and Alzheimer's¹⁰. More than 100 Bristol residents die prematurely each year because of a respiratory disease, accounting for around 10% of all premature deaths¹¹. This is higher than the England average¹². This does not include lung cancers which account for a further 102 premature deaths annually.

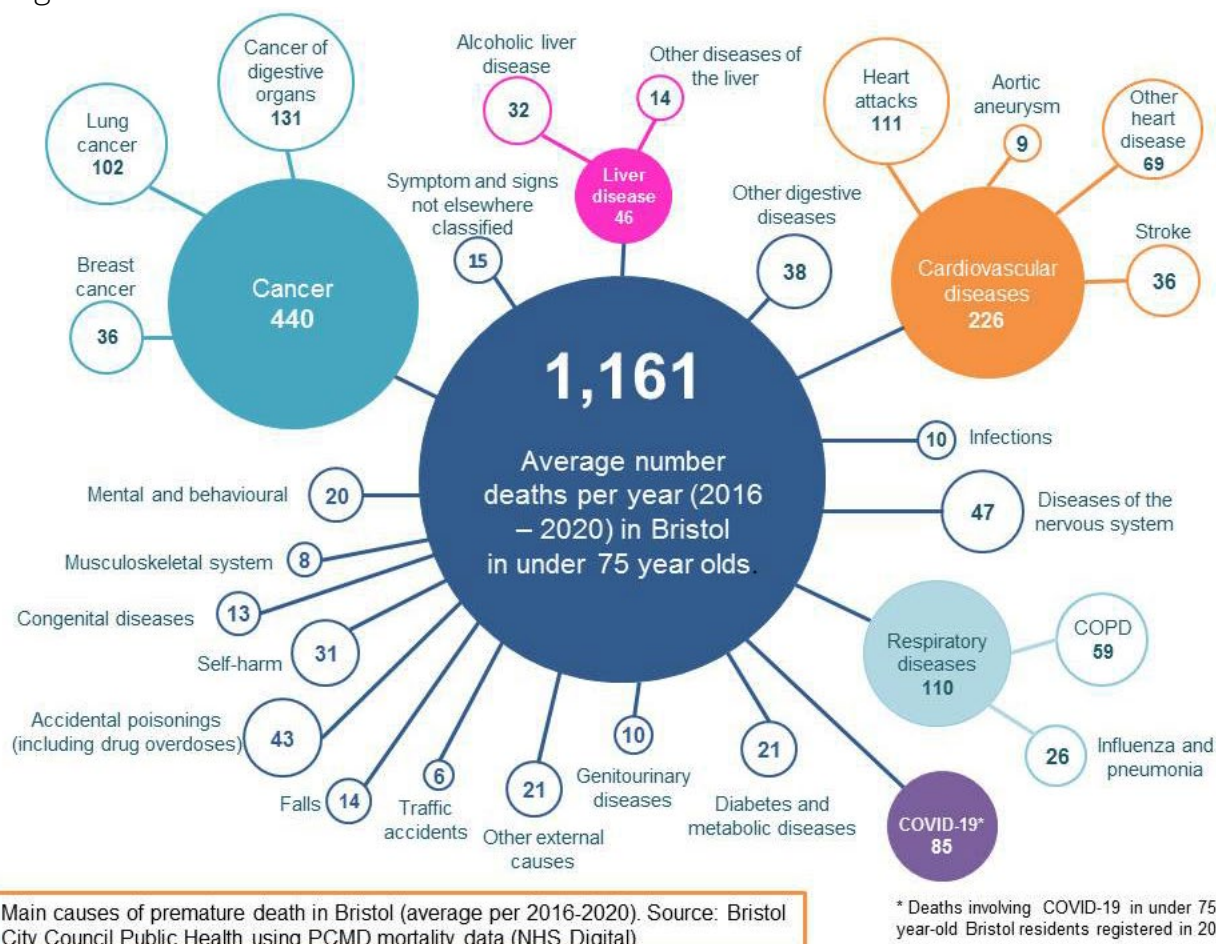


Figure 1: Causes of premature death in Bristol (average per 2016-20)

*COVID-19 death: any death with COVID-19 mentioned anywhere on the certificate.
Source: Primary Care Mortality database via NHS Digital, July 2021

Up to 2010-2012 the rate of premature deaths from respiratory illness across all genders was declining in Bristol and in England as a whole. However, progress appears to have stalled since then and we can see that the premature death rate from respiratory disease overall has showed signs of a possible increase (from 37.3 per 100,000 to 39.5 per 100,000¹³).

Preventable mortality is the number of deaths that could have been avoided had a health or lifestyle intervention been made and been successful. Bristol's preventable mortality rate for respiratory disease is 22.6 per 100,000 compared to the England rate of 19.6 per 100,000¹⁴. This is seen in *Figure 2*, where the upper (blue) line represents Bristol numbers.

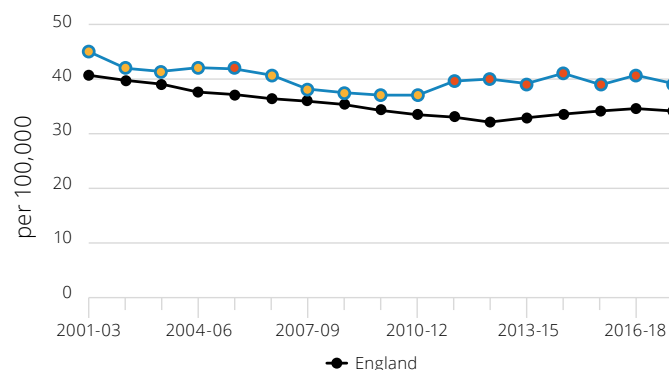
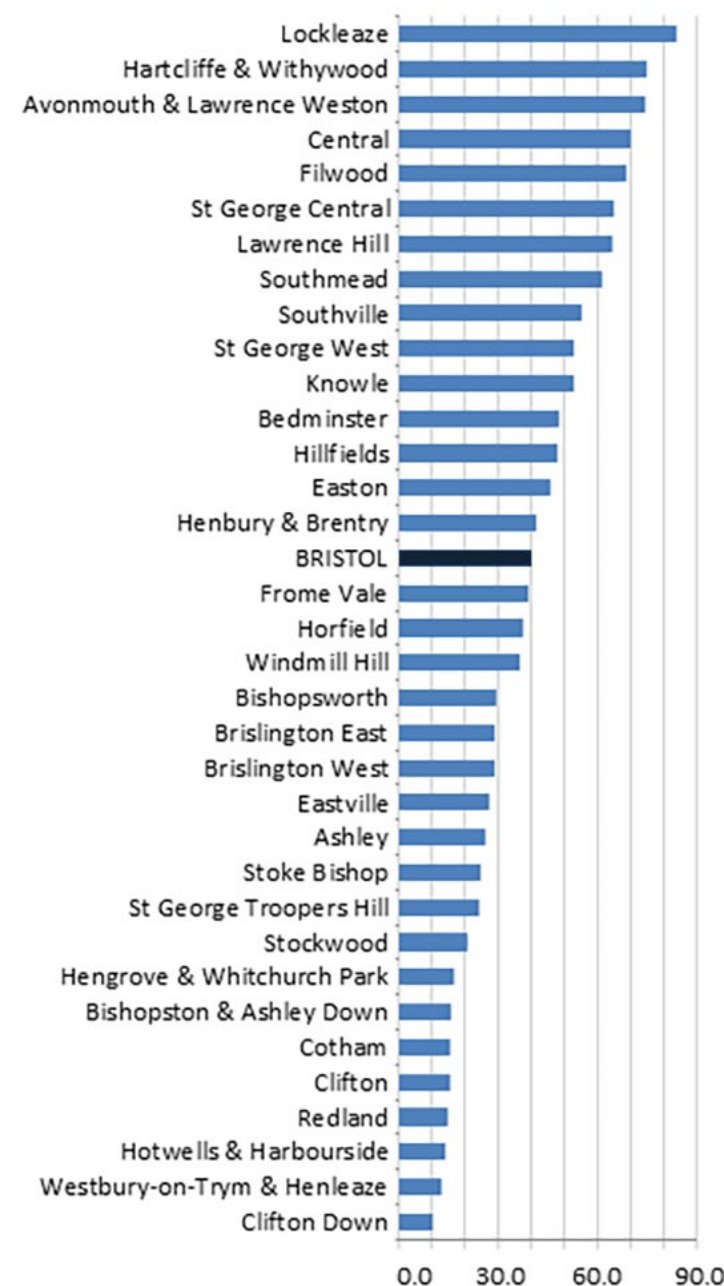


Figure 2: Under 75 Mortality Rate from Respiratory Disease (Persons)

There is also geographical variation, with areas in the northern and southern arcs of the city showing higher rates of premature deaths due to respiratory diseases¹⁵. In the 5 years between 2015 and 2019, 35% of all premature deaths caused by respiratory disease occurred in the most deprived areas of Bristol, compared to only 7% occurring in the least deprived wards. The highest rates of premature deaths due to respiratory disease in the period of 5 years have been seen in Lockleaze (83.9 per 100,000), Hartcliffe & Withywood (75 per 100,000) and Avonmouth & Lawrence Weston (74.3 per 100,000). The lowest rate has been observed in Clifton Down (10 per 100,000). For purposes of comparison, the Bristol average was 40 per 100,000 in the same period¹⁶.

Looking at cardiovascular disease, premature deaths are higher for men than for women. Rates for both men and women have been declining nationally and locally since 2001, however this decline appears to have slowed over recent years (see *Figure 4*)¹⁷. The under 75 mortality rate from cardiovascular diseases in Bristol was 74.5 per 100,000 population in the period of 3 years 2017-2019, similar to the England average of 70.4¹⁸.

Figure 3: Premature mortality caused by respiratory disease.



These local figures closely mirror the national pattern, which reflects a plateauing in improvements in heart disease mortality¹⁹. It is likely that a local and national increase in diabetes prevalence²⁰ is contributing to this plateau, as having diabetes doubles an individual's risk of developing cardiovascular disease²¹. This is influenced by a range of individual factors, such as healthy weight, smoking, being inactive, and excessive alcohol intake, with these factors being shaped by environmental influences such as access to healthy affordable food, safe places to exercise and exposure to poverty and social stress. These factors all contribute towards cardiovascular disease risk and, as became apparent during COVID-19, meant that some groups and communities were therefore also more at risk from COVID-19²².

Similar to the geographical distribution of respiratory disease discussed above, variation in cardiovascular mortality rates across the city shows the North & West (inner) locality rates are significantly lower than the Bristol average (see *Figure 5*)²³.

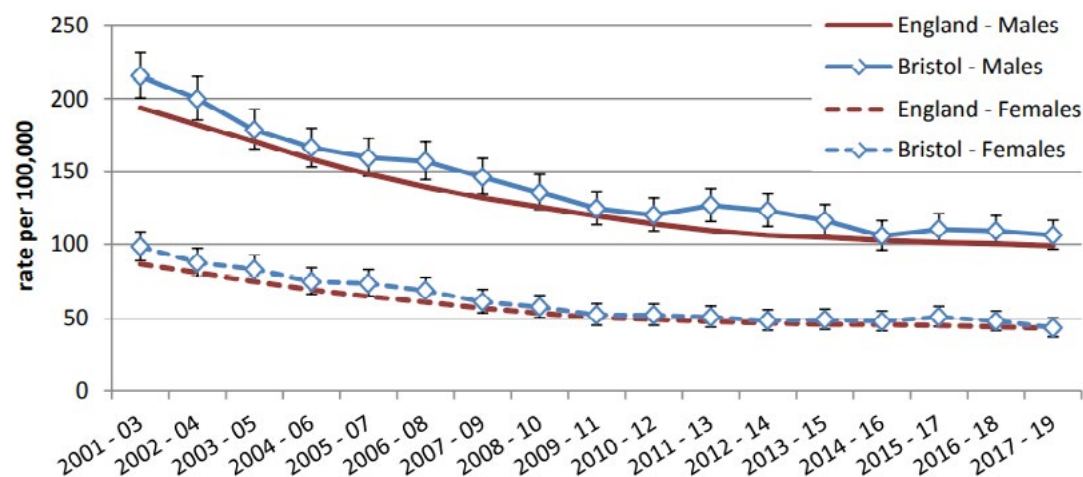


Figure 4: Under 75 mortality rate from cardiovascular diseases, by gender, for Bristol and England average

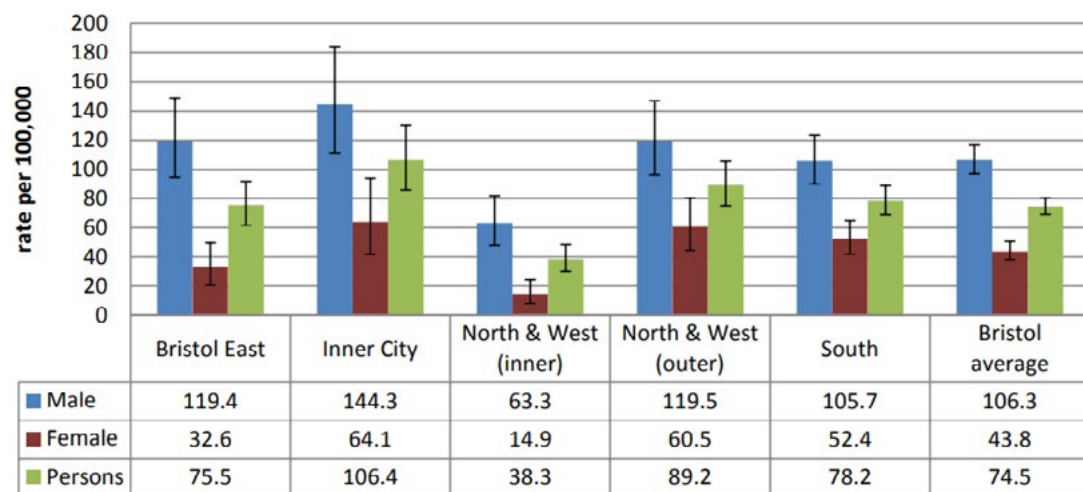


Figure 5: Under 75 mortality rate from all cardiovascular diseases

The role of vaccination

Influenza, or 'flu', is a contagious respiratory illness caused by influenza viruses that infect the nose, throat, and sometimes the lungs. It can cause mild to severe illness, and at times can lead to death. The proportion of deaths from flu and pneumonia (a common complication from flu) varies from year to year but is responsible for nearly 200 deaths on average in Bristol each year²⁴. Flu infections were considerably reduced over the past year, with COVID-19 prevention action like lockdowns and social distancing also being effective in preventing the spread of flu. An increase in flu infections is expected over the winter of 2021-22 as we face a winter without the same level of COVID-19 restrictions.

Annual flu vaccination programmes are the main protective action against influenza. The vaccine programme focuses on the over 50's because of an increased infection risk with age (previously over 65's but this has been lowered due to COVID-19), pregnant women, those who have immune-suppressing or long-term conditions, and primary-aged children. Bristol's vaccination coverage for 2019 – 20 in over 65's was 74%. This is below the national ambition of 75% but above the all-England rate of 72.4²⁵. The rate of vaccination amongst primary-aged children in Bristol over the same

time period is 51.9%, which is significantly lower than the England average of 60.4%. A contributory factor to this low uptake may be that the trans nasal version contains porcine gelatine. The introduction of a new injectable vaccine for children with no porcine content should support greater uptake in this age group. The proportion of under 65-year-olds with a long-term condition who received the flu jab in 2019-20 was 46%, slightly better than the England average of 44.9%.

Since March 2020 when community infections began to be recorded, up to August 2021, there have been a total of 52,106 cases of COVID-19 in Bristol. Within 12 months of COVID-19 being identified for the first time, effective vaccines have been developed. These vaccines appear to both protect individuals against COVID-19 and reduce the spread of the disease. Global vaccination is the single most important protection we can hope to have against this disease. The COVID-19 vaccine is a significant breakthrough in our fight against the virus, which affected our way of living so profoundly in 2020.

The importance of the COVID-19 vaccination is a reminder of the importance of our routine immunisation programmes. The UK

has a highly effective routine immunisation programme, which, amongst other illnesses, protects us against potentially fatal respiratory diseases including whooping cough, pneumococcal disease, the flu and now COVID-19. These vaccinations start conferring their benefits in the womb and it is routine now for infants and young people to receive lifelong protection against potentially fatal illnesses.

Each of these programmes protects both the individual and society. Measles is a highly infectious disease seen mainly in children, that used to be a killer disease. These days, thanks to the vaccination programme, outbreaks are rare and can usually be quickly contained.

Nevertheless, as with patterns of disease, patterns of vaccination uptake are also uneven, and this can be a contributing factor towards health inequalities. For this reason, the Bristol Health and Wellbeing Board has chosen to focus on improving vaccination uptake this year as a key action to reduce inequality in health.

Smoking

Tobacco smoking remains the single largest cause of preventable ill health and premature death, the largest driver of inequalities in health, and the leading modifiable risk factor for poor pregnancy outcomes²⁶. Over the last year we have seen smoking contribute to increased risk of COVID-19 and COVID-19 complications, contributing to inequality in terms of COVID-19-related disease. It includes smoking cigarettes, hand rolled tobacco, shisha, or any other means of burning and

inhaling tobacco smoke²⁷. Half of all life-long smokers will die from a smoking-related illness, notably lung cancer, chronic obstructive pulmonary disease or cardiovascular disease. On average, smokers die 10 years younger than non-smokers. Smoking prevalence in Bristol is around 18% of the population, which equates to a staggering 66,000 people. This is significantly higher than the England average of 13.9% and the joint second highest rate of the Core Cities in England.

The number of smokers in Bristol had been steadily declining from a high of 21% in 2011 to 16.3% in 2018 (the proportion of people smoking in that year). Nevertheless, recent data indicates that smoking in Bristol is increasing again²⁸.

While the overall prevalence of smoking has declined, it has left big inequalities. There is wide variation between wards in the proportion of households with a smoker and with clear associations with disadvantage²⁹.

Carbon monoxide is an odourless and tasteless gas produced by burning. It is inhaled when smoking tobacco or any other substance

“there is no risk-free level of exposure to tobacco smoke, and there is no safe tobacco product³⁰”

such as cannabis, skunk or shisha. Technically it binds with the haemoglobin to form carboxyhaemoglobin and it stops oxygen from binding with the same substance and forming oxyhaemoglobin. Ultimately this results in less oxygen in the bloodstream and causes breathlessness and damage to body's organs.

As smoking prevalence has declined, inequality caused by smoking has widened, with smoking harms concentrated among more disadvantaged communities and groups. Around 1 in 4 people in routine and manual occupations smoke, compared with 1 in 10 people in managerial and professional occupations. People who are unemployed are almost twice as likely to smoke as those in work³¹. Smoking prevalence among adults with a serious mental illness is estimated to be over two and a half times the national average³².

Smoking harm to children starts in the womb. Smoking in pregnancy causes nicotine to enter the mother's blood stream, along with carbon

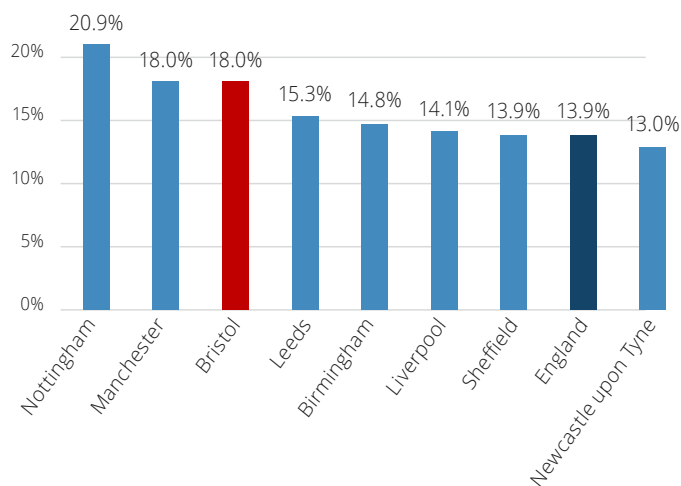


Figure 6: Estimated smoking prevalence in over 18s resident in an English Core City

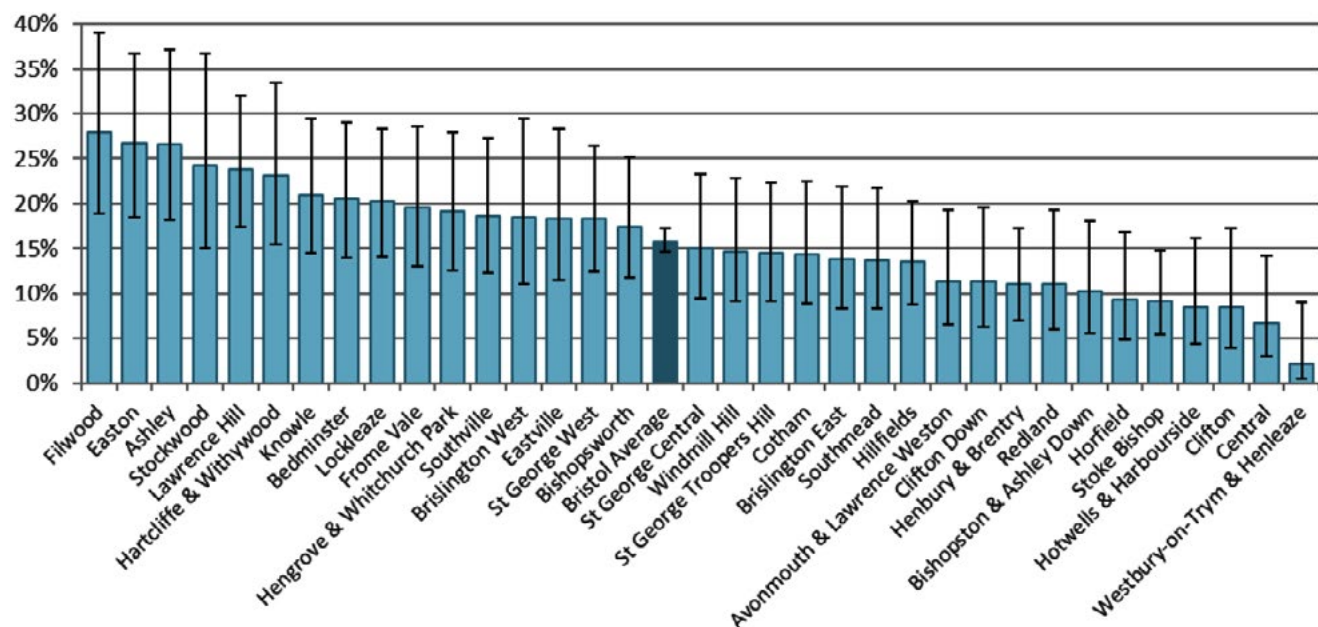


Figure 7: percentage of households with a resident smoker in Bristol (2021/21)

monoxide and thousands of other chemicals in tobacco smoke. The chemicals pass through the placenta into the developing baby. The carbon monoxide in the mother's blood stream means less oxygen available for her and the foetus. This means the baby's heart must work harder, damaging the growth and development of the baby and leaving it at increased risk of foetal growth restriction, higher risk of miscarriage, stillbirth, perinatal morbidity and

perinatal mortality³³. In Bristol, approximately 9.6% (equating to 535 women in 2019/20) of pregnant women smoke during pregnancy. While slightly lower than the England average of 10.4%³⁴ younger mothers and women from more disadvantaged backgrounds are most likely to smoke during pregnancy³⁵.

Smoking in the home is harmful for more than just the smoker – over 80% of cigarette smoke is invisible³⁶. Secondhand smoke irritates the

eyes and airways and for people regularly exposed, it increases the longer-term risk of multiple cancers, heart disease, stroke, and dementia³⁷. A Royal College of Physicians report³⁸ states "passive smoking is a significant cause of morbidity and mortality in babies and children." Children living with second-hand smoke are more likely to develop chest infections, asthma, ear infections, childhood cancers and are at increased risk of sudden infant death syndrome (cot death)³⁹. Children from families where smoking is common are three times more likely to start smoking⁴⁰, which due to nicotine being highly addictive will impact on their lives as adults⁴¹.

Since the first appearance of e-cigarettes in the UK, there has been debate and controversy in public health and respiratory medicine⁴², about their use as a substitute for smoking. Cochrane Reviews of studies into e-cigarettes from 2014 to 2020⁴³ conclude the evidence is growing that "electronic cigarettes may help smokers stop their smoking". Studies included in the reviews "did not find any serious side effects associated with their use for up to two years." PHE continues to monitor and report on the evidence and usage of vape devices. It concludes that vaping is 95% less harmful than smoking^{44, 45}.

Exercise

It was not by chance that daily exercise was permitted during COVID-19 lockdowns. Physical activity has an important positive impact on health, particularly the health of the cardiorespiratory system. Physical activity has been described as ‘the best medicine’. Any physical activity is better than none. Just ten minutes of moderate physical activity can provide health benefits both physically and

to our mental health. Guidelines from the UK Chief Medical Officer in 2019⁴⁶ recommend that each week adults should accumulate at least 150 minutes (2 1/2 hours) of moderate intensity activity (such as brisk walking or cycling); or 75 minutes of vigorous intensity activity (such as running); or even shorter durations of very vigorous intensity activity (such as sprinting or stair climbing); or any combination of moderate, vigorous and very vigorous intensity activity.

Unfortunately for people with lung disease who have lost some of their lung capacity, this is usually irreversible. However, improving fitness can help to make lungs better able to transport oxygen around the body and help to reduce breathlessness⁴⁷. All people with lung disease can benefit from becoming more active, even if it starts with a few more steps each day. Anyone with concerns about their ability to become more active, such as those with a pre-existing condition, should consult their general practitioner before making any changes. Figure 8 shows how being active can help people to improve their lung function⁴⁸.

There are over twenty chronic conditions which physical activity can help prevent and manage, as shown overleaf⁴⁹.

In England, 17.4% of the population are inactive⁵⁰ - that is not doing any physical activity at all- and, although levels of inactivity in Bristol compare favourably to national figures, inequalities exist across different Bristol populations. There are lower levels of activity in the most deprived areas, amongst teenage girls and women compared to teenage boys and men, Black, Asian and Minority Ethnic groups, disabled people and those of an older age. The graph below is from the Bristol Quality of Life Survey data



Figure 8: ‘How will being active affect my breathing?’ British Lung Foundation, 2021

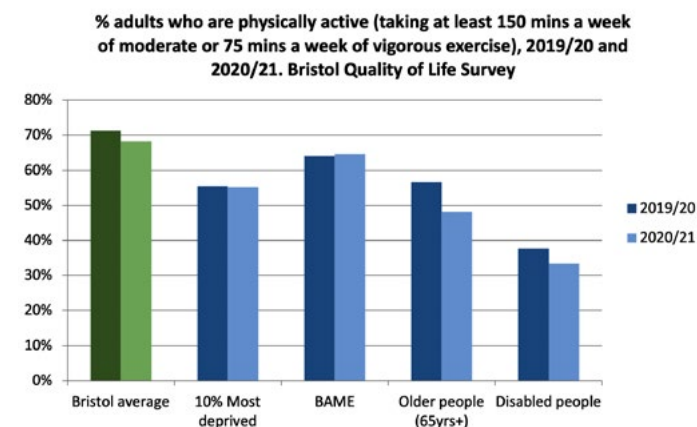
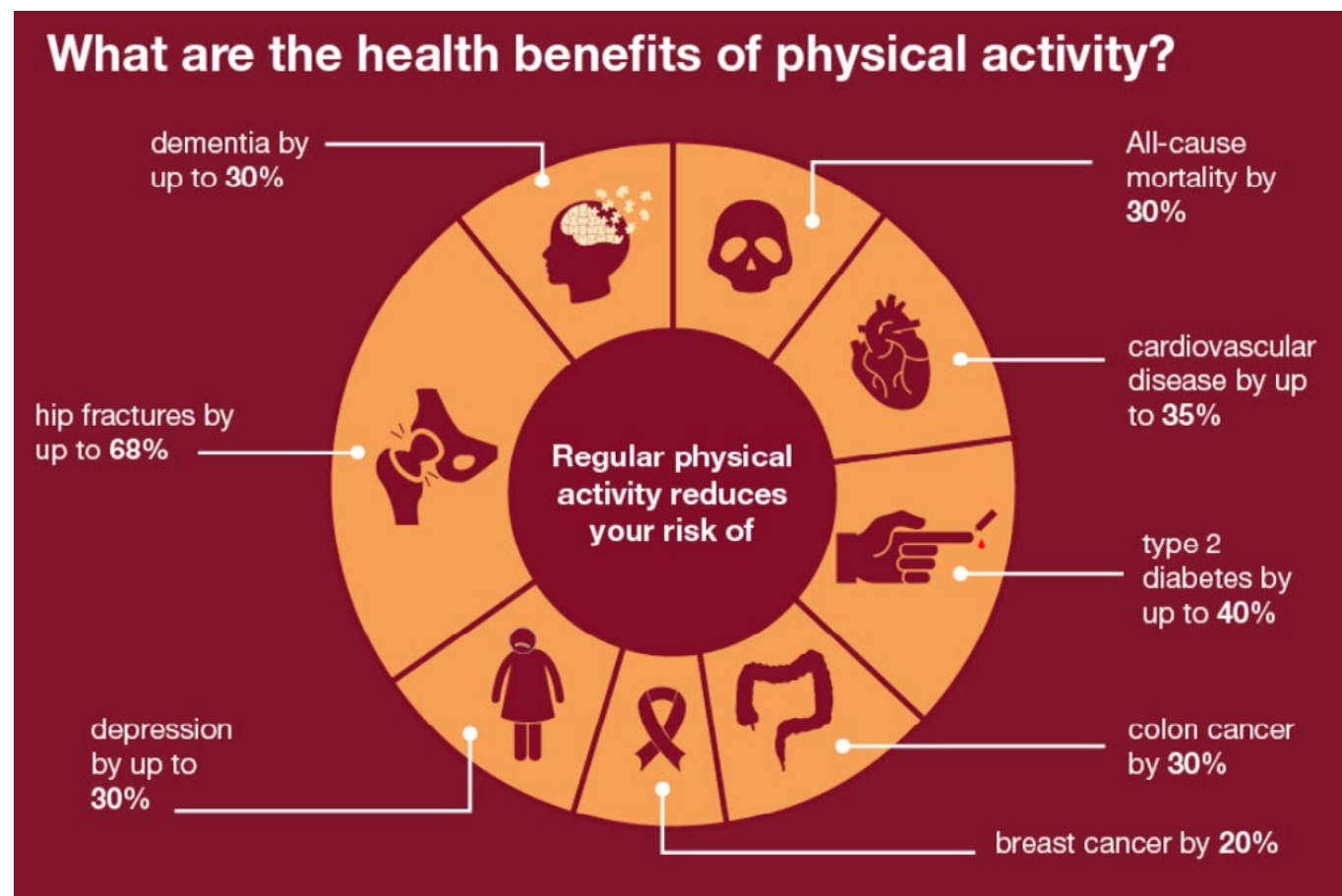


Figure 9: The percentage of adults who are physically active (taking at least 150 minutes per week of moderate or 75 minutes a week of vigorous exercise), 2019/20 and 2021/21.

for 2019/20 and 2020/21⁵¹. It shows the self-reported levels of physical activity in the different populations, clearly showing the lower levels of activity in the 10 most deprived wards of the city, and among Black Asian and Minority Ethnic populations, older people, and disabled people.

This illustrates the importance of creating safe places and spaces including gender-friendly environments and community-led activity to support everyone to be active. Unhealthy weight is a further risk factor in relation to complications from COVID-19 and other diseases. Healthy weight requires good levels of physical activity combined with healthy balanced food intake. Being active and eating healthily contribute to good physical and mental wellbeing.

In 2021 Bristol was the second city in the UK to be granted the status of Gold Sustainable Food City. This award recognises the collaborative work undertaken across the city by a multitude of organisations, businesses, and individuals including Bristol City Council to build a healthy, sustainable and equitable food system across the city. The work to achieve this accolade focusses on themes of reducing food waste, community action, growing



Bristol's good food movement, buying better, urban growing, eating better and food equality: [It's Gold for Bristol! #BristolGoldFoodCity \(GoingforGoldBristol.co.uk\).](#)

Indoors

We have all become aware of the importance of our indoor environments over the past year as we have spent more time in our homes due to the COVID-19 situation and, as we have moved to greater social mixing, we have all become aware of the importance and challenges of ventilation.

The Royal College of Paediatrics and Child Health (2020) has produced a comprehensive report into indoor air quality and specifically its effects on children⁵² which describes how children are at an increased risk of multiple cardiovascular and respiratory illnesses as a result of exposure to indoor air pollution.

“Pollutants from indoor sources can become trapped and reach high levels in under-ventilated rooms. Children spend many hours a day in their homes, and classrooms, so even low levels of pollution can contribute to accumulating exposure⁵³”

Ventilation in homes is important, not just to get rid of cooking odours and other unwanted smells, but more importantly to help get rid of indoor pollutants and moisture. Modern housing is increasingly built to be airtight and energy efficient which has many advantages but does also risk pollutants building up inside the home due to a lack of ventilation⁵⁴. Moisture can be generated from drying laundry and cooking or by dampness in the house itself. Condensation also forms within houses as the outside temperature falls, meaning it can be more noticeable in the winter. Without adequate ventilation this can lead to mould and fungal spores forming. Regardless of the cause, exposure to mould can cause health problems particularly for people with breathing conditions.

Ventilation doesn't work for tobacco smoke; neither does opening a door or window. While it reduces the smell of smoke, it does little to remove the harmful chemicals and

smoke particles from a room, leaving plenty behind to harm adults, children, and our pets too⁵⁵. To avoid the health risks from smoke indoors, remove the smoke completely by asking smokers to smoke outside, ideally at least seven steps away from the house so that smoke doesn't linger in entrances or drift back inside.

How homes are heated also has an impact on the amount of air pollution inside. Solid fuel burning in homes, such as open fire and wood burning stoves, release particulate matter (PM). The health effects of inhaled particulate matter are increasingly well evidenced⁵⁶ with impacts varying from exposure over a few hours to longer term exposure over several years. The health impact includes respiratory and cardiovascular illness, increased mortality from cardiovascular and respiratory diseases and lung cancer. Particulate matter is a particular risk to children, the elderly and anyone with pre-existing diseases and breathing difficulties⁵⁷. The build-up of these

particulates and gasses can be reduced by using an extractor fan to ventilate the space. Boilers, wood burning stoves and open fires, gas fires and cooking appliances, particularly gas cookers, should be regularly maintained by a qualified engineer to ensure they are compliant and safe.

Maintaining a clean home is generally a good thing, but people living with lung conditions may find that some household cleaning sprays, air fresheners or DIY products like glues and varnishes trigger their symptoms. There are chemicals in lots of household cleaning products that are known as Volatile Organic Compounds (VOCs) as well as bleach or ammonia, which can have a negative impact on lung function and may be linked to allergies and asthma⁵⁸. VOCs “are organic chemicals that have a significant vapour pressure at room temperature. If they are allowed to build up in the air, they can harm human health or damage the environment.”⁵⁹ VOCs are a particular issue in industrial uses; however, they are also given off indoors by household products and personal care

products that we use all the time. This means that indoor concentrations can be up to seven times higher than outdoors^{60, 61}.

Asbestos can be found in older buildings in decorative coatings on ceilings and walls, such as Artex; in linings for walls, ceilings and duct panels, insulation in some electric night storage heaters, bath panels, floor tiles and adhesive, and boarding around fireplaces. Asbestos is not dangerous until it is disturbed, typically occurring during building work, including DIY, which can then allow fine asbestos particles to be released into the air. Once in the air, asbestos fibres can be inhaled. It is breathing it in over a long period of time that can cause respiratory disease such as asbestosis⁶². Asbestos at home or in a workplace is subject to health and safety regulations. There is more information at the [Asbestos Information Centre \(aic.org.uk\)](http://aic.org.uk). Any Bristol resident concerned about asbestos in the home can seek advice from Bristol City Council: [Asbestos \(bristol.gov.uk\)](http://bristol.gov.uk).

Being cold makes it harder for our bodies to fight off infection, and many manageable lung

diseases, coughs and colds can become much worse as a result⁶³. People with lung diseases need to be especially careful to wrap up warm when going outside in cold weather, or even avoid going outside at all when the weather is at its worst. Homes need to be heated to at least 18 degrees⁶⁴.

The ability to heat our homes is a factor which exacerbates health inequalities. Not only are those with less wealth and home security more at risk of contracting lung diseases and respiratory infections, they are also more likely to live in cold homes. There is more information about this on the Public Health England Matters page: [How your body copes with cold weather – Public health matters \(blog.gov.uk\)](http://blog.gov.uk).

For those struggling to pay their heating bills, advice on how to access help with bills is available from the [Citizen's Advice Bureau \(bristolcab.org.uk\)](http://bristolcab.org.uk) or the Warmer Homes, Advice and Money programme: [WHAM – Warmer Homes, Advice & Money | Centre for Sustainable Energy \(cse.org.uk\)](http://cse.org.uk).

Outdoors

Outdoor air pollution comes from a number of sources including industry, weather systems, solid fuel burning and vehicle emissions⁶⁵.

In 2019, 5.0%⁶⁶ of all adult deaths in Bristol were attributable to Anthropogenic PM2.5 pollution. Anthropogenic PM2.5 pollution refers to tiny airborne particles (smaller than 2.5µm) of pollution created by human activity. This figure is essentially the same as the national average proportion of deaths which is 5.1%⁶⁷. However, when the air pollutant nitrogen dioxide (NO₂) is included in these calculations, the proportion of attributable deaths rises to 8.5%⁶⁸.

Bristol City Council monitors the key pollutants affecting public health in the city - namely nitrogen dioxide and particulates. This data directly informs local action to reduce air pollution. Data on air quality is published here: [Air Quality Dashboard \(opendata.bristol.gov.uk\)](https://opendata.bristol.gov.uk).

In locations that exceed the nitrogen dioxide air quality objectives in Bristol, over 80% of pollution has been shown to be from local traffic sources. There was a positive impact on pollution during the COVID-19 lockdowns with the annual mean NOx pollution at one

of central Bristol's air quality monitoring sites 28% lower in 2020 than it was in 2019. This effect was most likely to reduced vehicle usage during the lockdown periods.

The term "NOx" is used to describe a mixture of gases known as oxides of nitrogen, including NO₂. A 2017 study into the proportion of nitrogen oxide (NOx) emissions from vehicles calculated that 96% of all NOx emissions from vehicles come from diesels, with diesel cars (40%), buses and coaches (23%) and diesel Light Goods Vehicles (22%) being the largest contributors⁶⁹, with diesel emissions

accounting for the highest level of harm from small particles. In response to this data, action by Bristol City Council and the West of England Authority is focused on reducing pollutants from traffic.

It is this evidence which has informed the councils CAZ [Bristol's Clean Air Zone \(CAZ\) \(bristol.gov.uk\)](https://bristol.gov.uk) proposals which will include action to reduce vehicular pollution within the city centre.

Other sources of air pollution include combustion processes like wood burning stoves, and household gas and electricity production. There is also some contribution from industrial, agricultural, and natural processes⁷⁰.

Solid fuel burning of wood and coal also releases particulate matter which, as well as contributing to overall air pollution, has well documented health effects through short and long term exposure. These include increased respiratory and cardiovascular disease morbidity and mortality⁷¹. Under the Clean Air Act of 1993, the whole of Bristol is a smoke control area. In 2020 Bristol City Council commissioned a study to better understand the scale of solid fuel burning in the city and

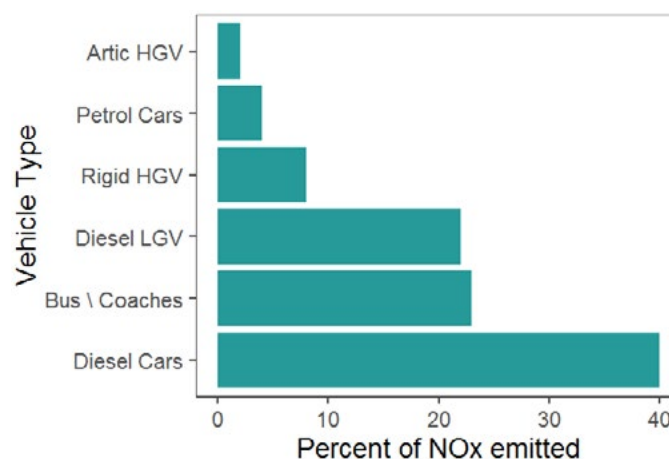


Figure 10: The percentage of NOx emitted by vehicle type.

the contribution that it has towards particulate pollution. The study identified that solid fuel burning represents approximately a third of PM10 and half of all PM2.5 emissions in Bristol and sets out a range of policy options for consideration. The report is available on the Bristol City Council web site here: [Impacts of Solid Fuel Burning in Bristol: Policy Options for Reducing Emissions \(bristol.gov.uk\)](https://www.bristol.gov.uk/reports-and-accounts/2019-2020/impacts-of-solid-fuel-burning-in-bristol-policy-options-for-reducing-emissions). The council continues to run a campaign called "Slow the Smoke" to encourage behaviour change around solid fuel burning. A recent successful bid to government under this theme will fund a project to research effective engagement with communities to further reduce emissions from solid fuel burning.

An Air Quality Management Area (AQMA) was declared in Bristol in 2003. It includes all the locations in Bristol within which air quality objectives are not being met. *Figure 11* shows the boundary of the AQMA where additional monitoring and action is undertaken. Approximately 100,000 people live within this AQMA.

The positive news on air quality is that people are already upgrading to cleaner vehicles across the city region, the introduction of the [Clean Air Zone \(cleanairforbristol.org\)](https://cleanairforbristol.org), additional interventions following Covid, changing travel habits and the financial support to help people upgrade their vehicle or switch to cleaner ways of travelling is speeding up this process. In addition, action on solid fuel burning and work to ensure that new homes are clean and green will also support improved air quality in our city.

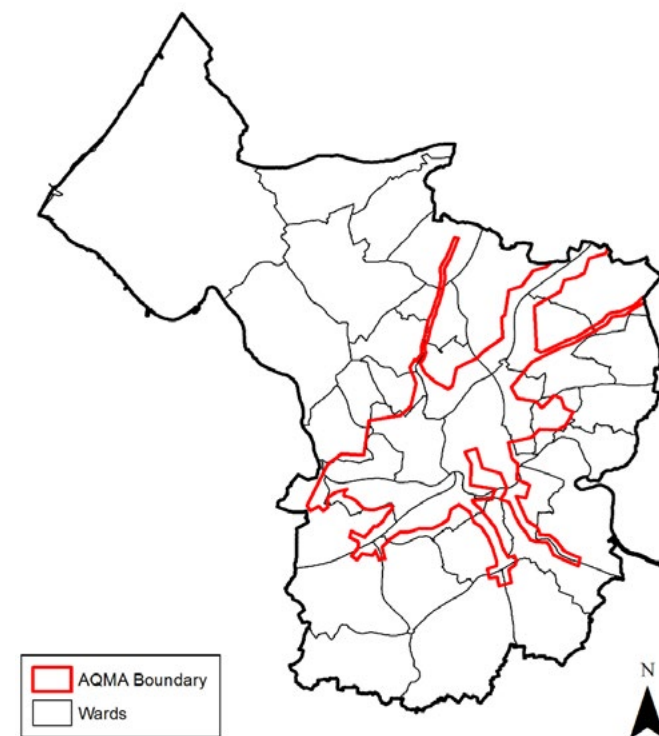


Figure 11: Air Quality Management Area for Bristol.

Green and active spaces and places

We discovered the joy and importance of our green spaces during COVID-19. Bristol residents have access to 1,500 hectares of freely available green spaces across our city⁷². From the Downs to parks and gardens, natural green space and our trees and hedges lining many of our roads, Bristol owns an abundance of green space. Evidence suggests that access to these green spaces is good for both our physical and mental wellbeing⁷³.



In 2020, 79% of Bristol residents said that they were happy with the quality of parks and green spaces in Bristol; an increase from 68% in 2018⁷⁴. The same survey showed that 60% of Bristol households visit a park or green space at least once a week. During the restrictions of the COVID-19 pandemic, more of us have come to appreciate the importance of these spaces and value them as a place to exercise, play and relax.

People need safe places to be active and to take exercise. However, the availability of green space and the quality of that green space is unevenly distributed across Bristol, with central and eastern areas having fewer opportunities to access high quality green space. This is being addressed as part of Bristol City Council's Parks and Green Space strategy⁷⁵ which aims to ensure that all Bristol residents have access to "formal, informal, natural, sports and children & young people's spaces".

Bristol is the home of Sustrans, the national cycling network, which has undertaken so much work to create safe cycleways across the country. Cycling is increasing in popularity

in Bristol. The city has many cycle paths and seventy-five miles of cycle routes, and online route planning makes it easy to plan your route. As a direct result of the changes in travel patterns during the COVID-19 pandemic, more dedicated cycle lanes have been created across the city centre. These are used by both cyclists and the new electronic scooters, which also support active and sustainable travel. There is a scheme run by [Loan a bike scheme \(BetterByBike.info\)](#) whereby residents may borrow an e-bike, folding or regular bike to experiment with cycling. Local cycle events are held across the city to enable people to exercise, socialise and have fun while cycling. Information on cycling can be found on [Cycling in Bristol \(BristolActiveCity.org.uk\)](#). Better by Bike is the Official cycling website for Bristol, Bath & NE Somerset, North Somerset, and South Gloucestershire.

Enabling children to be able to play outside is important for their physical and mental health and well-being. In many areas, where people don't have gardens or easy access to a green space nearby, this means playing in the street. However, the car has claimed our

streets for travel and parking which makes them less safe for play, from both traffic and air quality perspectives.

A School Streets pilot scheme was launched in February 2020, at two Bristol primary schools. The aim of School Streets is to turn roads outside schools into pedestrian and cyclist priority zones directly before and after the school day, making them safer in terms of congestion and air quality. Although the pilot was put on hold because of the impact of COVID-19, it has restarted and will inform roll-out at other schools in Bristol.

Playing Out is a UK-wide resident led street play organisation which originated, and is based, in Bristol. Bristol City Council have since developed a supporting policy which allows residents to apply for a Temporary Play Street Order (TPSO) which closes a street to traffic so children can play. This can be for once a week for up to three hours. **Playing out (bristol.gov.uk)**. In addition, Bristol City Council actively encourages applications for temporary street closures for neighbourhood community events and street parties. These initiatives reclaim public space, support people being active, reduce car use, and encourage neighbourliness, all of which support health and wellbeing.

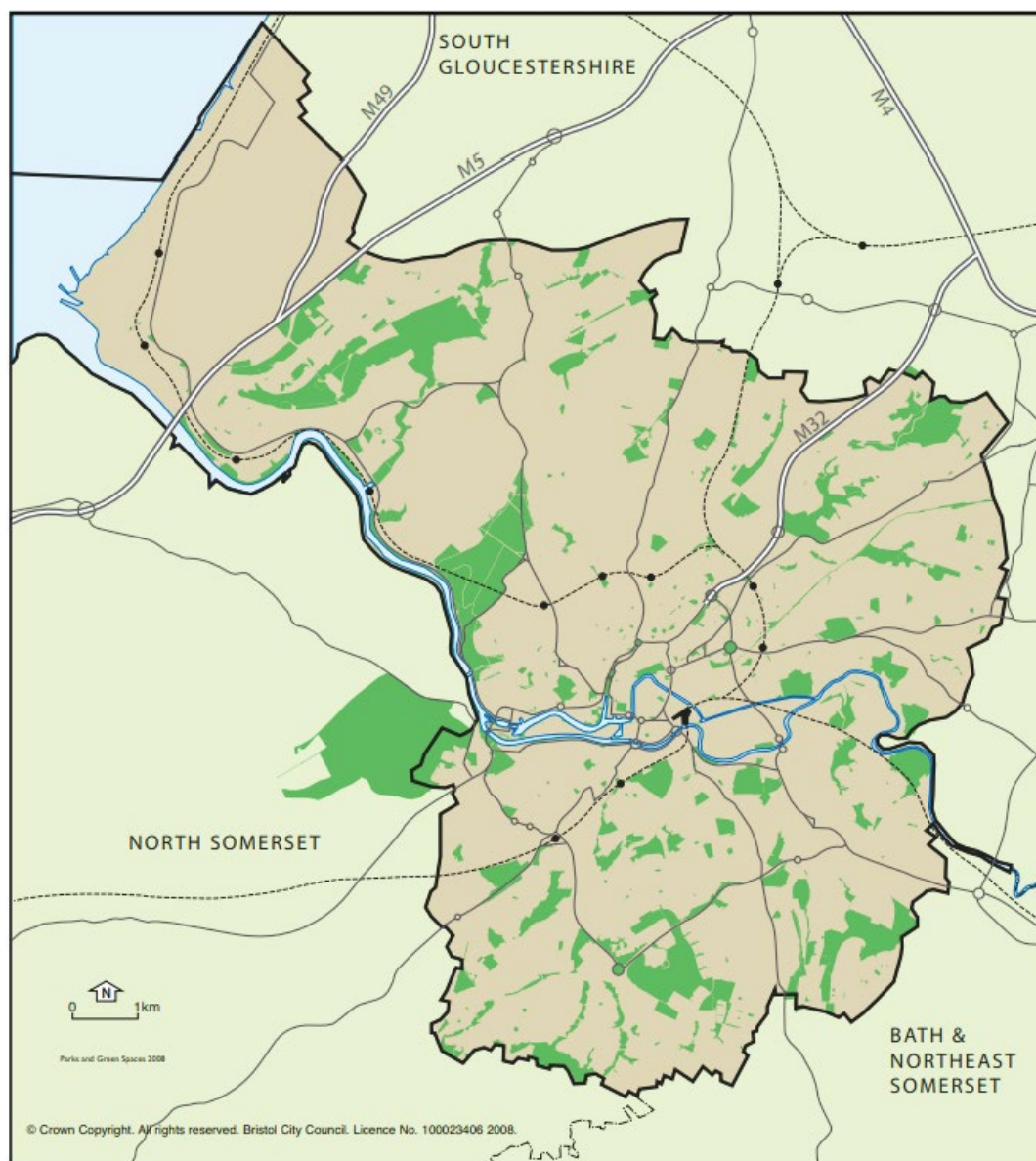


Figure 12: Map showing Bristol's primary green space.

Public policy, both local and national, creates the conditions within which healthy choices can be made and health inequalities are both exposed and addressed. Many commentators have written about the unintended consequences of policy. Health policy for example has been largely successful at improving population health overall. Life expectancy has increased significantly. However, at the same time, the gap between the healthiest and least healthy has widened and the number of years lived in poor health has increased.

National Stop Smoking policy has been incredibly effective in reducing smoking rates in the general population⁷⁶. The challenge now is to understand and reduce the harms from smoking within the most vulnerable communities and high-need neighbourhoods in Bristol.

As policy is framed and implemented, the impacts on inequality need to be carefully assessed, and action identified to build health into the city fabric and infrastructure. For example, ensuring homes are built and future

proofed to good homes standards and for maximum sustainability; and that action to improve air quality benefits those most at risk and mitigates any impacts on people on low incomes.

The council does not make policy and strategy alone, but with partners; most notably the One City partners who have signed up to the One City Plan⁷⁷, the West of England Combined Authority and with central government.

The One City Climate Strategy⁷⁸, supported by all city partners, sets out a framework which will support Bristol become carbon neutral and climate resilient by 2030. The strategy includes goals to help Bristol residents switch to significantly more walking, cycling and zero-carbon public transport modes; convert the remaining vehicles to zero carbon fuels; and to transforming freight, aviation, and shipping.

ClairCity was a four-year project (2016-2020) that worked directly with citizens and local authorities in Bristol and five other sites in Europe. ClairCity looked at how the behaviour

and everyday activities of people contributes to air pollution rather than attributing it to the technology emitting pollution. The project worked with Bristol residents to identify future policies that they support to achieve a clean air low carbon future for the city. The most popular policy measures identified and supported by citizens included banning/phasing out the most polluting vehicles (not just charging vehicles); making buses greener and cleaner; making public transport cheaper, and creating good alternatives to car use through the reallocation of road space in favour of public transport, walking and cycling.

A range of further interventions are planned as specific projects or as part of wider transport planning in the city and region. The Bristol Transport Strategy adopted in July 2019 sets out a vision which includes an ambition to 'create healthy places that promote active transport, improve air quality and improve road safety', and to reduce carbon emissions. The TravelWest Joint Local Transport Plan 2020-2036⁷⁹ was published in March 2020. This sets out the West of England Combined

Authority (WECA) region's transport vision through to 2036. This includes commitments to ensure transport is carbon neutral by 2030 and to address poor air quality. This plan supports the Bristol One City Plan ambitions to help residents undertake this 'modal shift' by implementing new mass public transport networks.

The UK has legal limits for pollution and the Government has directed Bristol City Council to implement a range of measures including a Clean Air Zone (CAZ) to ensure Bristol meets those limits within the shortest possible time. In February 2021 the council's cabinet approved the Full Business Case for the CAZ and submitted it to Government. Up to date information about the Clean Air Zone (CAZ) can be found here: [Bristol's Clean Air Zone \(CAZ\) \(bristol.gov.uk\)](https://bristol.gov.uk/clean-air-zone).

The [Bristol One City Plan \(BristolOneCity.com\)](https://bristolonecity.com) includes several ambitions, some of which are listed below, which directly address issues of lung health and air quality.



Goal 18

2021

Clean Air Zone progressed with proportional supporting measures to encourage a reduction in traffic entering the city, allowing businesses and residents to adapt and the start of improved air quality.



Goal 35

2022

An increase in short walking and cycling journeys benefits residents' health and wellbeing and contributes to improved community resilience, a thriving local economy and reduced transport emissions, resulting in more liveable neighbourhoods.



Goal 36

2022

There is an increase in the number of people using sustainable modes of transport to travel across the city, due to the implementation of a long-term behaviour change programme.



Goal 101

2026

Vaccination uptake continues to be maximised in communities experiencing inequalities in health.



Goal 154

2029

By 2029 across all communities in Bristol, it will be the norm for no pregnant woman to smoke and for all pregnant women to live in a smoke-free home.



Goal 462

2046

By 2046 fewer than 3% of people in the city smoke.

As we look to build back better following COVID-19 we have opportunities to shape our city, to take action to improve lung health and to reduce the inequalities which make people vulnerable to disease.

Bristol has challenges in terms of smoking prevalence, traffic related air pollution and entrenched and persistent health inequality. However, Bristol also has many assets; in its green space, creativity, ingenuity, problem solving ability, expertise, design, and above all, its young people who believe passionately in the creation of a better, fairer world.

For all these reasons, this Annual Report does not sit within, nor speak to a vacuum, but rather reflects, amplifies and extends the thinking, ambitions, and work of many people.

In summary, and from the broad perspective that this report has taken, seven specific areas are presented as opportunities for action to support Bristol to become a healthier city.

Mind the Gap: We can make sure that the impacts of all and any policy action address the gap in health inequality and do not inadvertently make this worse.

Fairer Bristol: We can take action to address poverty, building bridges to education and work; tackling digital exclusion, promoting food equality and supporting our businesses to recover sustainably.

Smokefree Bristol: We can take targeted action to reduce harms from smoking, addressing inequalities and focussing particularly where it will impact on children.

Active Bristol: We can support everyone to be active, by creating opportunities for equitable access to active travel, play, recreation, and sport.

Green Bristol: We can maintain and protect our green spaces in the widest sense, supporting growing, community and window gardens, as well as larger open spaces.

Vaccinated Bristol: We can support Bristol's Health and Wellbeing Board to deliver its ambition to reduce inequality in vaccination coverage for all routine immunisation programmes, which protect, amongst other illnesses, against potentially fatal respiratory diseases including whooping cough, pneumococcal disease and the flu and now COVID-19.

Healthy Homes: We can raise awareness and support policy action to reduce fuel poverty, reduce the harms from indoor pollutants, ensure that homes are heat proofed and that air pollution from domestic sources is minimised.

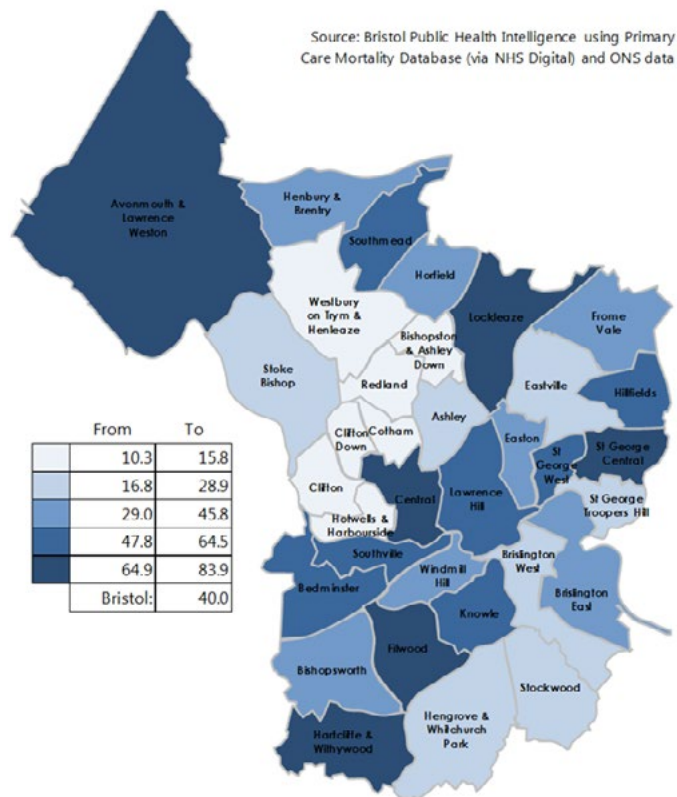
Healthy Workplaces: We can raise awareness and support policy action to reduce harm from pollutants at work and we can support business to engage with the One City Sustainability Agenda, reducing carbon emissions and promoting active lifestyles.

Improving air quality: We can support the implementation of Bristol's Clean Air Plans, Bristol's transport plans and Bristol's Climate Strategy.

APPENDICES

Appendix 1

Premature mortality caused by respiratory disease. Age standardised rates per 100,000 population. Bristol wards 2015-19



Appendix 2

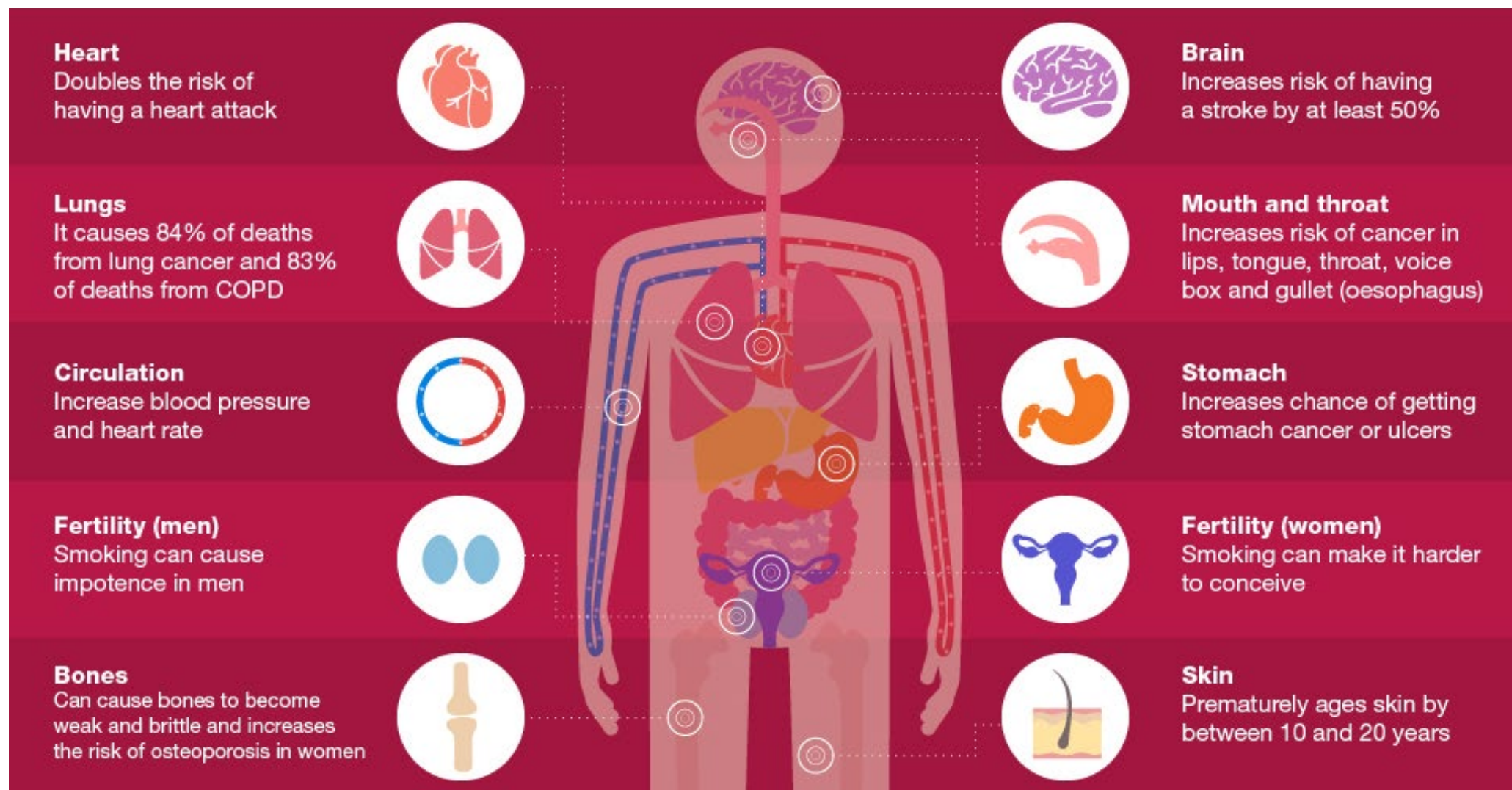
Stop Smoking Services

Support to stop is important for some smokers who find it difficult to quit on their own. Bristol has a successful Targeted Support to Stop Smoking Service which delivers specialist, non-judgmental, free smoking cessation support for pregnant women and their immediate family. We also offer free smoking cessation support to our residents who are living with long term conditions or who have a significant long-term mental health diagnosis and to those referred through the NHS Health Check.

There is information on the Bristol City Council website about how to access our digital service which provides expert advice, guidance on stop smoking aids such as medicines and e-cigarettes, and support plans tailored to you. [Support to stop smoking \(bristol.gov.uk\)](https://www.bristol.gov.uk/stop-smoking). There is also a link to our commissioned provider of Targeted Support to Stop, [Everyone Health](https://www.everyonehealth.co.uk/). They offer face to face and telephone support to stop smoking with behaviour change support and medications for people with long term conditions made worse by smoking, as well as pregnant smokers and people referred through the NHS Health Check and the Serious Mental Illness annual health check.

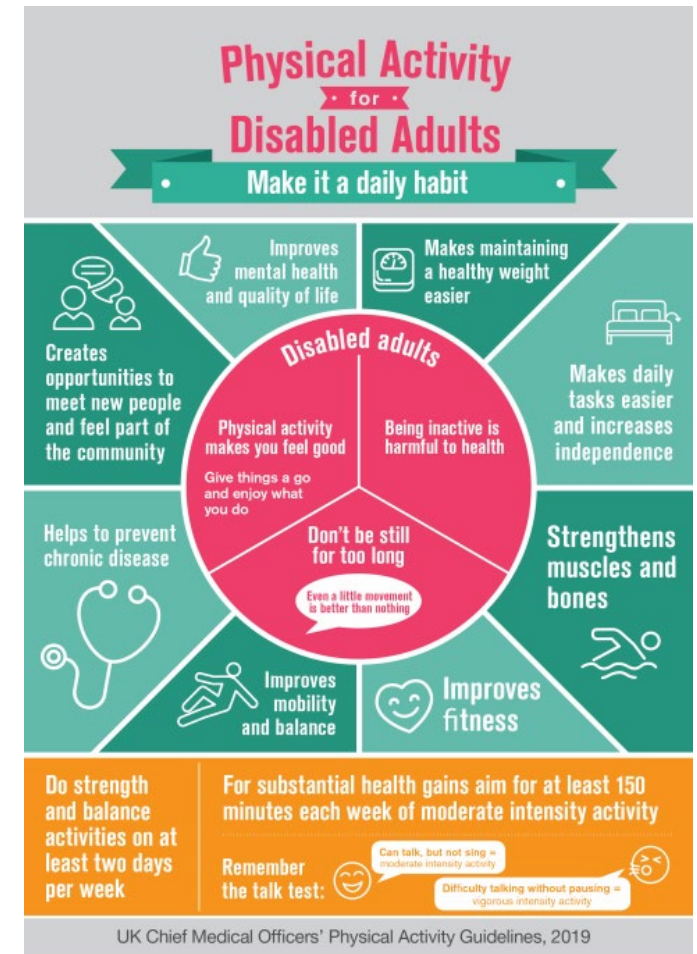
Appendix 3

How smoking harms the body



Appendix 4

Recommended levels of Physical Activity



Figures 13-14: UK Chief Medical Officers' Physical Activity Guidelines (publishing.service.gov.uk)

REFERENCES

- 1 [Healthier Weight Declaration Evidence Briefing \(foodactive.org.uk\)](https://www.foodactive.org.uk/healthier-weight-declaration-evidence-briefing)
- 2 [Changes over 15 years in the contribution of adiposity and smoking to deaths in England and Scotland | BMC Public Health \(biomedcentral.com\)](https://www.biomedcentral.com/bmcpublichealth/article/15/1/1)
- 3 [Breathing exercises for stress – NHS \(www.nhs.uk\)](https://www.nhs.uk/health-exercises-for-stress)
- 4 [NHS England – Respiratory disease \(england.nhs.uk\)](https://www.england.nhs.uk/respiratory-disease)
- 5 [How your heart works – Heart and circulatory system – British Heart Foundation \(bhf.org.uk\)](https://www.bhf.org.uk/heart-and-circulatory-system)
- 6 [Cardiovascular disease - NHS \(www.nhs.uk\)](https://www.nhs.uk/heart-disease)
- 7 [Cardiovascular Disease \(CVD\) – types, causes & symptoms | British Heart Foundation \(bhf.org.uk\)](https://www.bhf.org.uk/heart-disease/cvd-types-causes-symptoms)
- 8 [Cardiovascular Disease \(CVD\) – types, causes & symptoms | British Heart Foundation \(bhf.org.uk\)](https://www.bhf.org.uk/heart-disease/cvd-types-causes-symptoms)
- 9 [Cardiovascular and respiratory disease | Cambridge Biomedical Research Centre \(nihr.ac.uk\)](https://www.nihr.ac.uk/cvdr-respiratory-disease)
- 10 [Leading causes of death, UK – Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/leading-causes-of-death)
- 11 [Adult Respiratory Disease \(bristol.gov.uk\)](https://www.bristol.gov.uk/adult-respiratory-disease)
- 12 [Mortality Profile \(PHE.org.uk\)](https://www.phe.org.uk/mortality-profile)
- 13 [Mortality Profile \(PHE.org.uk\)](https://www.phe.org.uk/mortality-profile)
- 14 [Mortality Profile \(PHE.org.uk\)](https://www.phe.org.uk/mortality-profile)
- 15 [Primary Care Mortality Database \(digital.nhs.uk\)](https://digital.nhs.uk/primary-care-mortality-database)
- 16 [Primary Care Mortality Database \(digital.nhs.uk\)](https://digital.nhs.uk/primary-care-mortality-database)
- 17 [JSNA 2020/21 - Cardiovascular Disease \(CVD\) \(bristol.gov.uk\)](https://www.bristol.gov.uk/jsna-2020-21-cardiovascular-disease-cvd)
- 18 [Public Health Profiles \(PHE.org.uk\)](https://www.phe.org.uk/public-health-profiles)
- 19 [Health matters: preventing cardiovascular disease - GOV.UK \(www.gov.uk\)](https://www.gov.uk/health-matters-preventing-cardiovascular-disease)
- 20 [National General Practice Profiles \(PHE.org.uk\)](https://www.phe.org.uk/national-general-practice-profiles)
- 21 [20181114 PHE CVD prevention initiatives, 2018 to 2019.pdf](https://www.phe.org.uk/20181114-phe-cvd-prevention-initiatives-2018-to-2019)
- 22 [Health matters: preventing cardiovascular disease - GOV.UK \(www.gov.uk\)](https://www.gov.uk/health-matters-preventing-cardiovascular-disease)
- 23 [Primary Care Mortality Database \(digital.nhs.uk\)](https://digital.nhs.uk/primary-care-mortality-database)
- 24 [Primary Care Mortality Database \(digital.nhs.uk\)](https://digital.nhs.uk/primary-care-mortality-database)
- 25 [Public Health Profiles \(PHE.org.uk\)](https://www.phe.org.uk/public-health-profiles)
- 26 [Facts at a Glance \(ash.org.uk\)](https://www.ash.org.uk/facts-at-a-glance)
- 27 [A Report of the Surgeon General; How Tobacco Smoke Causes Disease – What it means to you \(cdc.gov\)](https://www.cdc.gov/reports/2020/surgeon-general/tobacco-smoke-causes-disease/)
- 28 [Local Tobacco Control Profiles \(PHE.org.uk\)](https://www.phe.org.uk/local-tobacco-control-profiles)
- 29 [The quality of life in Bristol \(bristol.gov.uk\)](https://www.bristol.gov.uk/quality-of-life)
- 30 [How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General \(HealthyPeople.gov\)](https://www.healthypeople.gov/2020/07/how-tobacco-smoke-causes-disease-the-biology-and-behavioral-basis-for-smoking-attributable-disease-a-report-of-the-surgeon-general)
- 31 [Adult smoking habits in the UK – Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/adult-smoking-habits)
- 32 [Adult smoking habits in the UK – Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/adult-smoking-habits)
- 33 [Smoking-Reproduction.pdf \(ash.org.uk\)](https://www.ash.org.uk/smoking-reproduction)
- 34 [Local Tobacco Control Profiles \(PHE.org.uk\)](https://www.phe.org.uk/local-tobacco-control-profiles)
- 35 [Briefing Health Inequalities \(PHE.org.uk\)](https://www.phe.org.uk/briefing-health-inequalities)
- 36 [Committee on Passive Smoking – Environmental Tobacco Smoke – NCBI Bookshelf \(nih.gov\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2730862/)
- 37 [SecondhandSmoke.pdf \(ash.org.uk\)](https://www.ash.org.uk/secondhand-smoke)
- 38 [Passive smoking and children \(BMJ.com\)](https://www.bmj.com/content/323/7304/1163)
- 39 [SecondhandSmoke.pdf \(ash.org.uk\)](https://www.ash.org.uk/secondhand-smoke)
- 40 [Factsheet Youth Smoking \(ASH.org.uk\)](https://www.ash.org.uk/factsheet-youth-smoking)
- 41 [Factsheet Youth Smoking \(ASH.org.uk\)](https://www.ash.org.uk/factsheet-youth-smoking)
- 42 [E-cigarettes: controversies within the controversy \(theLancet.com\)](https://www.thelancet.com/e-cigarettes)
- 43 [Electronic cigarettes for smoking cessation – Hartmann-Boyce, J, 2020 \(CochraneLibrary.com\)](https://www.cochrane.org/e-cigarettes)
- 44 [Vaping in England: 2021 evidence update summary – GOV.UK \(www.gov.uk\)](https://www.gov.uk/vaping-in-england-2021-evidence-update-summary)

- 45 [E-cigarettes: an evidence update - GOV.UK \(www.gov.uk\)](https://www.gov.uk)
- 46 [UK Chief Medical Officers' Physical Activity Guidelines \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)
- 47 [Keeping active with a lung condition | British Lung Foundation \(blf.org.uk\)](https://blf.org.uk)
- 48 [How will being active affect my breathing? | British Lung Foundation \(blf.org.uk\)](https://blf.org.uk)
- 49 [Health matters: getting every adult active every day – GOV.UK \(www.gov.uk\)](https://www.gov.uk)
- 50 [Physical Activity – PHE](#)
- 51 [The quality of life in Bristol \(bristol.gov.uk\)](https://bristol.gov.uk)
- 52 [The inside story: Health effects of indoor air quality on children and young people \(RCPCH.ac.uk\)](https://rcpch.ac.uk)
- 53 [The inside story: Health effects of indoor air quality on children and young people \(RCPCH.ac.uk\)](https://rcpch.ac.uk)
- 54 [The inside story: Health effects of indoor air quality on children and young people | \(RCPCH.ac.uk\)](https://rcpch.ac.uk)
- 55 [Secondhand Smoke \(ash.org.uk\)](https://ash.org.uk)
- 56 [Health effects of particulate matter: Policy implications for countries in eastern Europe, Caucasus and central Asia \(euro.who.int\)](https://euro.who.int)
- 57 [Lung cancer risk and solid fuel smoke exposure: a systematic review and meta-analysis. Om Prakash Kurmi, Pallavi Huma Arya, Kin-Bong Hubert Lam, Tom Sorahan, Jon G. Ayres. European Respiratory Journal 2012 40: 1228-1237 \(erj.ersjournals.com\)](#)
- 58 [Your home and your lungs | British Lung Foundation \(blf.org.uk\)](https://blf.org.uk)
- 59 [Tony Chapman \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)
- 60 [Air quality: a briefing for directors of public health \(Local.gov.uk\)](https://local.gov.uk)
- 61 [Observations Confirm that Volatile Chemical Products Are a Major Source of Petrochemical Emissions in U.S. Cities. – Abstract \(EuropePMC.org\)](https://EuropePMC.org)
- 62 [Asbestosis – NHS \(www.nhs.uk\)](https://www.nhs.uk)
- 63 [How your body copes with cold weather – Public health matters \(blog.gov.uk\)](https://blog.gov.uk)
- 64 [Minimum temperature threshold for homes in winter \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)
- 65 [Health effects of particulate matter: Policy implications for countries in eastern Europe, Caucasus and central Asia \(www.euro.who.int\)](https://www.euro.who.int)
- 66 [Public Health Profiles \(PHE.org.uk\)](https://phe.org.uk)
- 67 [Public Health Profiles \(PHE.org.uk\)](https://phe.org.uk)
- 68 [Health Impacts of Air Pollution in Bristol \(bristol.gov.uk\)](https://bristol.gov.uk)
- 69 [2020 Air Quality Annual Status Report \(bristol.gov.uk\)](https://bristol.gov.uk)
- 70 [Public Health England. 2019. Improving outdoor air quality and health: review of interventions - GOV.UK \(www.gov.uk\)](https://www.gov.uk)
- 71 [Executive summary \(bristol.gov.uk\)](https://bristol.gov.uk)
- 72 [Parks and Green Space Strategy \(bristol.gov.uk\)](https://bristol.gov.uk)
- 73 [Chapter 6: wider determinants of health - GOV.UK \(www.gov.uk\)](https://www.gov.uk)
- 74 [The quality of life in Bristol \(bristol.gov.uk\)](https://bristol.gov.uk)
- 75 [Parks and Green Space Strategy \(bristol.gov.uk\)](https://bristol.gov.uk)
- 76 [Key Dates \(ash.org.uk\)](https://ash.org.uk)
- 77 [The One City Approach \(BristolOneCity.com\)](https://BristolOneCity.com)
- 78 [One City Climate Strategy \(bristolonecity.com\)](https://bristolonecity.com)
- 79 [JLTP Adopted Joint Local Transport Plan \(travelwest.info\)](https://travelwest.info)

