Liver disease in Gloucestershire: A Rapid Health Needs Assessment

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Executive summary

Liver disease is a largely preventable condition that usually occurs as result of one, or several of, three key modifiable risk factors; alcohol, obesity and the metabolic syndrome and viral hepatitis (predominantly hepatitis B and C), with one in five people within the population currently at risk of liver disease. Despite its preventable nature, the incidence of liver disease is rising, in stark contrast to other major non-communicable diseases, such as ischaemic heart disease, certain cancers and diabetes, where incidence has either plateaued or fallen. Liver disease also represents a significant health inequality, displaying a social gradient of incidence – with higher rates of disease seen in the most deprived areas of the country, versus in the least deprived. This is also the case for mortality, where in England and Scotland premature deaths from liver disease are four times higher in the most deprived areas compared to the least deprived. Liver disease is often deemed a 'silent killer' due to its long latent phase where harmful exposures causing liver damage do not result in signs or symptoms of disease before severe liver damage has occurred – at which point the body can no longer compensate for its effects – and can result in liver failure and/or liver cancer, both of which carry a poor prognosis. Early diagnosis in the subclinical phase of the disease process is therefore essential for improving prognosis and preventing deaths from liver disease.

The national picture of poor liver health is mirrored within the South West, with a regional Liver Health Needs Assessment conducted in 2015 identifying increasing mortality from liver disease across the region, with higher mortality rates also correlating with areas of deprivation. Despite evidence-based interventions related to prevention of liver disease being clearly identified through this needs assessment, as well as other work and a local and national level aiming to curtail liver related morbidity and mortality (for example, a National Confidential Enquiry into liver deaths and a local Getting It Right First Time Report), an upwards trend in liver disease mortality in Gloucestershire has been identified, prompting this local Health Needs Assessment to identify areas of unmet need in the county in relation to liver disease and inform prevention strategies.

This work has identified the main cause of liver-related mortality in Gloucestershire as alcohol-related liver disease – again in keeping with the national picture – and is followed by mortality from liver cancers, as the second most common cause of local liver-related deaths. Mortality in Gloucestershire from alcohol-related disease has risen sharply since 2020, likely correlating with the impact of the COVID-19 pandemic on drinking behaviours, diet and weight, as well as access to and delivery of healthcare. Liver mortality is socially patterned in the county, in keeping with the regional and national picture, representing an important inequality based on socio-economic status. A gender inequality in deaths is also occurring with a higher proportion of men dying from liver disease than women in the county, across most age groups.

As well as rising mortality from liver disease, there has been an increase in all-cause liver disease hospital episodes in Gloucestershire from 2018/19 onwards, and the

county is now an outlier compared to our statistical and geographic neighbours in our hospital episode rates. No evidence of a change in coding practice has been identified to explain this – suggesting this is a true increase in demand for secondary care, which is concerning and warrants further investigation and action, as detailed within the recommendations. Many of the hospital episodes for liver disease in the county relate specifically to alcohol-related liver disease, and again Gloucestershire is an outlier in terms of the incidence of alcohol-related liver disease hospital episodes, specifically.

There is good evidence that an admission to hospital with alcohol-related liver disease carries a significantly increased risk of short- and long-term premature mortality, and thus the increasing numbers of admissions locally may well inform the rise in mortality seen – as well as representing a significant burden on secondary care services, as well as gaps in primary and secondary prevention locally. The upward trend in hospital episodes also appears to be driven by an increase in the average number of admissions per individual per year, with a large proportion of attendances represented by repeated admissions - suggesting increasing complexity of the cohort of individuals with liver disease, and perhaps gaps in longer term care planning and tertiary prevention. Important inequalities in liver disease hospital admissions in Gloucestershire have also been identified, with those living in areas of deprivation, men, and individuals who fall into 'other ethnic groups' experiencing statistically higher rates of admissions than other groups.

In terms of characterisation of the population at risk of liver disease within the county, this is difficult due to gaps in data collection, in particular relating to weight status and alcohol intake across the population. Only 3% of the population registered within primary care in Gloucestershire have had their alcohol use clearly recorded, representing a need to strengthen screening and brief intervention for problematic alcohol consumption within primary care, as well as onwards referral to services. Measurement of adult Body Mass Index is also limited within primary care, and it is difficult to also identify the number of people living with hepatitis B and C within the local population. It is likely that Metabolic Dysfunction-Associated Steatotic Liver disease (previously known as non-alcoholic fatty liver disease) is likely to become the leading cause of liver transplantation across the country in the future given the rising prevalence of obesity, with a multiplication of risk of chronic liver disease seen where people are also drinking to high levels, which needs consideration going forward locally.

There are opportunities for strengthening primary prevention in the county – for example through advocacy of Minimum Unit Pricing where possible and considering novel ways to challenge our cultural relationship with alcohol and unhealthy commodities. A comprehensive weight management offer and healthy lifestyles service, as well as drug and alcohol treatment services are available within the county, but there are areas where recognition of those at risk of liver disease and early intervention could be strengthened. It is now recommended that active case finding for liver disease is conducted where high-risk individuals receive screening should be in the form of direct access Fibroscan. This is service is now currently in development through a Community Diagnostic Centre, and will shortly be opening in the county, but this offer again could be strengthened to ensure good links to other services as well

as screening for harmful alcohol use, brief intervention and vaccination offer, as well as broader exploration of how we can Make Every Contact Count in relation to alcohol and health promotion throughout the system.

Recommendations

A) Further data considerations

1) Use a population health management approach to increase vaccination coverage:

- Review vaccination coverage of individuals with chronic liver disease, specifically influenza, pneumococcal, COVID-19 and hepatitis B and use this insight to identify barriers to uptake.
- Review uptake of hepatitis B vaccination for groups who are high risk for liver disease and use this insight to identify barriers to uptake.

2) Review strategies to improve coding rigour for liver-related hospital episodes statistics locally – examples include using the Liverpool alcohol-related liver disease algorithm and use of multiple, grouped ICD-10 codes (46; 61).

3) Review the coverage and access to needle and syringe exchange programmes and opioid agonist therapy for people who inject drugs in Gloucestershire to ensure access is equitable. Some work already is currently being progressed on this following on from the recent Drug and Alcohol Needs Assessment and has not been reviewed as part of this piece of work.

B) General

1) Establish a liver disease Clinical Programme Group or multi-disciplinary group to further develop and take forward recommendations to improve liver health and outcomes within the county.

2) Undertake a root-cause analysis review of a sample of patients who are admitted as an emergency to Gloucestershire NHS Foundation Trust, including individuals who have more than one admission, to identify specific drivers of emergency hospital admissions and areas for quality improvement.

3) Review a sample of patients with liver diseased admitted electively and Gloucestershire NHS Foundation Trust, to identify what is driving high numbers of hospital episodes for elective admissions, and if coding could be improved for these encounters.

4) Share insights and learning from this Needs Assessment with relevant stakeholders to raise awareness of liver disease in the county e.g., by presenting to the Health and

Wellbeing Board, Clinical Programme Board or incorporating intelligence into Gloucestershire's Joint Strategic Needs Assessment

5) Review and follow recommendations from a 2023 review of Hepatitis B and C pathways in Gloucestershire, including improving local surveillance of hepatitis B and C cases in the county through implementing a system of local data collection.

6) Review and implement recommendations from the Gloucestershire's 2023 Director of Public Health report on alcohol in conjunction with those from this HNA.

C) Primary prevention

1) Synthesise the evidence for Minimum Unit Pricing legislation for review by officers and political stakeholders.

2) Synthesise the evidence for local restriction of marketing of unhealthy commodities, including alcohol, in council-owned advertising spaces for review by officers and political stakeholders (53).

3) Identify systems ownership of hepatitis B vaccination of contacts of individuals who have been diagnosed with hepatitis B, as well as to high-risk groups, which may need specific commissioning. Consider the feasibility of delivery of vaccinations through other settings including the Community Diagnostic Centre or through vaccine outreach.

4) Continue to strengthen obesity prevention and weight management treatment pathways, with reference to new NICE guidance when it is published, addressing key gaps (e.g., access to specialised treatment for adults with severe obesity, inequalities in access, experience, and outcomes) and including alcohol screening and advice alongside healthy weight interventions.

5) Raise awareness of the risk of liver disease within the local population – e.g., through publicising tools such as the 'Love your Liver' Screen developed by the British Liver Trust (64), school-based education and use of behavioural insights approaches in targeted communications.

D) Secondary prevention – early detection and treatment

1) Strengthen identification of at-risk drinkers in primary care using the AUDIT-C tool, followed by provision of a brief intervention, which is consistently documented using appropriate SNOWMED codes. Specifically, alcohol use should be inquired about:

- At new patient registration
- During annual hypertension reviews
- As part of any NHS/other routine 'health check'
- Opportunistically during consultation where possible

Aim for all registered adults to have their alcohol risk assessed at least every 5 years.

2) Make Every Contact Count within other settings in relation to identification of harmful alcohol use (using validated tools), brief intervention and referral to specialist services – e.g., through commissioning the delivery of these psycho-social interventions within community, Pharmacy settings, social prescribing services and the Community Diagnostic Centre, and training of providers.

3) Publicise and provide training around identification of harmful alcohol-use, brief intervention, and referral pathways for healthcare professionals within the system.

4) As per NCEPOD recommendations, all patients presenting to hospital services should be screened for alcohol misuse and all those identified with a history of potentially harmful drinking, should be referred to alcohol support services for a comprehensive physical and mental assessment. The referral and outcomes should be documented in the notes and communicated to the patient's general practitioner.

5) Establish the planned Community Diagnostic Centre (CDC) with direct access to Fibro-scanning from primary care. Offer Fibroscan for individuals with high alcohol intake (>50 units/week for men, or >35/week for women. or AUDIT-C positive) as well as those who meet the relevant criteria for MASLD using the Fibrosis-4 index (as the Enhanced Liver Fibrosis (ELF) score is not locally available) as a risk-stratification tool.

6) Noting the multiplicative effect of alcohol and obesity on liver ill-health, consider the evidence base and benefits for reducing thresholds for direct access to Fibro-scanning where individuals have both elevated BMI and high alcohol use.

7) Pilot different approaches for provision of lifestyle support within the CDC e.g., for alcohol:

- All staff with patient contact to be trained in screening and brief intervention for harmful alcohol use and to have responsibility for onwards referral to specialist services where relevant, *or*,
- Consider the possibility of a commissioned alcohol liaison service to be embedded within the CDC.

For weight management/healthy lifestyles:

- Providing written information/leaflets to patients about the Healthy Lifestyle Services on referral to the CDC, *or*
- Verbal offer of referral into the Healthy Lifestyle Services to be made by staff within the CDC on review of new patient, *or*
- Consider a commissioned Healthy Lifestyles Service to be embedded within the CDC.

8) Consider delivery of vaccination for patients with chronic liver disease within CDC (hepatitis A, hepatitis B, influenza, pneumococcus) – e.g., through training CDC staff to deliver vaccinations within the centre or considering feasibility of support for vaccination within the CDC by the vaccine outreach team.

9) Establish a robust and well publicised referral pathway between the CDC and specialist hepatology services into weight-management and the healthy lifestyles services.

11) Establish a referral pathway from the current alcohol treatment provider into the CDC for direct access Fibroscanning, where access criteria are met.

12) Establish a rapid-access hepatology clinic or pathway for patients identified with decompensated cirrhosis in primary care.

13) Raise awareness of multiplication of risk of alcohol and increasing BMI within primary care, considering imbedding review of this within annual health checks and NHS health checks, as well as the risk of alcohol use with all other causes of liver disease.

14) Offer 100% of clients accessing Via a hepatitis C test, with 90% of those offered receiving a test, and 75% of those who have been diagnosed with hepatitis C going on to receive curative treatment, to achieve micro-elimination of hepatitis C within populations who inject drugs within Gloucestershire.

15) Make Every Contact Count and offer opportunistic hepatitis B and C testing for at risk groups across the system and promote the free online hepatitis C testing offer to the public.

16) All health and social care professionals in the local system should be trained to recognise alcohol use disorder and provide brief intervention, as per the Lancet Commission, with a particular focus in strengthening this in primary care and amongst accident and emergency staff.

E) Tertiary prevention

1) Audit the number of individuals identified as having alcohol dependence or drinking to problematic levels in the hospital setting who were offered an onwards referral to specialist community alcohol services, ensuring a robust referral mechanism is in place.

2) Support collaboration and avoidance of duplication between the two alcohol teams in the hospital and identify where there may be gaps in provision across both hospital sites.

3) Audit care against the NCEPOD and Lancet Commission recommendations, including the standard that all patients admitted with liver disease should be reviewed by a hepatologist within 72 hours of admission.

4) Audit referrals to palliative care services for patients, aiming for this to be offered for all patients with:

- Advanced cirrhosis
- Prognosis is expected to be <12 months

    - Decompensated ALD with ongoing alcohol-use
    - Irreversible decompensation where liver transplantation is not feasible.
    - Two or more unplanned liver-related hospitals admissions within the last 6 months.

5) Consider developing a combined specialist palliative care and hepatology outpatient clinic for relevant patients, like the Enhanced Supportive Care scheme.

6) Formalise the role of a clinical 'liver champion' within secondary care to:

- Support the development of defined clinical pathways and care bundles in collaboration with acute medicine and intensive care colleagues.
- Be a point of liaison between hepatology with Public Health and Primary Care.

7) Audit uptake of bundles of care for cirrhosis/decompensated liver disease

8) Implement recommendations from the Getting It Right First-Time review, which include:

- Audit of Spontaneous Bacterial Peritonitis cases
- Root-cause analysis of patients diagnosed with hepatocellular carcinoma during an emergency presentation.

9) Review and quality assure the pathway for six-monthly ultrasound surveillance for hepatocellular carcinoma for all patients diagnosed with cirrhosis.

Contents

Introduction and background……..……10
Risk factors for liver disease ……..12
Natural history of liver disease……...17
About Gloucestershire ……21
Local liver disease mortality…….....26
Liver disease hospital episodes……....37
Prevalence of liver disease……..……..66
Epidemiology of risk factors for liver disease ……..……70
Service mapping…….....……78
Economic impact ……..92
Conclusions and recommendations……...……...93

1. Introduction

Purpose

This document sets out a rapid epidemiological health needs assessment (HNA) of liver health in Gloucestershire. Its intended purpose is to investigate and better understand the local burden of liver disease, identify areas of unmet need, and present some initial recommendations aiming to better meet these needs.

The decision to undertake this HNA stems from a recognition that liver disease and its associated mortality is largely preventable and that, despite this, an upward trend in liver disease mortality in Gloucestershire has been noted from recent data reported by the Public Health Outcomes Framework (Fingertips). There is additionally a current system focus on improving and streamlining diagnostics for liver disease via the planned implementation of a Community Diagnostic Centre, work being conducted to evaluate, and quality assure viral hepatitis pathways, and an exploration of the impact of alcohol on the local population through the 2023 Director of Public Health report. This needs assessment is therefore well timed to bring together and capitalise on these differing workstreams and continue momentum to improve liver health within our local population.

Scope

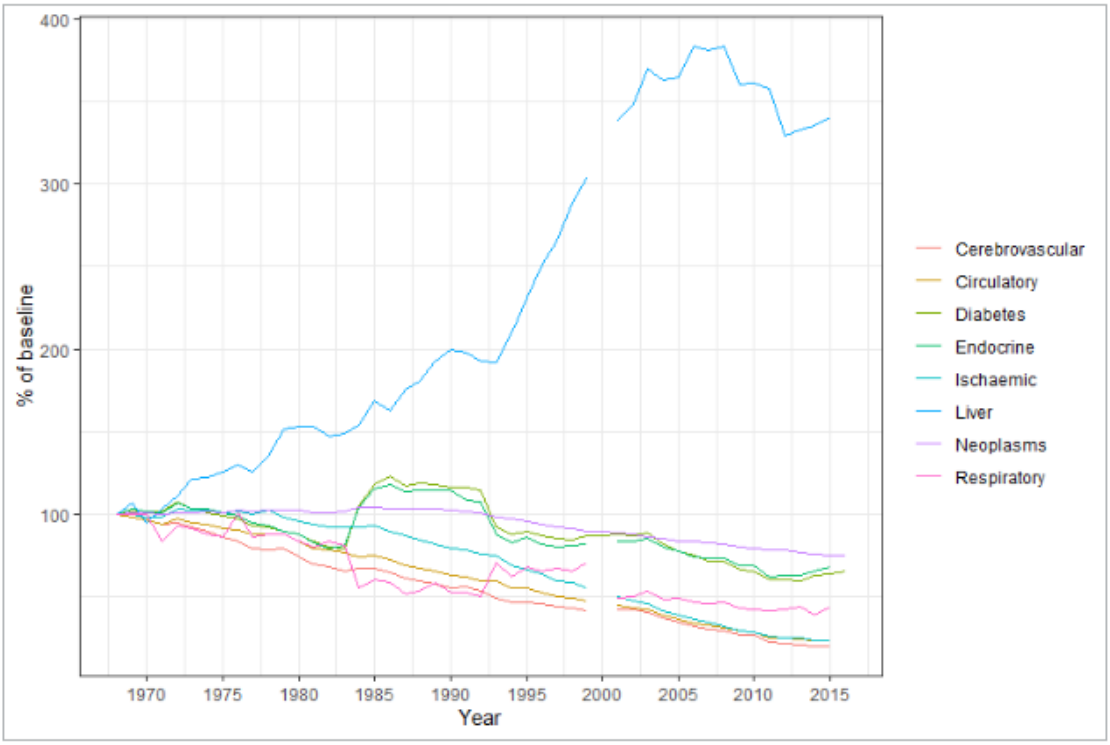
This is an epidemiological needs assessment of liver disease in the adult (18 years of age and over) population in Gloucestershire, focusing on the most common preventable causes of liver disease in the UK, which are alcohol-related liver disease, metabolic dysfunction-associated steatotic liver disease (MASLD; previously known as non-alcoholic fatty liver disease or NAFLD) and viral hepatitis (predominantly hepatitis B and C). Liver disease in children, whilst important, is rare, and tends to differ in its drivers compared to adult liver disease, and thus has been deemed out of scope of this piece of work. The primary objectives of this HNA are to describe the burden of liver disease mortality and hospital admissions in Gloucestershire and characterise the prevalence of liver disease and the population at risk from primary care records. Liver service mapping has also been conducted, to identify areas where pathways and opportunities for prevention could be strengthened.

Background

Liver disease is one of the few non-communicable diseases (NCDs) in the UK where a continued upwards trend in morbidity and mortality has been observed over time, in stark contrast to many other NCDs; such as cardiovascular disease, where deaths have either steadily decreased or remained stable, as demonstrated in figure one (1). Indeed, recent data from the Office of National Statistics demonstrates that over the last 20 years, premature deaths from liver disease have risen by 62.5% in men and 65.4% in women, in England alone (2).

The burden of liver disease in England is stark and unacceptably high given that it is almost entirely preventable; with alcohol-use, obesity and viral hepatitis recognised as the underlying cause in 90% of cases (3). Liver cancers, which most commonly arise from chronic liver damage and inflammation linked to one of these three exposures, are also the fastest growing cause of cancer deaths in the UK (3). Current liver-related mortality equates to approximately 25 deaths per day in England, with hospital episodes where liver disease is the primary cause of admission also increasing by 47% since 2011/12, with a jump from 22% seen between 2020/21 and 2021/22 alone (3). The extent of liver disease morbidity and mortality in England, and across the UK, is at odds with other nations in Western Europe where incidence has fallen, resulting in recent calls from the Office of Health Improvement and Disparities for more local action and system focus on prevention of liver disease (3; 4). Indeed, liver disease is the most common cause of years of life lost in those aged 75-years and younger, and the second commonest cause in women of working age (5).

Figure 1: Deaths from chronic disease over time as percentage of baseline in England, 1970-2015. Source: Reducing liver death: a call to action, UK Health Security Agency, 2021 (6).



Liver ill-health is strongly associated with socio-economic deprivation, whereby people who live in the most deprived areas of England are more likely to develop, be hospitalised, and die from liver disease compared to those who live in the most affluent

areas, representing an important inequality (3; 6). Increasing admissions and mortality from liver disease are closely linked to increasing alcohol-related harm across the UK and the rising prevalence of obesity, both of which are also strongly socially patterned (1). Viral hepatitis is most often seen in groups who experience social exclusion, such as prisoners, people who inject drugs and certain migrant groups, who may also face additional barriers to healthcare access and treatment.

The role of multiple, intersecting risk factors, most commonly affecting those who are less advantaged in society, is an important factor in the natural history of liver disease. For example, the combined influence of genetic and environmental factors, or the risk multiplication seen where alcohol is consumed in conjunction with living with obesity or viral hepatitis, is often under-recognised, despite those with multiple risk factors more severe manifestations of liver disease, and an increased likelihood of developing liver cancer (1).

Risk factors for liver disease

Alcohol

Alcohol use is recognised as the most common cause of liver disease in England and exhibits a dose-response relationship, where increasing alcohol consumption correlates with severity of liver damage (7). Individuals who consume alcohol do not have to have a history of dependency to develop alcohol-related liver disease – in fact up to one in five people in the UK are drinking to thresholds where liver damage can occur, suggesting that our social relationship to alcohol has obscured our awareness of its impact on liver health (8). Alcohol consumption can lead to fatty deposits in the liver (steatosis), which can progress to scarring (fibrosis) and subsequent liver cirrhosis (permanent and irreversible liver damage with the potential for liver failure) (8). Notably, where individuals are also living with obesity, there is an increased risk that alcohol-related liver disease will progress to fibrosis and cirrhosis (9).

Evidence based interventions for reducing both harmful consumption of alcohol, but also minimising alcohol related health harms, including liver disease are:

- Reducing the availability of alcohol e.g., through Minimum Unit Pricing and restrictions on the advertising of alcoholic beverages (these are also cost effective interventions Recommended by the World Health Organisation for reducing alcohol related health harms) (10; 11; 12)
- Early identification of those who are drinking at levels of increasing and higher risk (e.g., through use of the validated AUDIT-C tool), and provision of brief advice around cutting down by a healthcare or other relevant professional (10; 12; 11)
- Identification of individuals drinking to harmful levels and connecting them with services that provide behavioural interventions such as motivational interviewing or cognitive behavioural therapy, as well as pharmacological treatments for addiction and medically assisted detox where necessary (12; 11).
- Raising awareness of alcohol as a health and social problem (11)

As well as primary and secondary prevention strategies, such as those listed above, there are many best practice recommendations for management of individuals who have established alcohol-related liver disease and other health harms. A National Confidential Inquiry into deaths from alcohol-related liver disease was conducted in 2014, where over 50% of individuals whose deaths were reviewed were found to have received care that was 'less than good', with the report identifying multiple missed opportunities for earlier intervention by healthcare professionals, which, in some cases, could have prevented deaths (13). The Inquiry found that most individuals whose deaths were part of the review attended hospital at least once before their death where harmful drinking was either not identified, or where, on identification of problematic drinking, brief interventions and/or referral to specialist services did not occur. In many cases, simple opportunities to improve the care of individuals admitted with alcohol-related liver disease were missed.

The Confidential Inquiry concluded with the following recommendations:

1) All patients presenting to hospital services should be screened for alcohol misuse.
2) All patients presenting to acute services with a history of harmful drinking, should be referred to alcohol support services for a comprehensive physical and mental health assessment. The referral and outcomes should be documented in the notes and communicated to the patient's General Practitioner.
3) Each hospital should have a 7-day Alcohol Specialist Nurse Service, with a skill mix of liver specialist and psychiatry liaison nurses who can provide comprehensive physical and mental health assessments, brief interventions and onwards referral to specialist services, within 24 hours of admission.
4) A multidisciplinary Alcohol Care Team should be established in each acute hospital and integrated across primary and secondary care.
5) All patients admitted with decompensated alcohol-related liver disease should be seen by a specialist Gastroenterologist or Hepatologist at the earliest opportunity after admission. This should ideally be within 24 hours and not later than 72 hours after admission to hospital.
6) Escalation of care (to a high dependency or intensive care level) should be actively pursued for patients with alcohol-related liver disease, who deteriorate acutely and who's background functional status is good. There should be close liaison between the medical and critical care teams when deciding on appropriate levels of care for the deteriorating patient.

Where individuals with alcohol related liver disease are still consuming alcohol, it is essentially that they should be referred to specialist drug and alcohol services with a goal of complete abstinence required to prevent further progression of liver damage and reduce the risk of death.

Obesity and metabolic syndrome

Metabolic dysfunction-associated steatotic liver disease (MASLD) is caused by harmful accumulation of fat within the liver (steatosis) without a history of excessive alcohol-consumption. National Institute for Health and Care Excellence (NICE) guidelines stipulate that a diagnosis of MASLD can only be made where alcohol consumption is less than 20 g of alcohol (2.5 units) per day for women and less than 30 g (3.75 units) per day for men.

MASLD is most often seen in individuals living with obesity or are overweight, and as such, the prevalence of MASLD maps closely to that of obesity within the adult population, which in England in 2021 was 26% (14; 15; 16). Prevalence of MASLD across Europe is thought to be as high as 23% and, whilst incidence data in the UK is very limited, it is predicted that it will soon become the leading cause of liver transplantation given the high and increasing prevalence of obesity (14).

MASLD encompasses a spectrum of liver disease strongly associated with insulin resistance and the metabolic syndrome; where there is a clustering of risk factors such as abdominal obesity, hypertension, high triglycerides, and impaired glucose tolerance (16; 15). Up to 90% of individuals affected by MAFLD will have a good prognosis and may never become symptomatic from the disease however, for a smaller group the disease will progress to fibrosis, cirrhosis and, in some cases, hepatocellular (liver) cancer (15). Understanding of why some people with MASLD develop fibrosis and cirrhosis whilst the majority do not is limited, but it is likely that a complex interplay of genetics and environmental factors, such as sedentary behaviour and alcohol use of any level, can induce progression (17). Whilst alcohol consumption must be within the diagnostic threshold stipulated by NICE (as described above) in order to exclude alcohol-related liver disease when MASLD is suspected, it is likely that even low levels of alcohol intake will exacerbate liver damage caused by steatosis in individuals living with obesity and the metabolic syndrome – and there is no evidence for a ‘safe’ or threshold level of alcohol consumption, for the general population, or those living with MASLD, below which health harm can be avoided (17).

The National Institute of Health Research (NIHR) has identified nine high impact areas for localities to focus on to prevent and manage obesity within their population (18). These are:

1) Positively influencing the types of food that people buy and eat
2) Promoting active workplaces
3) Enabling active travel and use of public transportation
4) Supporting healthy schools
5) Providing weight management programmes
6) Reducing obesity amongst children and families
7) Expanding access to public sports and leisure facilities
8) Designing the built and natural environment to be less obesogenic
9) Embracing system-wide approaches (18)

Community led and placed based and whole systems approaches that address the multiple causes of obesity are likely to provide the greatest health gains and be most effective at prevention. This work should involve bringing community and wider stakeholders together and agreeing collaborative action to address key priorities in local prevention of obesity. Notably, the level of resources required to implement such work, alongside paucity of evidence of the long-term impact on obesity levels within a population, is a barrier to the wholesale adoption of this approach at this time.

In addition to the NIHR high impact areas, NICE has set out eight quality standards which should be considered when commissioning health weight initiatives and Tier 2 weight management programmes (19). These are:

1. Ensuring the provision of health food and drink options within Local Authorities and NHS venues using vending machines.
2. Provision of nutritional information on menus at Local Authority and NHS venues.
3. Prominent display of healthy food and drink choices within Local Authority and NHS venues
4. Access to a publicly available, up-to-date list of local healthy lifestyle and weight management programmes.
5. Access to data on attendance, outcomes and views of participants and staff from locally commissioned healthy lifestyle and weight management programmes
6. Individuals identified as being overweight or living with obesity should be given information about local healthy lifestyle and weight management programmes.
7. Individuals identified as overweight or living with obesity who also have other co-morbidities should be offered a referral to a healthy lifestyle and weight management programme
8. Individuals who have completed healthy lifestyle and weight management programmes should have an agreed plan for prevention of weight regain (19).

It should be noted that updated NICE guidance on the prevention and management of adult obesity are due for publication in 2024, where these quality statements are likely to be refreshed.

Where individuals have been diagnosed with MASLD, the best practise NICE guidance for management includes (15):

- Supporting lifestyle modifications around diet, physical activity, and regular exercise, to encourage gradual sustained weight loss where the individual affected is overweight or living with obesity.
- Advice about drinking alcohol within the national recommended limits (recognising that there is no ‘safe’ limit).
- Ensuring that associated conditions such as hypertension, hyperlipidaemia, and type 2 diabetes mellitus are optimally managed.

- Giving advice about sources of information and support for people with MASLD, such as the British Liver Trust.

Referral to a liver specialist should be made if:

- There is a high risk of advanced liver fibrosis.
- There are signs of advanced liver disease.
- There is uncertainty about the diagnosis (15).

Viral hepatitis

Acquisition of a hepatitis virus (B or C) can cause persistent infection of the liver over time, which can in turn lead to cirrhosis, liver failure, liver cancers and death in some cases. Hepatitis B and C are bloodborne viruses which are transmitted through contact with infected blood or other bodily fluids, for example through unprotected sexual intercourse, sharing needles or other drug paraphernalia, mother-to-child transmission during pregnancy, birth, or breastfeeding, and through use of contaminated blood products or equipment in a healthcare setting. Importantly, infection with viral hepatitis is almost entirely preventable.

Hepatitis B

The risk of development of chronic hepatitis B infection depends on the age at which the virus is acquired, with young infants being most likely to develop persistent infection of liver (chronic disease). Most healthy individuals who acquire the virus will develop an acute illness with jaundice (yellowing of the skin), before going on to clear the infection, but 5% of cases will develop chronic infection and thus the associated risks of cirrhosis, liver cancer, liver failure and death in later life. The vast majority (95%) of people with chronic hepatitis B infection in the UK are migrants who acquired the infection in their country of origin, usually at birth or in early childhood. The remainder of individuals are likely to have acquired hepatitis B in the UK through mother-to-child transmission, or through high-risk behaviours such as unprotected sexual intercourse or injecting drug use. Unfortunately, there is currently no cure for hepatitis B, with treatment aiming to suppress and control viral activity, and thus prevent liver damage, as much as possible.

Evidence-based interventions to prevent and control hepatitis B (and thus reduce the risk of liver damage) include:

- Immunisation of all infants against hepatitis B (an effective hepatitis B vaccination has been part of the national immunisation programme since 2017) and of high-risk groups (e.g., people who inject drugs, prisoners, sex workers, migrants from high prevalence countries and healthcare professionals, amongst others).

- Needle and syringe exchange programmes, good coverage and access to opiate agonist therapy for individuals who inject drugs.
- Screening of high-risk groups and antenatal screening for all pregnant women.
- Antiviral therapy in pregnancy where mothers test positive, followed by subsequent vaccination (+/- immunoglobulin therapy) for their infants to prevent mother-to-child transmission (20).

Hepatitis C

Injecting drug use is the predominant risk factor for Hepatitis C acquisition in the UK, and, unlike Hepatitis B, most adults who acquire the infection will go on to develop chronic disease. As with chronic Hepatitis B, chronic Hepatitis C causes damages to the liver over time, risking cirrhosis, liver failure, liver cancer and death. There is now an effective treatment for Hepatitis C which can adequately clear the virus from the body, representing cure, but the risk of re-infection remains, with no lifelong immunity from infection or effective vaccine currently available against Hepatitis C.

Access to sterile injecting equipment through needle-exchange programmes, alongside opioid agonist therapy for the treatment of drug dependence, are well evidence-based to prevent and reduce the risk of transmission of hepatitis C amongst people who inject drugs, as well as reducing the potential for re-infection after treatment has been completed. The use of low dead-space needles and syringes (which retain less blood following injection compared to traditional syringes) are also effective at reducing the risk of hepatitis C transmission (21).

Active case-finding, such as through testing of high-risk groups, followed by linkage to care and treatment for identified cases, is essential for achieving elimination of hepatitis C as a public health problem – a WHO target by 2030 - as well as for prevention of morbidity and mortality from liver disease associated with hepatitis C. ‘Microelimination’ is a strategy that can be employed locally and involves elimination of hepatitis C infection within targeted groups or in particular geographic areas. Microelimination is a key tool promoted by NHS England to achieve national elimination of hepatitis C by 2025 (22).

Hepatitis A

Other forms of viral hepatitis include hepatitis A, which is transmitted via faecal-oral spread, usually from ingestion of contaminated food or water. Rarely, this can cause acute liver failure and is particularly dangerous for individuals who already have underlying liver disease but does not cause chronic infection. Hepatitis A is a vaccine-preventable disease, and all individuals with liver disease of any type should be offered immunisation to prevent infection and associated morbidity and mortality that this can cause.

Natural history of liver disease

The liver is responsible for many major bodily functions, including the clearance of toxins from the blood, metabolism of drugs, regulation of amino acids (essential building blocks of proteins) and clotting factors, helping to maintain a healthy immune system, breaking down fats during digestion, as well as converting glucose into glycogen for storage, which can subsequently be broken down to provide energy when needed (20).

All forms of liver disease exhibit a common pathway to chronic liver damage, through a process of inflammation and fibrosis (tissue degeneration, scarring and stiffening of the liver), which in turn can progress to liver cirrhosis, where damage to liver tissue is widespread and irreversible, resulting in a progressive loss of function of hepatic cells. In the UK, cirrhosis is most frequently seen in ALD or MASLD (21). Factors associated with increased risk of progression to cirrhosis include increasing age, medical co-morbidity, and male sex, except for ALD, where women tend to progress more rapidly to cirrhosis than men. In those with the three most common causes of liver disease (ALD, MAFLD and viral hepatitis-associated liver disease), between 10-20% will develop cirrhosis within 10-20 years (22). All individuals diagnosed with cirrhosis should be referred to secondary care for specialist assessment and ongoing management by a Hepatologist (liver specialist) (21).

There are two major clinical phases of liver cirrhosis; initially a ‘compensated’ phase, which can then be followed by a ‘decompensated’ disease state (23). In compensated cirrhosis, the liver can maintain enough usual function that this phase is usually asymptomatic, however, where there is ongoing challenge to the liver (e.g., through continued alcohol-use or an intercurrent illness), compensated disease can easily tip into the ‘decompensated’ state, where essential functions become impaired, leading to the development of overt symptoms and signs of disease and multi-organ dysfunction. The most common signs of decompensated cirrhosis are; ascites (fluid accumulation in the abdominal cavity), upper gastrointestinal haemorrhage due to variceal bleeding (life-threatening bleeding from rupture of enlarged vessels in the gut caused by increased pressure in the liver due to fibrosis), encephalopathy (brain dysfunction and altered mental state due to accumulation of toxins usually cleared by the liver) and jaundice (build-up of bilirubin (a bile pigment) blood causing yellowing of the skin) (21). Most deaths from liver disease occur because of decompensated cirrhosis, which has a mortality of 40%, 65% and 80% respectively at 1, 2 and 5 years after diagnosis (21; 24).

Liver disease is often referred to as a ‘silent killer’, due to its long latent phase prior to the onset of symptoms and clinical signs, where typical blood tests used to assess liver function are often normal, meaning that most individuals are not aware they have liver disease until they develop decompensated cirrhosis (25). Indeed, three-quarters of individuals who die from liver disease were only diagnosed when admitted to hospital with complications of cirrhosis, at which point liver damage is irreversible, and mortality is high (25). Earlier diagnosis of liver disease can be achieved through active case-finding and screening of high-risk individuals, such as those who drink to high levels or have chronic viral hepatitis, utilising diagnostics such as transient elastography (‘fibro-scanning’); an imaging technique that can identify early scarring

of the liver and assess the degree of liver stiffness (fibrosis) during the subclinical (asymptomatic) phase.

Liver cirrhosis is also a potent risk factor for liver cancer, specifically hepatocellular carcinoma, which has an incidence of 1-4% per year in individuals with liver cirrhosis of any cause, and carries a high mortality rate, with only 1 in 5 individuals being eligible for radical (curative) treatment at the point of diagnosis (21; 26).

Management of individuals identified as having compensated cirrhosis to reduce morbidity and mortality should include the following (21):

- Screening, surveillance, prevention and treatment of varices
- Screening, prevention and treatment of osteoporosis (reduce bone mineral density resulting in increased risk of fracture which individuals living with cirrhosis are more at risk of).
- Surveillance for hepatocellular carcinoma with six monthly liver ultrasounds
- Provision of annual influenza, pneumococcal and COVID-19 vaccination, as well as Hepatitis A and B vaccination to prevent infection which may lead to decompensated disease and liver failure.
- Information and support around alcohol use – where abstinence is the goal for those with ALD to prevent further progression of cirrhosis, and minimising intake for those with other forms of liver disease, such as MAFLD and viral-hepatitis associated liver disease.
- Treatment of the underlying cause of liver disease where indicated, e.g., treatment for alcohol dependence or anti-viral treatment for Hepatitis B or C
- Nutritional support – noting that 20% of individuals with compensated cirrhosis are malnourished, which can also be seen in the presence of obesity (21).

Where decompensated cirrhosis occurs, management should include (24):

- Medical management of encephalopathy e.g., through use of medications which reduce toxin build-up in the blood and brain.
- Management of ascites e.g., through medical (drug) treatment and drainage (paracentesis).
- Nutritional support and provision of supplemental protein.
- Consideration of referral for liver transplantation as the definitive management of decompensated cirrhosis where there is a likelihood of poor survival or impaired quality of life, following best practice NICE guidance.
- Treatment of underlying cause e.g., antivirals in viral hepatitis, or abstinence from alcohol in ALD, which in some cases may lead to reversal of decompensated disease (24).
- Advanced care planning and referral to palliative care, where there is:
    - Advanced cirrhosis
    - Prognosis is expected to be <12 months
    - Decompensated ALD with ongoing alcohol-use
    - Irreversible decompensation where liver transplantation is not feasible.
    - Two or more unplanned liver-related hospitals admissions within the last 6 months.

Liver disease in the South West

A Health Needs Assessment looking at liver disease in the South West was published in 2015 by Public Health England (27). Key findings from this were:

- A 23% increase in deaths from liver disease between 2001 and 2012.
- A recognition that liver disease predominantly affects younger, working age individuals, with 71% of the 2,534 deaths from liver disease in 2010-12 occurring in those under the age of 75 years-old
- 24,303 alcohol specific admissions in 2012/13 and 922 alcohol-related liver disease deaths in 2010-2012 occurred in the region
- People living in the most deprived quintile of the region are 4.9 times more likely to die from alcohol-related liver disease than those living in the least deprived quintile.
- There are well evidenced cost-effective interventions available to reduce alcohol-related liver disease and implementation of these should be strengthened.
- 75% of people living with hepatitis C are still undiagnosed, with an estimated 14,635 people infected with hepatitis C in South West.
- There are also issues with under-diagnosis of hepatitis B within the region.
- 62.7% of the population of the Southwest is either overweight or obese, with a large proportion of these individuals therefore at risk of MASLD.

Key recommendations from the HNA included:

- 95% of liver disease is due to preventable causes, and therefore prevention strategies are crucial to reduce the incidence of liver disease. The most important prevention strategies in the South West should be:
    - Strengthening identification of and brief advice for individuals exhibiting harmful alcohol use
    - Increasing the coverage and access to needle and syringe programmes
    - Increasing coverage and access to immunisation against hepatitis
    - Supporting people in the region to have healthy lifestyles to prevent obesity and its associated impact on health.
- Implementation of strategies for earlier diagnosis of liver disease to reduce morbidity and mortality. In the South West the HNA identified that this could be achieved through:
    - Improving expertise in primary care around liver disease
    - Active case finding for hepatitis B and C
    - Targeted screening of liver disease for high-risk individuals
- Pathways relating to the diagnosis and management of all three of the main risk factors for liver disease have been identified as unclear regionally. This is a potential area for improvement in the South West, and these pathways should be reviewed through the hepatobiliary networks.

- The governance and accountability of the Southwest hepatobiliary networks need to be strengthened. This can be achieved through inclusion of a wider membership, terms of reference and clearer leadership, work plan and outcomes.
- There needs to be an increased awareness of liver disease to improve detection and reduce stigma. This can be achieved through several processes:
    - Inclusion within local Joint Strategic Needs Assessments (JSNA)
    - Increasing Health and Wellbeing Board awareness
    - Education for healthcare professionals
    - Public awareness campaigns including social marketing and health promotion.
- There is a need for all commissioners to work together with providers to ensure prevention and care are in place and accessible across the whole liver pathway.
- In addition to the above there is clear public health evidence to support the benefits of minimum unit price for alcohol. Local Authority Public Health should consider how to best facilitate a local understanding of the benefits of minimum unit price and its appropriate place as the most cost-effective response to alcohol related harm and an understanding of the necessary steps for implementation.

Getting It Right First-Time input into liver services within Gloucestershire

Getting It Right First-Time (GIRFT) is a national programme designed to improve the treatment and care of patients through in-depth review of services, benchmarking, and presenting a data-driven evidence base to support change.

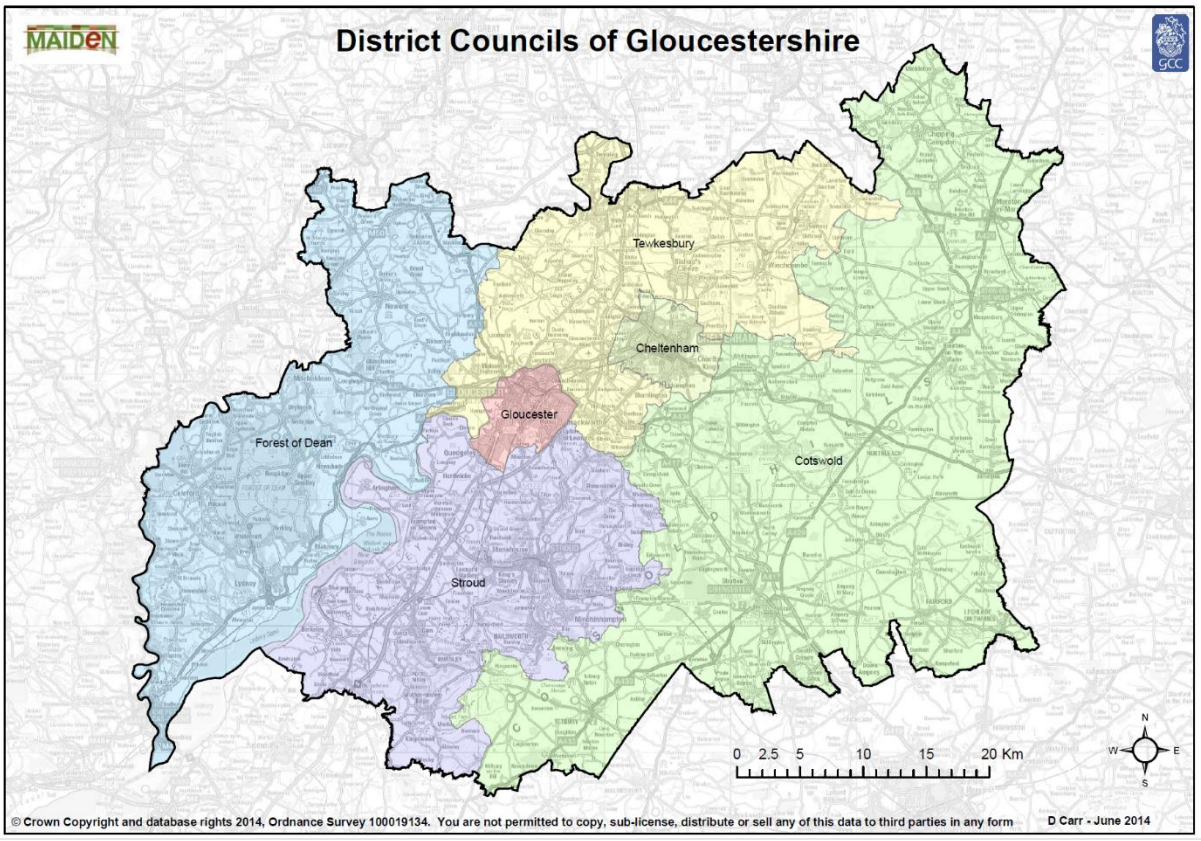
A clinical review of the gastroenterology service at Gloucestershire Hospitals NHS Foundation Trust was conducted by GIRFT in August 2017, and recommended the following:

- Improving links into community detoxification services
- Audit spontaneous bacterial peritonitis (SBP; a complication of decompensated cirrhosis where individuals develop an infection of the fluid build-up in the abdomen) cases and ensure that these patients are sent home with antibiotic prophylaxis to reduce the risk of recurrent SBP admission.
- Audit liver disease mortality rates to see if high mortality rates in the county are due to a coding issue, or if there is a real issue to be addressed.
- Auditing how many of their liver biopsies could have been investigated with a non-invasive Fibroscan, to help provide evidence of expansion of the Fibroscan service.
- Consider developing a direct access Fibroscan service for GPs, to help risk stratify patients with liver disease and reduce hepatology waiting times.
- Perform a root-cause analysis for any patients who present with HCC as an emergency (or in those who were known to have cirrhosis, and cancerous changes were not picked up via the 6 monthly surveillance programme) to identify themes to improve access to elective diagnostic pathways.

2. About Gloucestershire

Gloucestershire is a county in England situated at the northern edge of the South West region. It covers an area of 1,025 square miles and is largely rural county with two central urban areas: Gloucester and Cheltenham. There are six districts which are Forest of Dean, Tewkesbury, Stroud, Gloucester City, Cheltenham, and the Cotswolds.

Figure 2: Map of the districts within Gloucestershire. From: Inform Gloucestershire, Gloucestershire County Council.



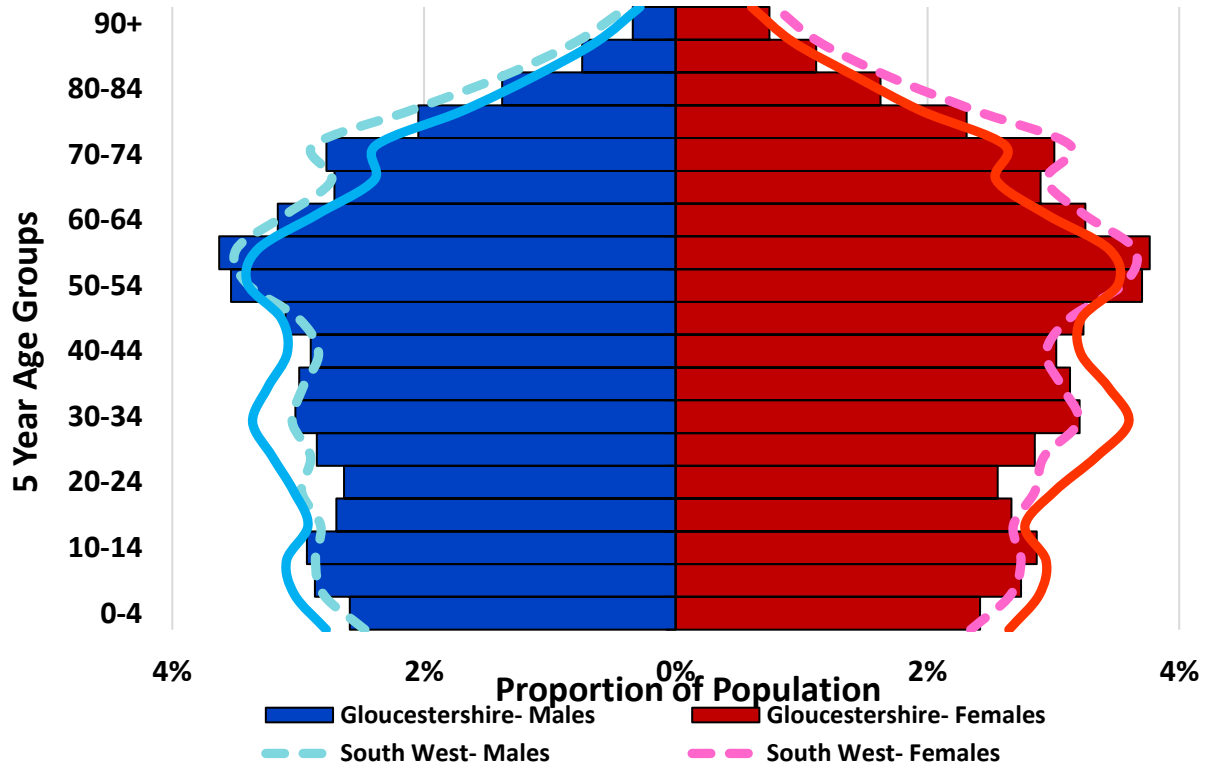
Population structure

According to the 2021 population census, Gloucestershire has a resident population of 645,100 people, with a higher than the national average growth rate, amounting to an 8.1% increase since the last census. The urban districts of Gloucester and Cheltenham are the most densely populated in the county, whilst the Cotswolds is the sparsest. Gloucester has the largest population numbers in the county, and the Forest of Dean has the smallest, whilst the district of Tewkesbury is experiencing the fasted population growth rate (28).

Overall, there were 329,800 women and 315,300 men living in Gloucestershire on census day, representing a female: male split of 51.1% vs 48.9%. Most of the population is of working age, representing 56.5% of the county's population. One fifth

of the population is aged between 0-19 years of age (21.4%), and a further fifth is aged over 65 (21.7%); a bigger proportion than the national average (18.6% for England and Wales) (28). Population aged 65 and above increased by 25.6% between the 2011-2021 census, representing the age group locally where the biggest population growth has occurred (28).

Figure 3: Population pyramid comparing the age structure of Gloucestershire, the Southwest and England and Wales using the 2021 Census. From: Census 2021 first release briefing, Inform Gloucestershire (2021) (28).



Gloucestershire's old-age dependency ratio was 0.38 in 2021, which represents the number of people aged 65 and over per 100 of people aged 20-64 (28; 29). This is indicative of the level of support provided by the working population to the older population and means that for every 100 people of working-age in the county on census day, there were 38 people aged 65 and older who were economically dependent on them. Gloucestershire's old-age dependency ratio is lower than that of the South West (0.40), but higher than that of England and Wales (0.32) in 2021 (28)

Ethnicity

The 2021 Census identified that 10% of Gloucestershire residents (around 64,500 people) were born outside the UK, compared with a national figure of 17.4%. Of this group, 50.5% were born in another European country and 22.8% were born in the Middle East or Asia (28). With regards to ethnicity, the 2021 Census found that:

- 87.7% of Gloucestershire residents have a White British background
- 2.9% have an Asian, Asian British or Asian Welsh background
- 2.2% have a mixed or multiple ethnic background
- 1.2% have a Black British, Welsh, Caribbean or African background
- 0.6% have a White Irish background
- 0.1% are White Gypsy and Irish Travellers and 0.1% are White Roma.

Overall, 6.9% of the population in Gloucestershire are from an ethnic minority background (excluding White minorities), which is considerably lower than the national figure of 19.0% (30).

Deprivation

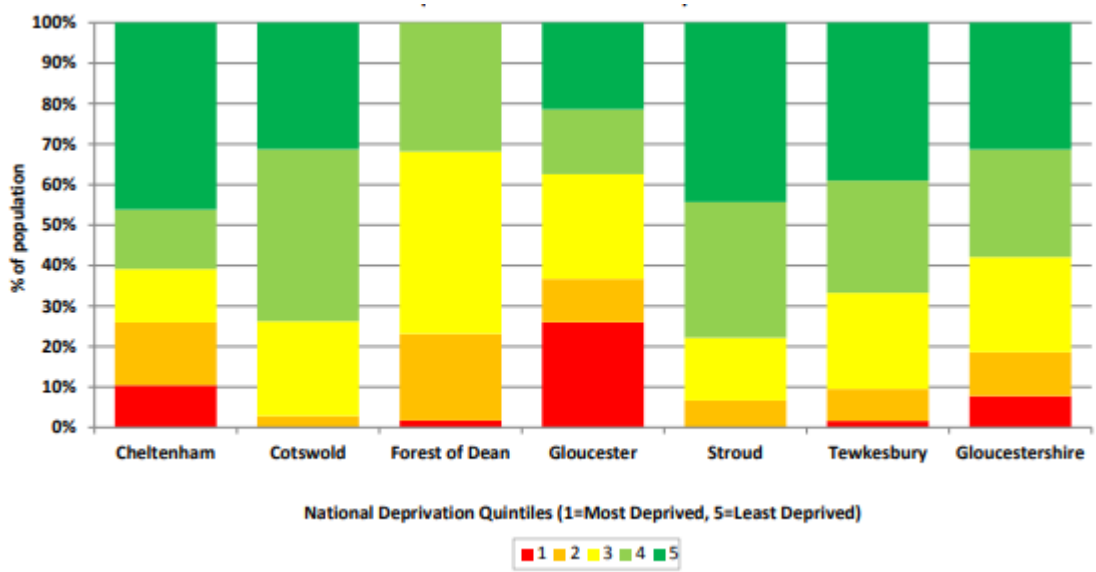
Compared to the national context, Gloucestershire is not a particularly deprived county (31). The Indices of Multiple Deprivation (IMD) rank for each of the six districts in Gloucestershire shows that even the most deprived districts (Gloucester City, and Forest of Dean) fall in the middle deprivation quintile (middle 20%) out of all 317 English Local Authorities (figure 4). Overall, Gloucestershire ranks 126 out of 151 Upper-Tier Authorities for deprivation, which means it sits within the least deprived quintile nationally (31). Whilst Gloucestershire is a relatively affluent county overall, significant inequalities persist with pockets of deprivation.

Figure 4: Gloucestershire districts Index of Multiple Deprivation rank and national quintile. From: Indices of deprivation 2019, Data and Analysis team, Gloucestershire County Council (2019) (31).

District	IMD Rank[4] (out of 317 authorities, 1 most deprived)	Quintile (Q1 most deprived)
Cheltenham	237	Q4
Cotswold	272	Q5
Forest of Dean	143	Q3
Gloucester	138	Q3
Stroud	279	Q5
Tewkesbury	261	Q5

The percentage of Gloucestershire's population who sit within each national deprivation quintile per district is presented in figure 5 (below).

Figure 5: percentage of the population per district who sit within the national deprivation quintiles as per the IMD 2019 index. From: Indices of deprivation 2019, Data and Analysis team, Gloucestershire County Council (2019) (31).



There are 31 Lower Super Output Areas (LSOAS) within Gloucestershire that sit within the 20% most deprived nationally, and 11 within the 10% most deprived nationally for income deprivation. This accounts for 2.8% of the county population living in the 10% most deprived areas, which are listed below in Table 1:

LSOA	District	National Rank (1 most deprived)
Matson and Robinswood 1	Gloucester	766
Podsmead 1	Gloucester	983
Cinderford West 1 *	Forest of Dean	2,084
St Paul's 2	Cheltenham	2,170
Barton and Tredworth 4	Gloucester	2,486
Moreland 4	Cheltenham	2,496
Tuffley 4	Gloucester	2,589
Westgate 1	Gloucester	2,808
St Mark's 1	Cheltenham	2,929
Matson and Robinswood 5	Gloucester	3,051
Hesters Way 3	Cheltenham	3,281

Table 1: Gloucestershire's lower super output areas (LSOA) that sit within the 10% most deprived areas nationally for income deprivation. From: Indices of deprivation 2019, Data and Analysis team, Gloucestershire County Council (2019) (31).

3. Epidemiology of liver disease in Gloucestershire

Data concerning liver disease mortality, hospital admissions and prevalence based on primary care records are presented below. To ensure consistency and comparability, all-cause 'liver disease' has been defined as per the definitions used by the South West HNA and encompasses the ICD-10 codes displayed in Table 2 (below). It should be noted that MASLD is included under the ICD-10 umbrella code K76 ('other disease of the liver'), as subcode K760.

All liver disease:

ICD-10 code	Description
B15	Acute hepatitis A
B16	Acute hepatitis B
B17	Other acute viral hepatitis
B18	Chronic viral hepatitis
B19	Unspecified viral hepatitis
C22	Malignant neoplasm of liver and intrahepatic bile ducts
I81	Portal vein thrombosis
I85	Oesophageal varices
K70	Alcoholic liver disease
K71	Toxic liver disease
K72	Hepatic failure, not elsewhere classified
K73	Chronic hepatitis, not elsewhere classified
K74	Fibrosis and cirrhosis of liver
K75	Other inflammatory liver diseases
K76	Other diseases of liver
K77	Liver disorders in diseases classified elsewhere
T864	Liver transplant failure and rejection

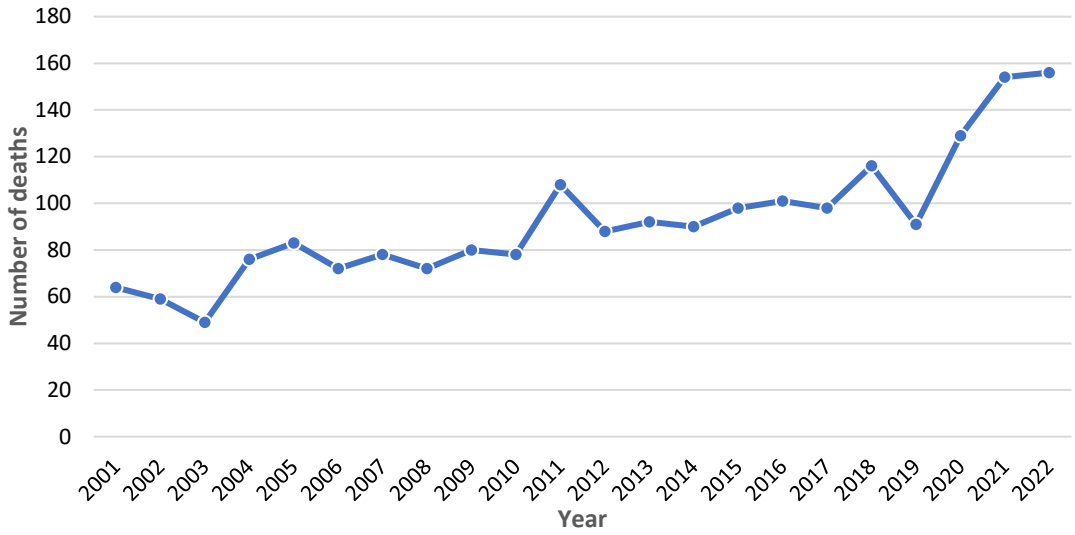
Table 2: ICD-10 codes used to define all-cause liver disease. From: Liver Disease in the Southwest, Public Health England (2015) (27).

Mortality statistics are based on the primary underlying cause of death as designated by the Office of National Statistics (ONS) on receipt of death registration. It should be noted that a significant limitation of this data is that the numerators used to estimate prevalence, and rates are based on population estimates over time from the 2011 census, which have since been updated based on 2021 data, but this information was not available at the time of writing.

Liver disease mortality

The Primary Care Mortality Database (PCMD) is the main source of mortality data used here unless otherwise indicated. Using the definition above for all-cause liver mortality, there has been an overall increasing number of deaths from liver disease occurring amongst Gloucestershire residents between 2001-2022, with some fluctuation between the years (Figure 6).

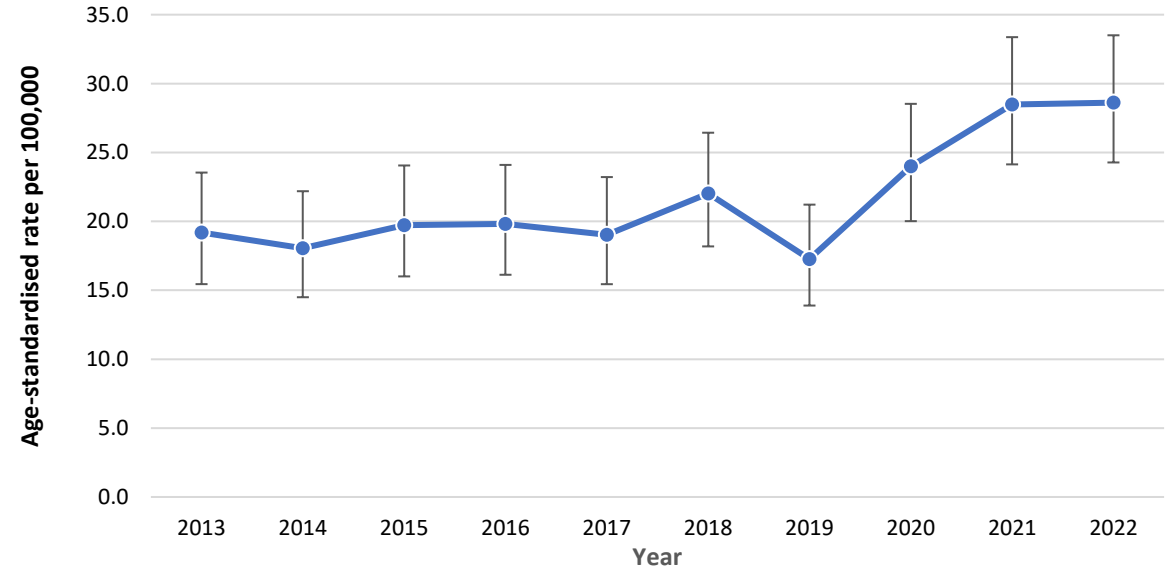
Figure 6: Crude mortality from liver disease for Gloucestershire residents aged 18 and over: 2001-2022



Source: Primary Care Mortality Database

Using age-standardised mortality rates, we can see that there were 28.6 deaths per 100,000 people aged 20 and over in 2022, which is a statistically significant increase compared to the 2013 rate of 19.2 deaths per 100,000 (Figure 7).

Figure 7: Age-standardised motality rates for Gloucestershire residents aged 20 and over: 2013-2022

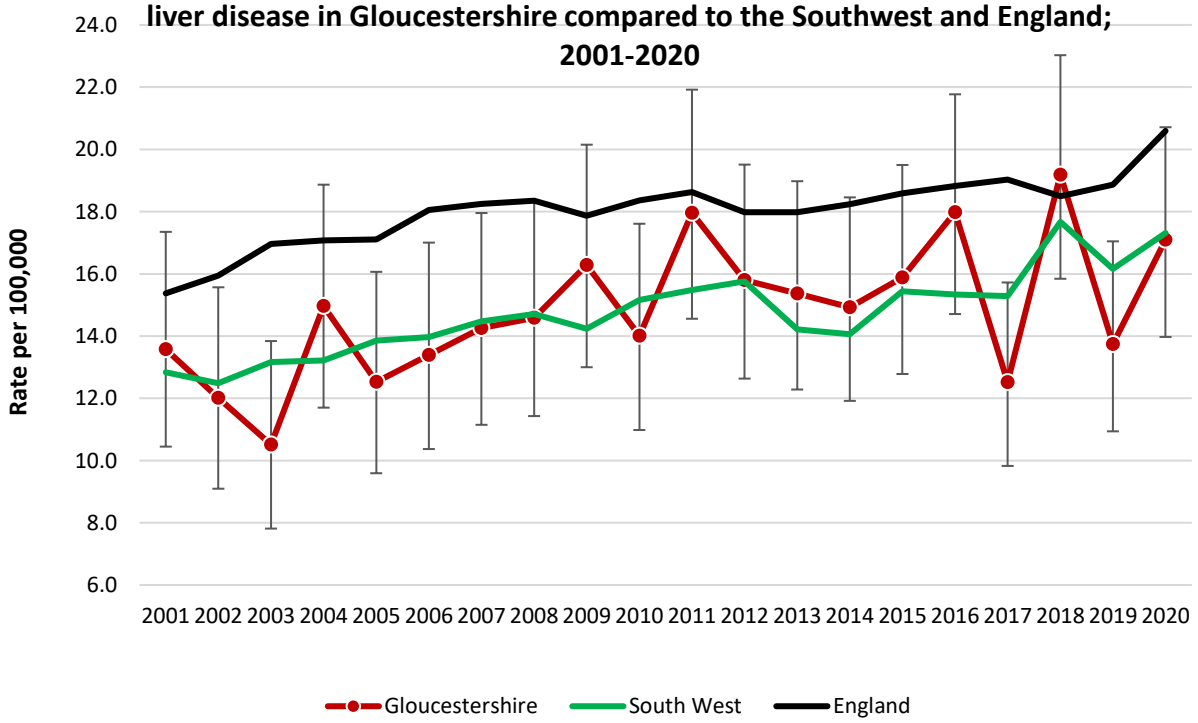


Source: Primary Care Mortality Database

The confidence intervals indicate that the upwards trend across the period became statistically significant in 2021 and 2022 from the rate recorded between 2013-2017, as well as the mortality rate recorded in 2019. This jump in mortality seen from 2020 onwards in Gloucestershire correlates with the COVID-19 pandemic and was mirrored in the region and nationally as seen in Figure 8 (below).

When comparing Gloucestershire's age-standardised liver mortality rate to that of England and the South West, we can see that the mortality rate for Gloucestershire has never been significantly higher than the regional and national at any time between 2001-2020 at which time data is available (Figure 8). This is derived from the Office of Health Improvement and Disparities' (OHID) Liver Profile (Fingertips), which uses official registration of deaths data, and is coded in a slightly different way than the Primary Care Mortality Database. Notably, data is unavailable from Fingertips after 2020, as data for 2021 and 2022 is being updated with new population estimates derived from the 2021 census. Therefore, whilst we can see that all-cause mortality has increased from 2021 onwards in Gloucestershire, we cannot compare this to the national average, and it is not possible to identify whether Gloucestershire is now an outlier in its mortality rates on account of the increase in deaths seen in 2021. A major caveat of the data extracted from the Primary Care Mortality database is that the population estimates used as denominators for data presented between the 2011 and 2021 census have not been updated, and thus it is possible that the mortality rate is over or underestimated. It should also be noted that this data considers under-75 mortality only, whereas the data presented from the primary care mortality database is all adults over 18.

Figure 8: Age-standardised Under-75 mortality rate per 100,000 from liver disease in Gloucestershire compared to the Southwest and England; 2001-2020



Source: Liver disease profile, Office of Health Improvement and Disparities

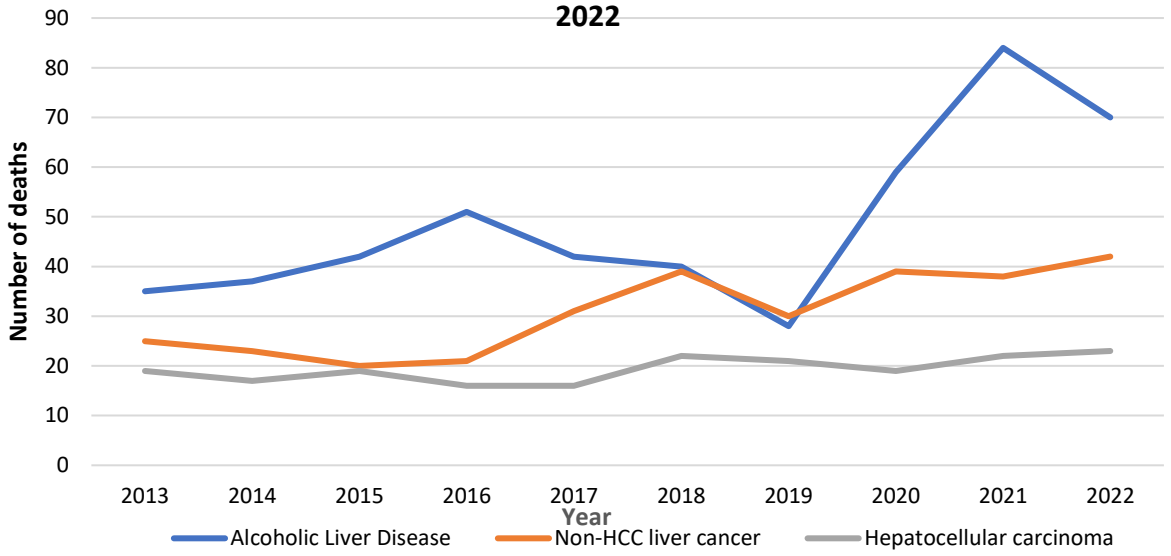
With these caveats in mind, however, it is apparent that mortality rates from liver disease have risen in Gloucestershire since the COVID-19 pandemic (2020 onwards), with this rise becoming statistically significant from 2021 onwards. This is in keeping with the predicted and observed adverse impact of COVID-19 on liver health seen around the world, which may be partly explained by the disruption of healthcare services, leading to missed opportunities for early diagnosis and intervention, as well as deferred routine care for those with established liver disease (32; 33). In addition, increased alcohol use and weight gain has been documented during periods of 'lockdown' throughout the pandemic which, alongside the risk of COVID-19 infection itself, is likely to have led some individuals with compensated cirrhosis (both known and unknown) tipping into the decompensated state, who may then have faced barriers to accessing - all of which are likely to have contributed to increased mortality (33; 32).

Specific causes of liver death

Crude liver disease mortality broken down by its top three causes over 2013-2022 is displayed in Figure 9. The top three causes in order of frequency are 1) alcohol-related liver disease (ICD code K70), 2) hepatocellular carcinoma (HCC) (ICD code C220) and 3) non-hepatocellular carcinoma (non-HCC) liver cancers (representing intra-hepatic bile duct carcinoma (code C221), hepatoblastoma (C222) (which is very rare in adults), angiosarcoma of the liver (C223) and unspecified liver cancer (C229). It is notable that whilst both alcohol-related liver disease and non-hepatocellular carcinoma deaths have risen sharply from 2020 onwards, the increase for alcohol-related liver deaths has been much sharper, with just over 40 deaths from non-HCC cancer occurring in 2022, and approximately 70 occurring for individuals with ALD. When all deaths from liver malignancy are considered together, however, (non-HCC and HCC liver cancer), there is a smaller difference in the crude numbers dying from ALD vs liver cancer, noting that it is not possible to discount the play of chance in these (small) numbers. We also know that harmful alcohol use is a major risk factor for hepatocellular carcinoma (and other cancers), contributing to at least 15-30% of cases, and thus is likely to be a prominent underlying driver for a significant proportion of the liver cancer deaths in Gloucestershire (particularly the HCCs), as well as more directly causing death from ALD (34).

The upward trend from 2020 onwards in the crude mortality from ALD is suggestive that this is likely to be the main driver of the overall increase in all-cause liver mortality in the same period. This is again exemplified in Figure 10 which shows the proportion of all liver disease deaths occurring due to the top five underlying causes for 2018-2022 and 2013-2022.

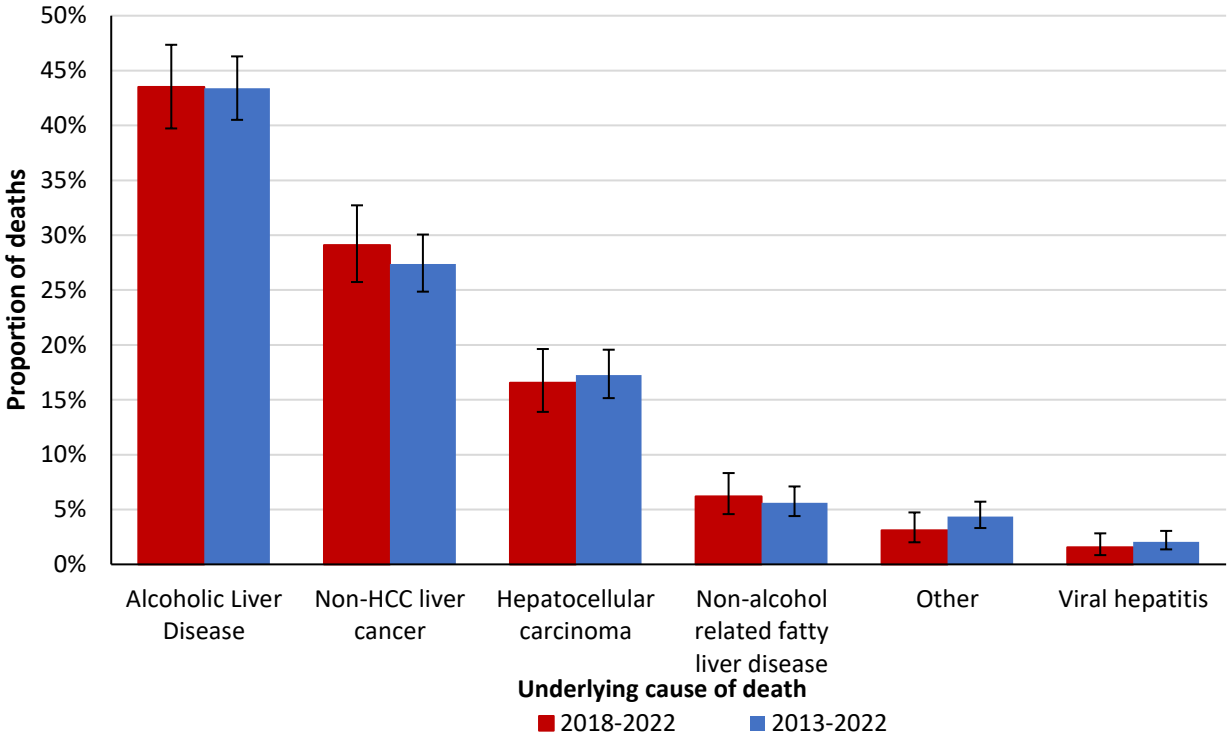
Figure 9: Top 3 causes of liver disease deaths in Gloucestershire: 2013-2022



Source: primary care mortality database

From Figure 10 we can see that just over 40% of liver disease deaths over time have been due to alcohol-related liver disease.

Figure 10: Proportional underlying causes of liver disease deaths in Gloucestershire: 2013-2022 and 2018-2022



Source: primary care mortality database

Non-hepatocellular carcinoma liver cancer has accounted for just under 30% of deaths, Hepatocellular carcinoma contributing 17% of deaths, and MASLD and viral hepatitis represent a much smaller proportion of deaths, at 6.2% and 1.5%, respectively.

Alcohol-related liver mortality as a proportion of all liver deaths reached an all-time high in 2021, representing 54.5% of deaths in this year. This is in keeping with a wider trend across England, and in many industrialised countries, where alcohol-related liver disease deaths saw an unprecedented increase during the pandemic, associated with an increase in alcohol purchasing, consumption and higher risk drinking by those who were already drinking heavily before the pandemic begun, likely leading to an increased number of individuals with underlying ALD tipping into decompensated cirrhosis and fulminant liver failure (6). In 2020, across England, there was a 21% increase in ALD deaths compared to deaths recorded in 2019, whereas between 2018 and 2019 the increase was under 3% (6)

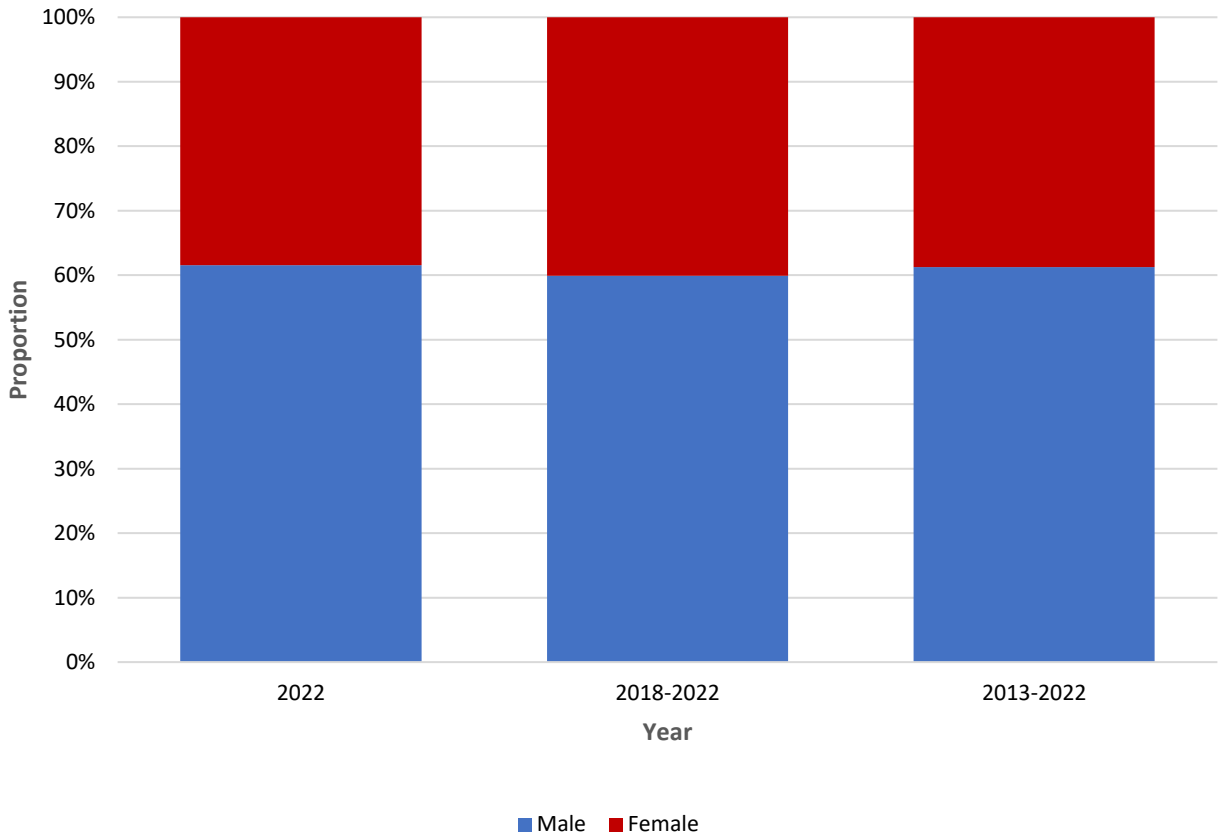
Liver cancer has been identified as amongst the fastest increasing cancers in both incidence and mortality in the UK (35). According to the statistics by Cancer Research UK, the 1-year and 5-year relative survival for liver cancer are around 38% and 13%, respectively, with patients who are diagnosed at earlier stages generally having better survival outcomes, as they are more likely to receive treatments with curative intent (35). In contrast, patients who receive a diagnosis of liver cancer on presentation to A&E (or other emergency presentation) have the poorest prognosis (35).

Demographics of those dying from liver disease in Gloucestershire

Gender

The gender distribution for all-cause liver mortality deaths in Gloucestershire has been quite consistent over time, with approximately 60% of the deaths occurring in men (Figure 11). This represents a gender inequality, as men make up around 49% of the population of the county but is in keeping with national and regional figures and correlates with the higher proportion of men than women who drink to higher-risk levels at a national level (36; 37).

Figure 11: Proportion of all-cause liver disease deaths by gender in Gloucestershire: 2013-2022

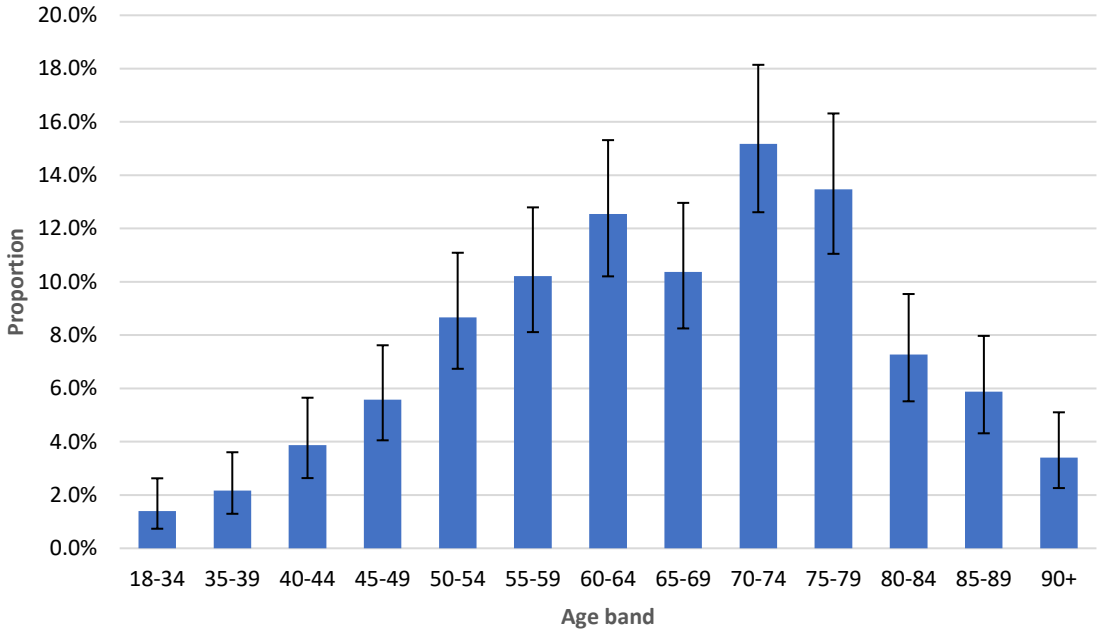


Source: primary care mortality database

Age

The age distribution of liver disease deaths in Gloucestershire is presented in Figure 12 and indicates that all-cause liver mortality occurs most commonly in the 70-74 age group, between 2018-2022. From 2018-2022, just under 90% of deaths occurred in people over the age of 50, and more than 50% occurred in those over 65. The age distribution from 2013 onwards is similar. This is in keeping with national trends and correlates to the relatively long latent period of liver disease – noting that many of the risk factors for liver disease will be occurring from young adulthood.

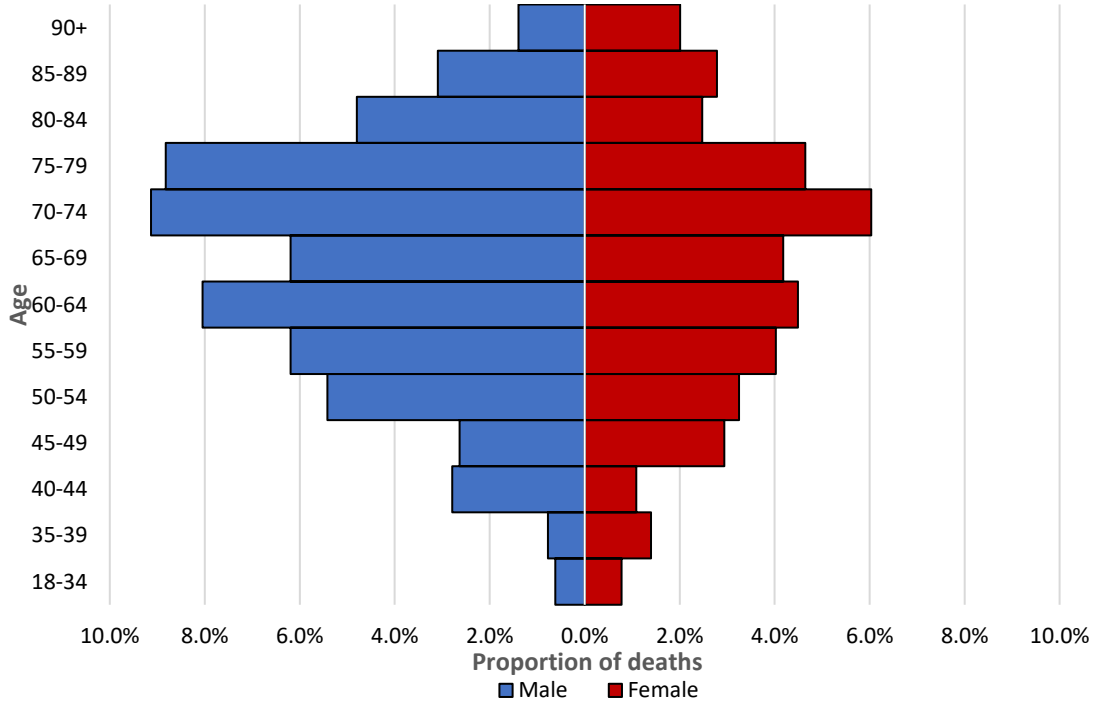
Figure 12: Proportion of all-cause liver disease deaths by age in Gloucestershire:2018-2022



Source: Primary Care Mortality Database

When reviewing the age and gender distribution of all-cause liver mortality from 2018-2022 (Figure 13), there is a higher proportion of male deaths in each age group compared to females, except for those aged 34-and-under (grouped together due to small numbers) and for those over 90**.**

Figure 13: Proportion of liver disease deaths per age bracket and gender in Gloucestershire: 2018-2022



Source: Primary Care Mortality Database

This may be due to the faster rate of progression of alcohol-related liver disease seen in women than men, resulting in death at a younger age, as well as the longer life expectancy seen in women at a population level, which may mean that more women are alive to develop liver disease, in particular liver cancers, in the over 90 age-bracket.

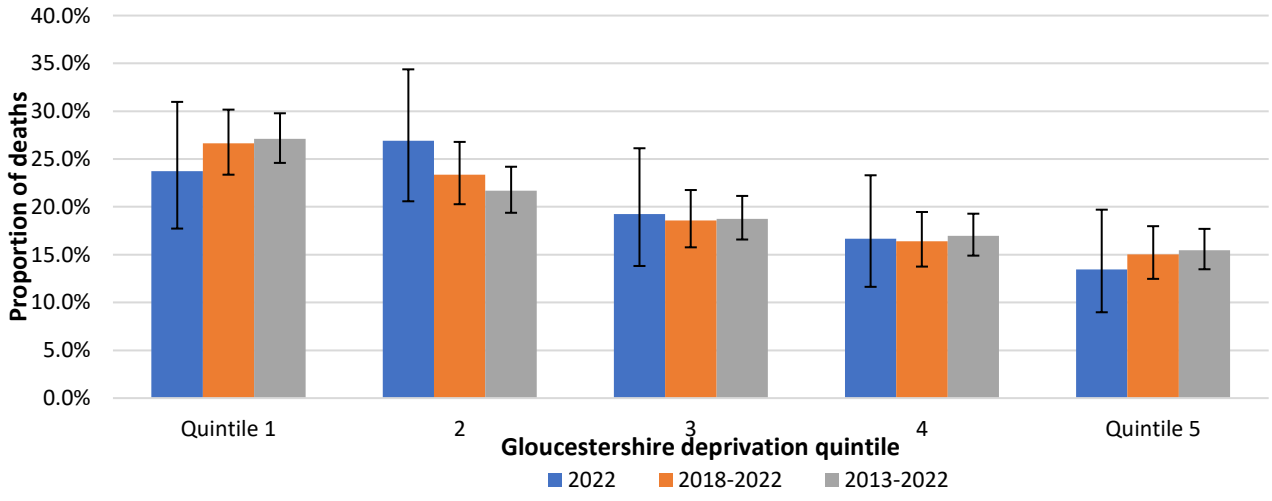
It should be noted that data relating to gender-diverse individuals has not been captured here but are likely to represent small numbers in the county.

Deprivation

When mortality is broken down by local deprivation quintile, there is clear evidence of social patterning of liver disease deaths (Figure 14). Just over a quarter of the people who died from liver disease in the last 10 years lived in the two most deprived deprivation quintiles compared to just under half of people dying in the last 10 years living in the two least deprived quintiles.

In the five- and ten-year period data shown in Figure 14, there is a significant difference between the most and least deprived quintiles, whilst this is not reflected in 2022 data alone, where numbers are smaller. In general, there is an overrepresentation of people dying from liver disease in the two most deprived quintiles compared to the overall proportion of Gloucestershire residents living in each deprivation quintile. Conversely, there is an underrepresentation of people dying from liver disease in the two least deprived quintiles compared to the overall Gloucestershire proportion.

Figure 14: Liver disease deaths in Gloucestershire per county deprivation quintile: 2013-2022



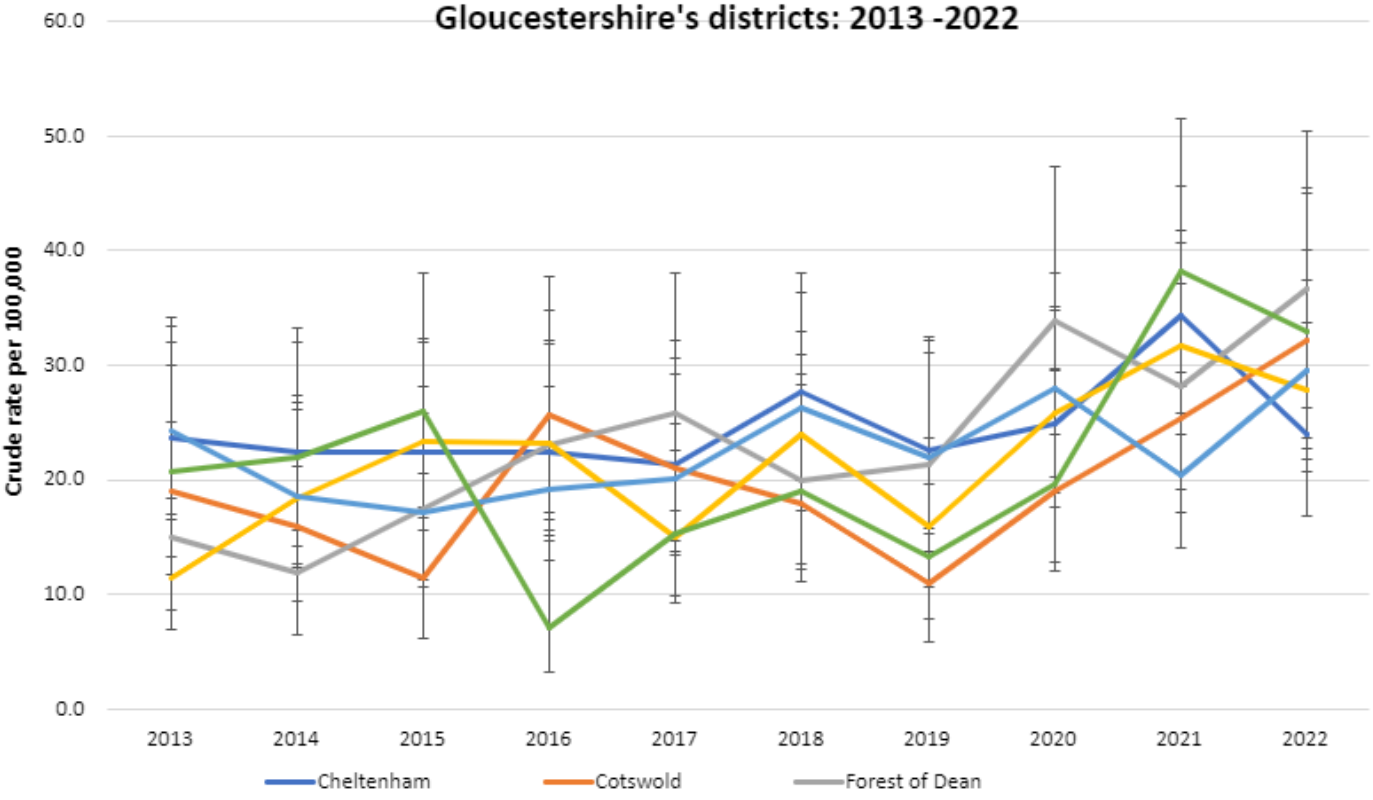
Source: Primary care mortality database

Disparities in liver disease mortality by deprivation thus represents a significant inequality in Gloucestershire, which is mirrored across the region and nationally.

District

The liver disease mortality rate from 2013-2022 per district is shown in Figure 15 and indicate an upward trend in deaths across all districts over the period. Whilst there is no statistically significant outlier in terms of mortality rates across the districts, the lowest proportion of liver related deaths in the county is seen in the Cotswolds, with Tewksbury district also seeing a mortality rate lower-than the county average, which did reach statistical significance in 2016, only.

Figure 15: Liver disease mortality rate, per 100,000 across Gloucestershire's districts: 2013 -2022



Source: Primary care mortality database

Other considerations

It is important to acknowledge that there is clear evidence from other work that individuals dying from liver disease often experiencing challenging and complex end of life care needs, and barriers to accessing supportive palliative care (30; 41). The reason for this complexity and the barriers faced are multifactorial, but for many includes issues such as stigma, complex symptomatology, prognostic uncertainty, drug or alcohol dependency and chaotic social circumstances for some (30). Significant inequity also exists in the provision of palliative care for patients with

advanced liver disease when compared to others who have differing life limiting or otherwise significant illnesses, such as cancer (41). Quality of symptom management and access to palliative care and advanced care planning is beyond the scope of this needs assessment, but is an important consideration for this cohort, particularly given increasing local mortality from liver disease, and should be a consideration by the system for this group.

From our data, we do not know where individuals with liver disease within Gloucestershire have died, but we do know that across England 70% of deaths from liver disease occur in a hospital setting, rising to 80% where people have a diagnosis of alcohol-related liver disease, a figure that is much higher than for other diseases, such as cancer, where only 40% of deaths occur in hospital (41). The reasons for this are likely multi-factorial, but notably only 30% of patients with advanced liver disease in England are referred to specialist palliative care services, which is at odds with best practice guidance from the British Society of Gastroenterology on the care and management of individuals with decompensated liver disease (41; 27).

Summary and main themes from mortality data

- Rising all-cause mortality from liver disease is seen in Gloucestershire over time, with a significant upwards trend correlating with the COVID-19 pandemic. Rising liver mortality was noted by the Getting It Right First Time (GIRFT) review of liver care in Gloucestershire in 2019.
- The main cause of liver death in Gloucestershire is alcohol-related liver disease, in keeping with national trends. The proportion of deaths from alcohol-related disease rose from 2020, peaking in 2021 at just under 55% of all death.
- Rising deaths from ALD is likely to be associated with the increasing patterns of alcohol consumption seen nationally during the COVID-19 pandemic, particularly amongst individuals who already consumed alcohol to higher levels prior to this period, leading to decompensation of underlying liver disease, and subsequent death.
- Alcohol-related disease is also likely to be a prominent driver of primary liver cancers, which are the second most common cause of liver-related death in the county. Primary liver cancers are rising in incidence across the UK with generally poor survival.
- There is a higher proportion of cases of non-hepatocellular carcinoma mortality than hepatocellular carcinoma mortality in the county, which is in keeping with better survival and prognosis seen in HCC than other primary liver cancers (38).
- MASLD, viral hepatitis and ‘other’ liver disease contribute to a smaller proportion of mortality seen.
- There is clear social patterning of liver disease mortality, with a statistically higher death rate for those living in the most deprived areas of Gloucestershire, compared to the least deprived. This is in keeping with national trends and represents a significant local inequality.

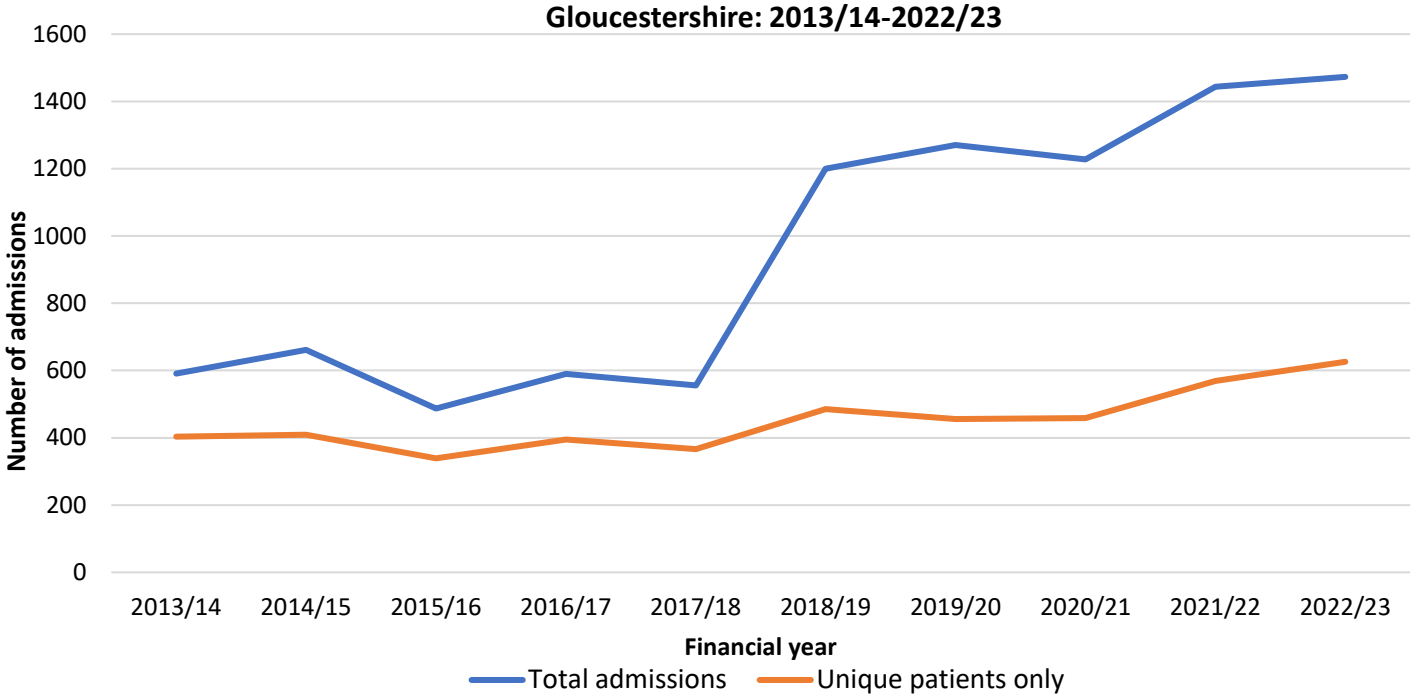
- There is no single district in Gloucestershire where mortality is significantly higher than the Gloucestershire average.
- 90% of the deaths in Gloucestershire are occurring in those over the age of 50, with 50% also aged over 65.
- Gender inequality is also seen in who is dying from liver disease in the county, with, for almost all age groups, a higher proportion of male versus female deaths, with the expectation of those aged 34 and under and those aged 90 and above.
- Patients dying from liver disease are a group who experience an identified inequity in access to palliative care services at the end of life, and in the receipt good symptom control during decompensated liver failure. Access to palliative care services and quality of end-of-life care are beyond the scope of this review, but should be a local consideration going forward, considering the increasing mortality we are seeing and the documented inequity in access to these services that people dying from liver disease face.

Liver disease hospital episodes

Unless stipulated otherwise, the following data around hospital admissions for liver disease refers to admitted patient care episodes where liver disease is deemed to be the primary cause of attendance. Admissions are presented per the financial year.

Figure 16 shows the total number of admitted patient care episodes where liver disease has been stipulated as the primary cause of admission between 2013/14 and 2022/23. The total number of admissions sharply increased from 2018/19 onwards, with admissions in 2022/23 more than double what they were in 2013/14, rising from 591 to 1473 over this period.

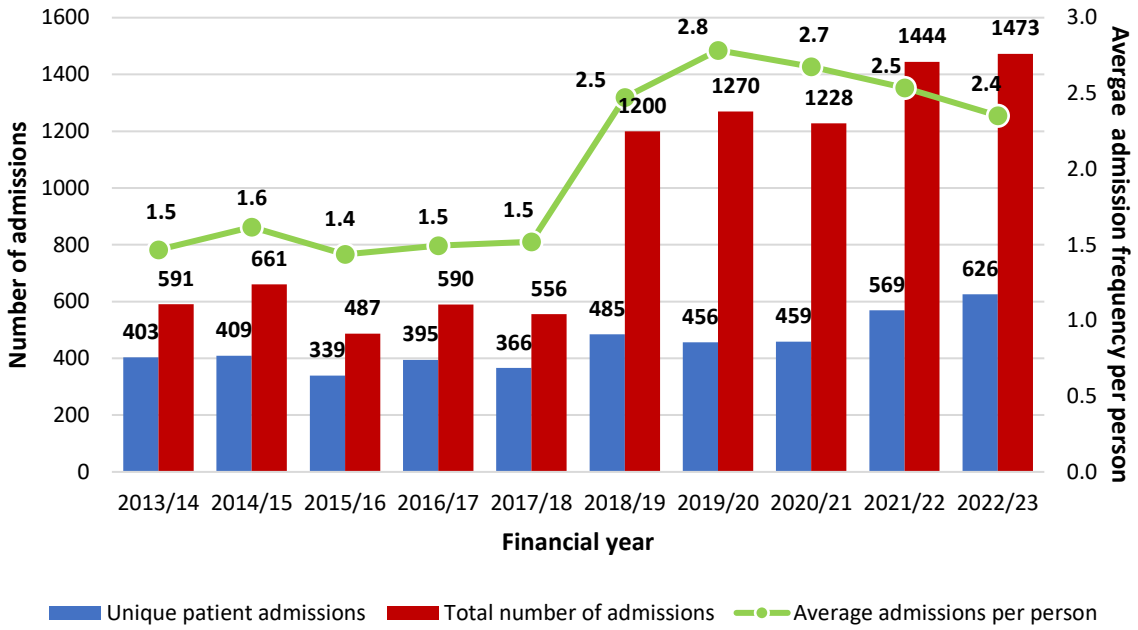
Figure 16: Admitted patient care episodes (total and unique patients) for liver disease Gloucestershire: 2013/14-2022/23



Source: admitted patient database

When the analysis is limited to the number of unique individuals admitted per year (orange line, Figure 16), rather than total hospital episodes (where admission numbers are counted, rather than individuals, meaning the data is inclusive of repeated admissions of the same person in one year) the increase in admissions is far less marked over time, with the gap between admissions for unique patients only, versus the total number of admissions, also widening significantly from 2018/19 onwards.

Figure 17: Annual unique patient care episodes, total admissions and average admissions per person per year where liver disease is the primary reason for admission; Gloucestershire: 2012/13-2022/23



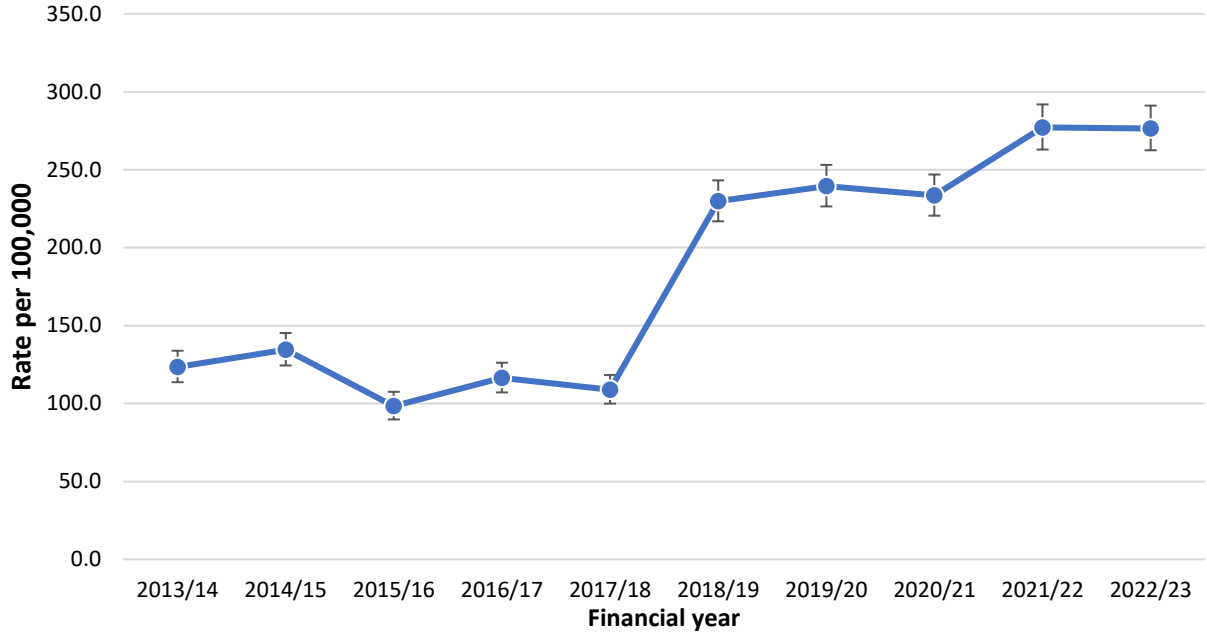
Source: admitted patient care database

The number of unique and repeated admissions per year is also depicted in Figure 17, along with the average number of admissions per person, per year (green line, Figure 17). This again clearly shows the sharp increase in total admission numbers in 2018/19, as well as a less marked increase in the proportion of these that were only admitted once over the cause of the year, where liver disease was the primary cause. Except for 2020/21, there has been a year-on-year increase in the total number of admissions since 2018/19, however, the number of unique patients didn't noticeably increase beyond 2018/19 until 2021/22. In 2022/23 there was a total of 1473 admissions by 626 unique patients where the primary diagnosis was liver disease, meaning that more than 50% of the total admissions represent individuals who are being admitted recurrently.

Since 2019/20 there has also been a year-on-year increase in the average number of admissions per patient. In 2022/23, there was an average of 2.4 admissions per unique patient which is an increase of 0.9 admissions compared to 2013/14.

When the admission data is age-standardised, the admission rate per 100,000 (including repeat admissions over the course of each year) population again shows a jump from 2017/18 to 2018/19, which is statistically significant (Figure 18). There was also a statistically significant increased rate in admissions from 2020/21 to 2022/23. At the start of this time series, in 2013/14, the hospital admission rate was 123.5 per 100,000, and by 2022/23 it is 276.6 per 100,000, representing an almost three times increase in admissions over the 10-year period.

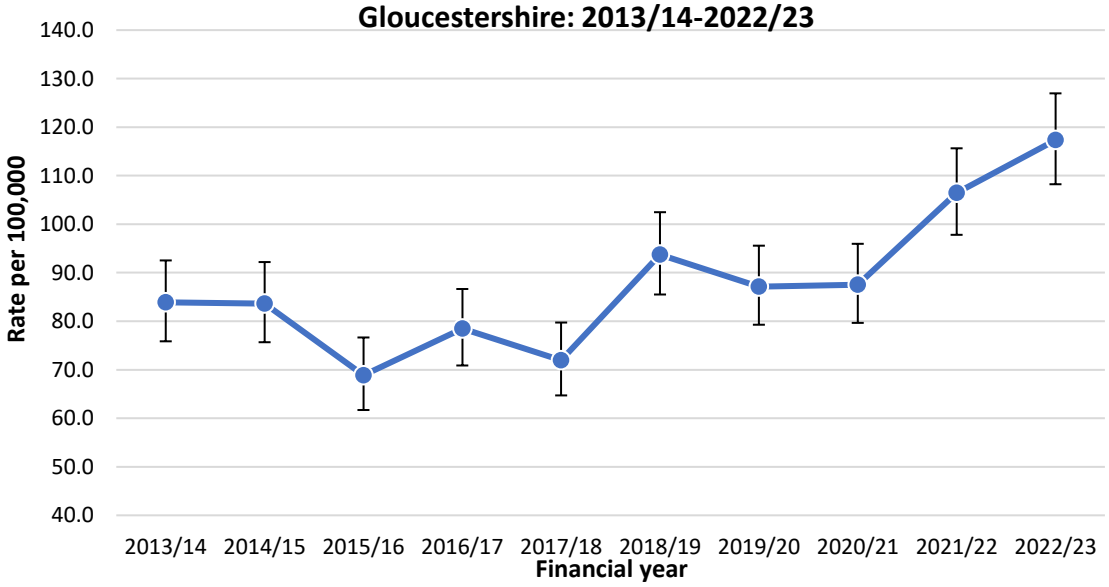
Figure 18: Age-standardised hospital admission rate for liver disease hospital episodes (all admissions) per 100,000 population aged 20 and over, Gloucestershire: 2013/14-2022/23



Source: admitted patient care database

When the age-standardised rate of admissions for unique patients are considered only, rather than total hospital episodes again we see an increase in rate from 2017/18 to 2018/19, which is statistically significant, a further increase in 2022/23 reaching statistical significance from 2020/21 (Figure 19).

Figure 19: Age-standardised liver disease admission rate for unique patients only per 100,000 population aged 20 and over in Gloucestershire: 2013/14-2022/23



Source: admitted patient care database

This corroborates the evidence that individuals being admitted recurrently over a single year make up more than half of the total hospital episodes year-on-year, whilst the number of unique patients being admitted is also increasing.

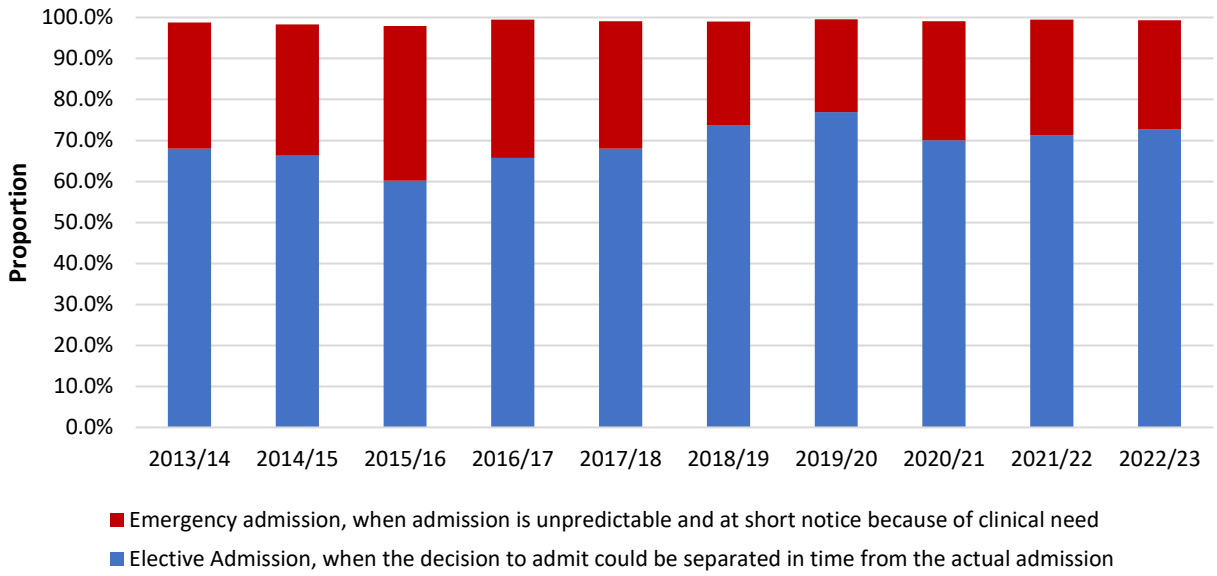
Rising hospital episodes from 2018, particularly for individuals experiencing repeated admissions, are notable and raises questions as to the underlying driver of this - whether this be due to increasing morbidity, barriers to accessing scheduled care (such as hepatology outpatients and primary care), gaps in tertiary prevention measures to minimise the risk of decompensated liver disease or other complications (for example, oesophageal varices), or inadequate application of end of life care, including barriers to accessing palliative care services. Whilst we know that unscheduled hospital admissions for liver disease, particularly in ALD results in an increased risk of death, we also know that hospital readmission for patients with cirrhosis is an independent risk factor for mortality (44).

For the purpose of this needs assessment, it was not possible to link hospital episodes with mortality data or to stratify the risk of death by the frequency of hospital episodes for a singular individual, however, drawing on wider evidence it seems likely that increased admissions per person suggests increased complexity within the cohort, potentially unmet need and gaps in prevention and longer term care planning, and may well have correlated with rising mortality also seen within the county. There is good evidence that early provision of palliative care leads to improvements in symptoms, quality of life and reduced healthcare use and even increased survival with people with serious illness, and there are clear guidelines around thresholds for referral of patients with liver disease to palliative care services – including those who have had two or more unscheduled admissions within the last six months, or for those who are thought to be within the last year of life (42; 28). Aggregated data from 2015-2018 across England shows that individuals who die of liver disease have the highest proportion of emergency admissions within the last three months of life, compared to those dying from other causes, which can suggest poor identification of people at risk of death, poor planning and availability of services and/or poor communication, co-ordination and information sharing, and may well be relevant locally (43).

Alternative explanations for increasing hospital episodes, including recurrent admissions, include a change in coding practise, or an increase in planned admissions for elective treatment, rather than emergent/unscheduled care. To explore whether coding practices have changed, we spoke with the Business Intelligence Unit at Gloucestershire Hospitals NHS Foundation Trust. The team advised that quality improvement work had been completed in relation to improving the coding of co-morbidities (depth of coding), which came into effect in August 2022, but no other changes had been made which would explain the increase in admissions seen.

To explore whether the increase in admissions represents an increase in elective versus unscheduled admissions, the proportion of emergency versus elective admissions for all annual hospital episodes where the primary diagnosis is liver disease is displayed in Figure 20:

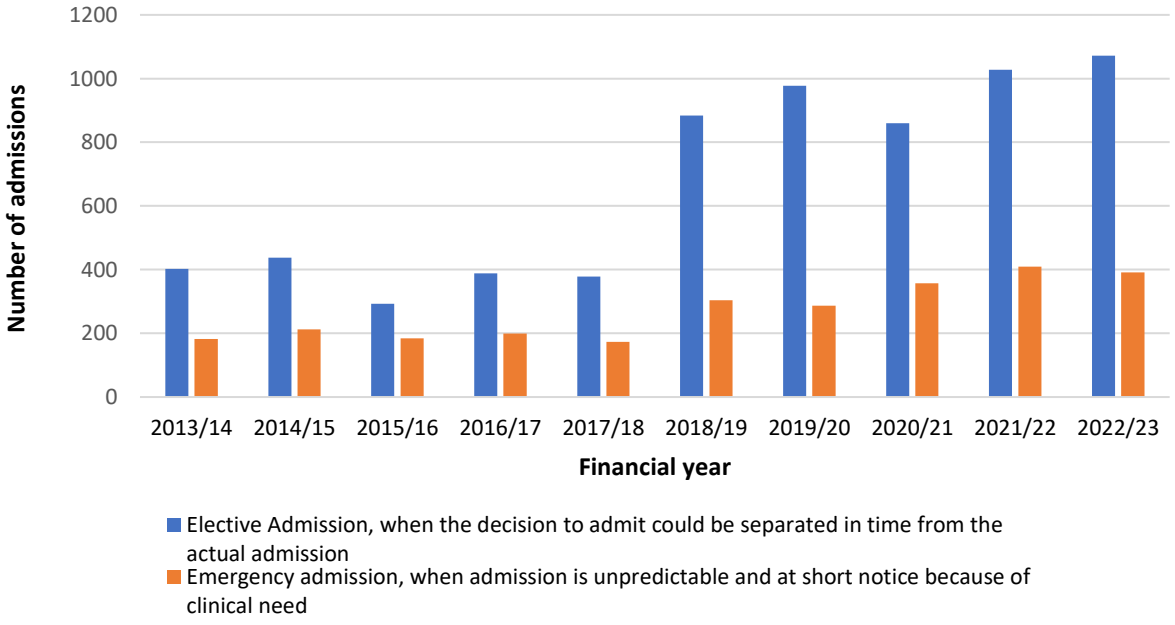
Figure 20: admission method for all hospital episodes where the primary diagnosis is liver disease: 2013/14-2022/23



Source: Admitted patient care database

A consistently higher proportion of patients are being admitted electively, rather than in an emergency, with liver disease (between 60-75% of admissions being elective over time) – suggesting that these are planned admissions as part of scheduled treatment, rather than unscheduled care where there has been decompensation of liver disease or other complications.

Figure 21: Admission method of patients with a primary diagnosis of liver disease: elective versus emergency: 2013/14-2022/23



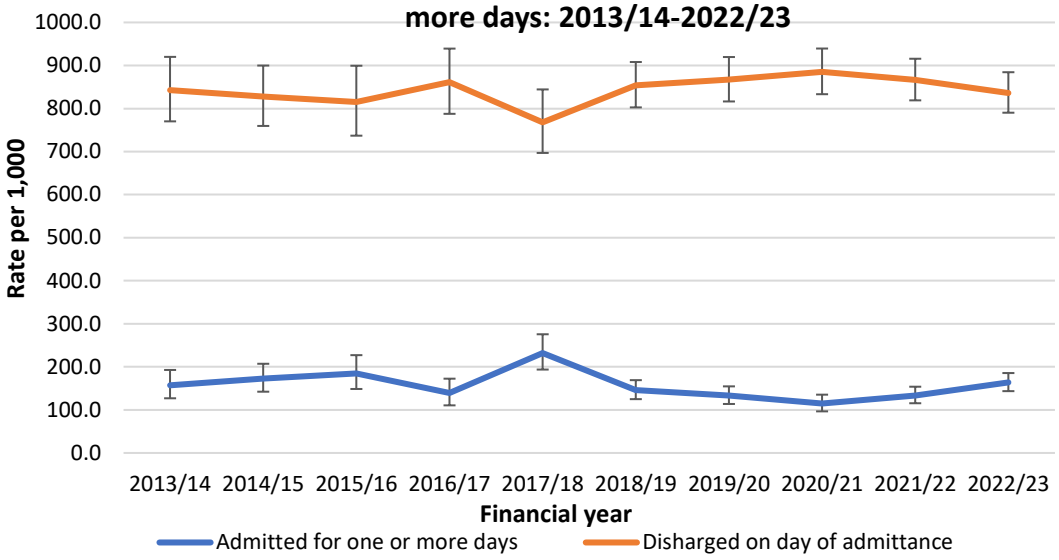
Source: admitted patient care database

When reviewing actual numbers of elective versus emergency admissions over time (Figure 21) we can see that there is an increase in both categories between 2013/14 and 2022/23. In 2013/14 there were 402 elective admissions and 182 emergency admissions with liver disease, which had increased to 1072 elective admissions and 391 emergency admissions in 2022/23. This represents an increase of 2.66-fold for elective admissions, and 2.15-fold increase for emergency admissions. Therefore, it appears that whilst most admissions continue to be elective in nature, the increase in admissions overall appears likely to be due to both increasing elective and emergency admissions, suggesting that there is an increasing burden of liver disease in the county that represents increasing demand on all forms of hospital-level care.

On discussion with the hospital service, it was reported that there are a large number of patients year-on-year who undergo elective paracentesis for ascites (a complication of liver cirrhosis and hallmark of decompensated disease), and that whilst these are generally day-case procedures, they have previously been identified by a Getting It Right First-Time review (2019) as being coded as admitted patient care episodes. The report recommended that coding practises be reviewed and that discrepancies such as this be changed, however, we have confirmed with the hospital that day-case paracentesis continues to be coded as inpatient activity. The hospital reported that day case paracentesis has been consistently coded in this manner, with no apparent change in coding practice which would lead to the sharp change in admission numbers seen. It is important to note, however, that demand for elective care does appear to be going up, which may represent an increased burden of patients with liver cirrhosis and complications of this, or potentially improved access to secondary care services. Notably, the ICD-10 code for ascites (R18) is not included in the South West HNA's definition of liver disease, and so any hospital episodes records where the primary diagnosis is coded as such have not been included in this analysis, and thus any elective activity falling under code R18 cannot be contributing to the trends seen. The exact code used by the hospital to characterise their admissions for ascitic drains is unclear, however, and has not been confirmed by the hospital by the time of writing.

To investigate the degree to which the admission data is being influenced by day-case admissions, we have analysed the number of individuals admitted and discharged on the same day (who may be more likely to be electively admitted for a procedure) versus those admitted for one or more days Figure 22 shows the rate of liver disease admissions per 1,000 for both categories:

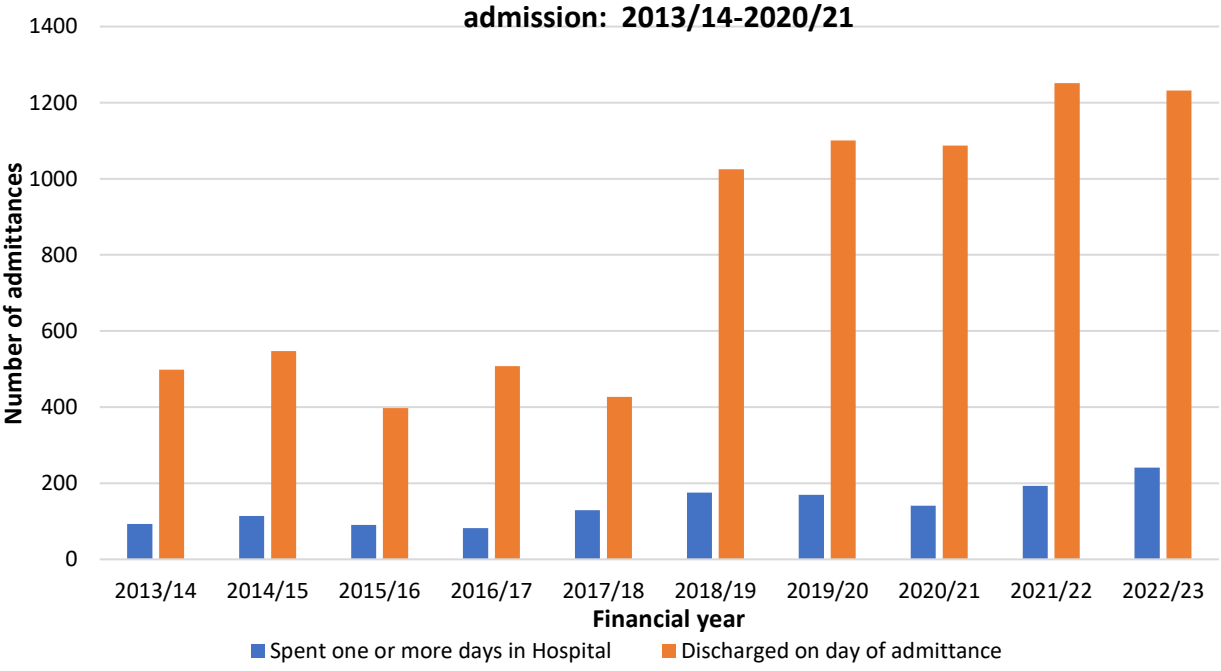
Figure 22: Liver disease hospital episode admission rate per 1,000 for those discharged on the same day versus admitted for one or more days: 2013/14-2022/23



Source: admitted patient care database

Whilst there has been a large increase in patients who are admitted and discharged within a 24-hour period from 2018/19 onwards, this does not translate into a statistically significant increase.

Figure 23: number of hospital episodes with liver disease by duration of admission: 2013/14-2020/21



Source: admitted patient care database

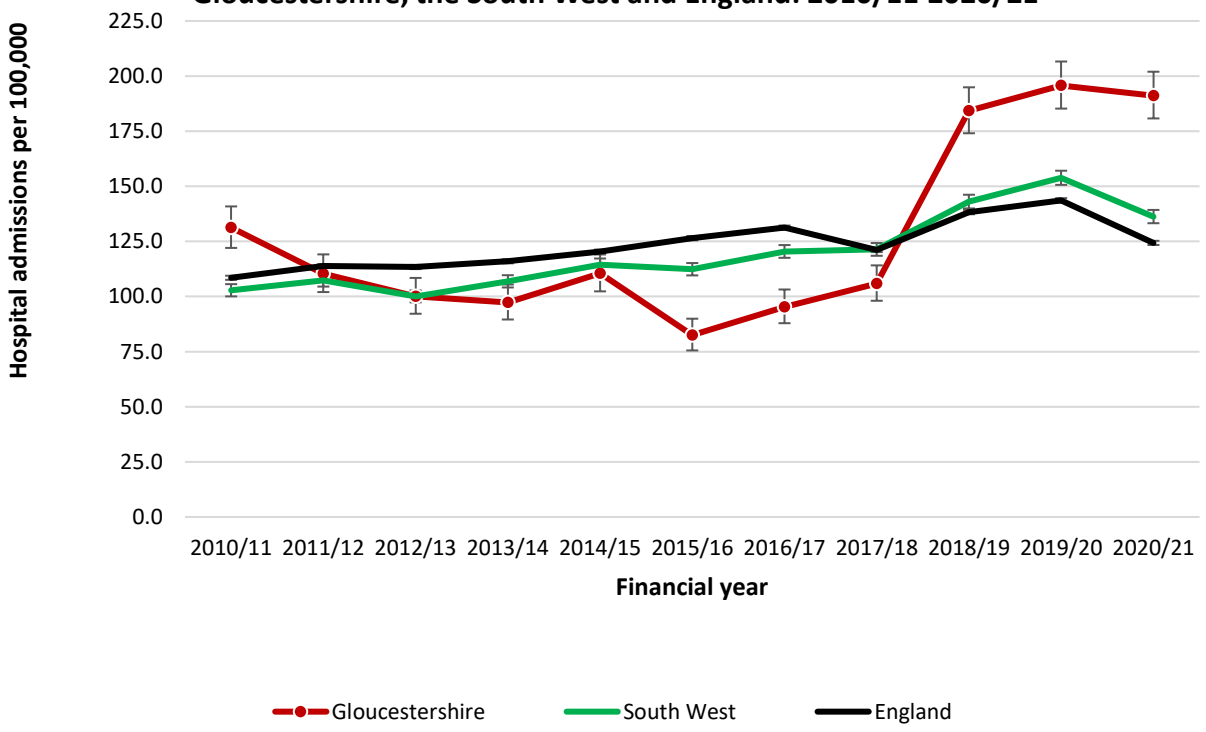
When crude numbers of hospital episodes are reviewed over time, split up by the length of stay (discharged on day of admission version staying more than one day in hospital), we again see a rise in both categories, with a large increase in short-term admissions between 2017/18 and 2018/19, with a continued yearly increase of both (Figure 23).

Whilst elective admissions are contributing to a large proportion of hospital episodes, there are also increasing numbers of unscheduled hospital events, which are associated with increased short- and long-term mortality for liver disease and is a concerning trend. Increasing elective admissions may represent an overall increased burden of liver disease in Gloucestershire, requiring increased demand on the hospital level care.

Comparison with neighbours and national picture

When comparing hospital admissions for liver disease in Gloucestershire to the regional and national average, Figure 24 shows that whilst we have previously seen fewer admissions per 100,000 than both the region and national average (2015/16-2017/18), from 2018/19 onwards, Gloucestershire now has more admissions per 100,000 than nationally or regionally, which is statistically significant. Across the South West and England, an increasing trend was also seen from 2017/18 to 2018/19, however, this rise was not as sharp as that seen for Gloucestershire.

Figure 24: Liver disease hospital admission rate (all hospital episodes) in Gloucestershire, the South West and England: 2010/11-2020/21



Source: Fingertips

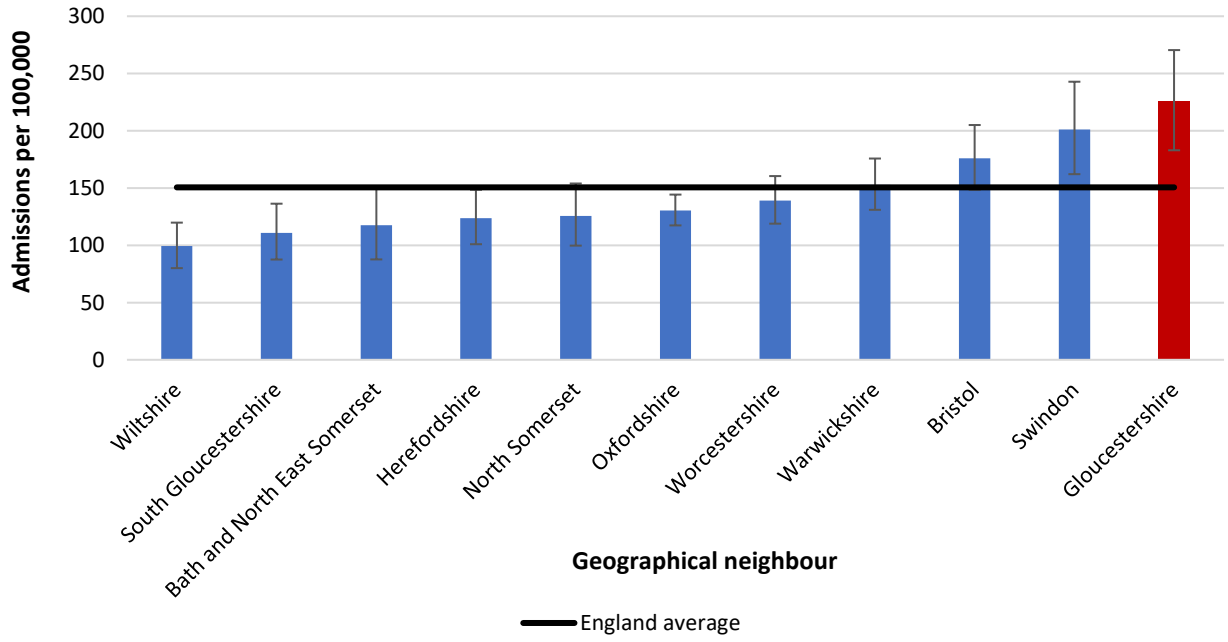
Whilst the data presented in the graph are only inclusive of 2020/21, updated data from Fingertips confirms Gloucestershire remains an outlier in terms of liver disease admissions in 2021/22 and 2022/23, with 225.9 admissions per 100,000 (CI=183.0-270.5), compared to 150.6 per 100,000 (CI=148.3-152.9) across the South West and 150.6 per 100,000 (CI=148.3-152.9) for England.

It is notable that hospital episodes presented on Fingertips includes both elective and emergency admissions for all regions, as in Gloucestershire, but it is unclear how other Local Authorities code day case procedures such as elective paracentesis, and whether they are counted as inpatient activity. Regardless, as there has been no change in coding that we have been able to identify over time, the increase in hospital episodes over time for Gloucestershire appears to be true, with the proportion of elective admissions versus emergency admissions appearing relatively stable over time, suggesting increasing burden of liver disease and demand for hospital services in the county for those with liver ill health. What is more, increasing admissions per person appears to be a significant contributor to rising hospital episodes, indicating increasing complexity of the cohort.

Geographical neighbours

In terms of geographical neighbours, Gloucestershire has a higher rate of admissions per 100,000 (reaching statistical significance) than eight of its neighbouring local authority areas in England (Figure 25). Notably, hospital episodes in Gloucestershire are not significantly different to those in Bristol and Swindon, which are both urban areas with higher levels of deprivation than Gloucestershire, where you might expect to see higher levels of alcohol related harm.

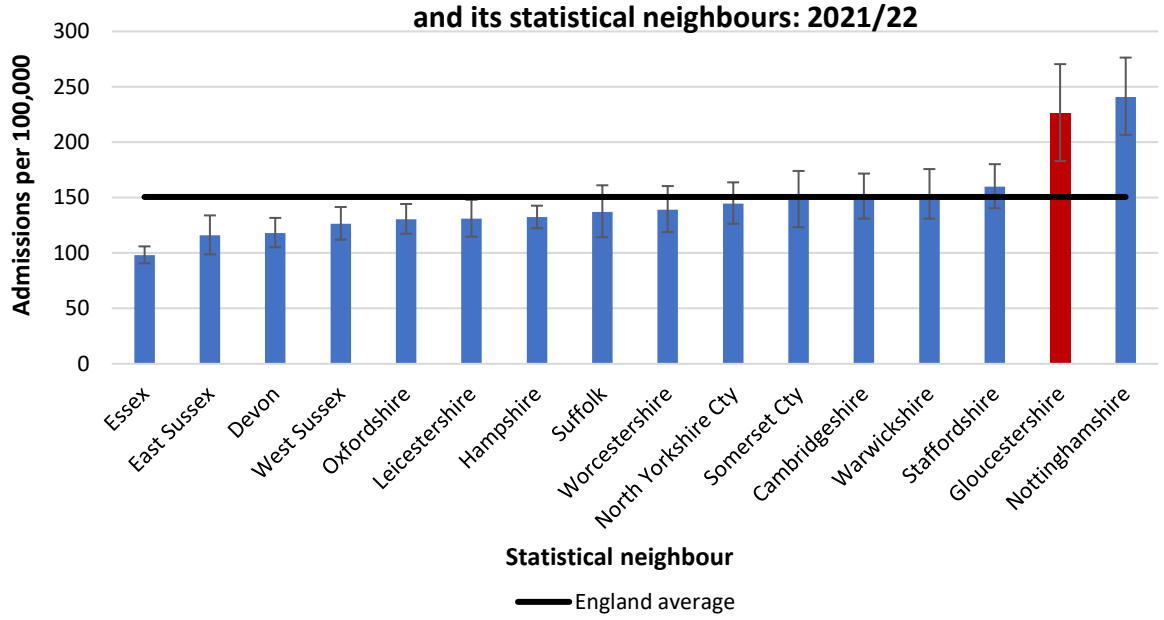
Figure 25: Hospital admission rate for liver disease in Gloucestershire and its geographical neighbours: 2021/22



Source: Fingertips

Statistical neighbours

Figure 26: Hospital admission rate for liver disease in Gloucestershire and its statistical neighbours: 2021/22



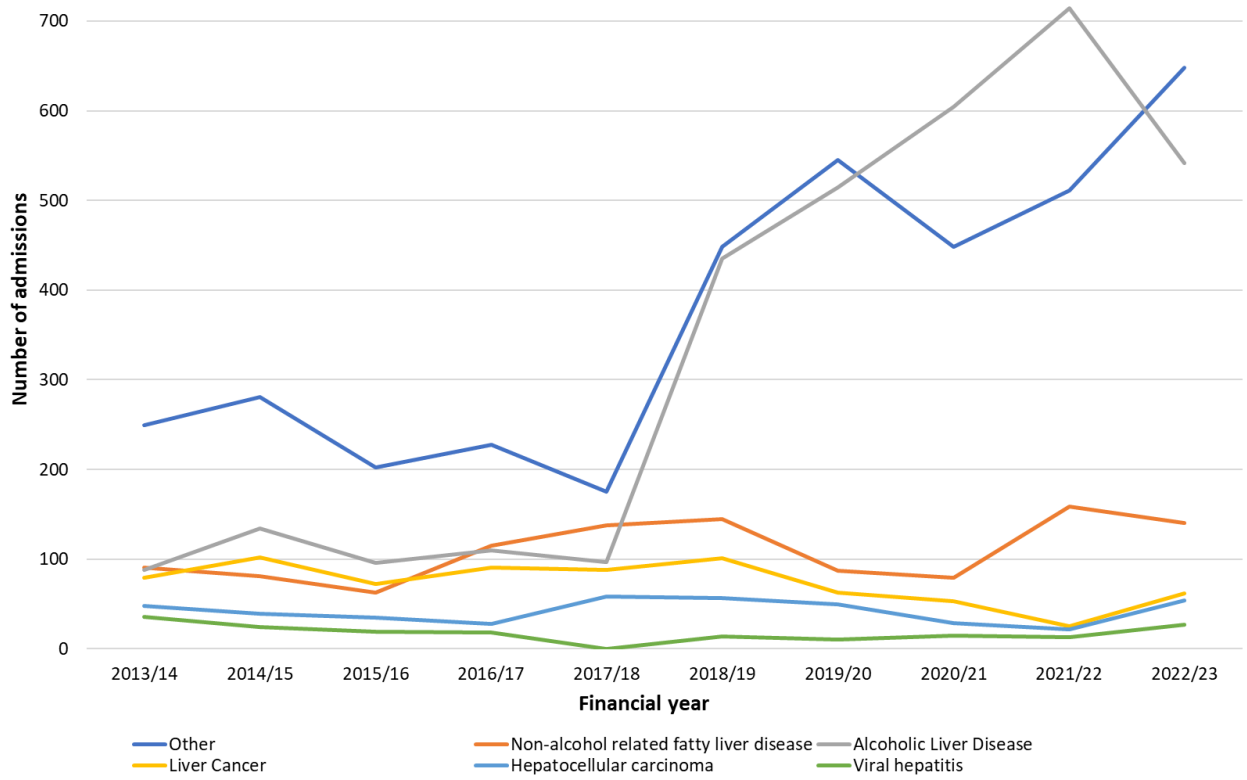
Source: Fingertips

In 2021/22, Gloucestershire has a statistically significant higher admission rate per 100,000 than 14 of its 15 statistical neighbours, with the singular exception of Nottinghamshire (Figure 26), which is not statistically different from Gloucestershire. These neighbours are socio-economically 'nearest' to Gloucestershire in terms of the population, and again we would not expect to see ourselves as an outlier in terms of admissions here.

Primary cause of admissions for liver disease

The trend in liver disease admissions broken down by underlying cause is presented in Figure 27. This shows a clear increase in 2017/18 onwards of both alcohol-related liver disease admissions and 'other' liver disease admissions, which both map the overall upwards trend of liver disease hospital episodes that we have seen from this period onwards.

Figure 27: Number of admissions for liver disease by underlying cause, Gloucestershire: 2013/2014-2022/2023



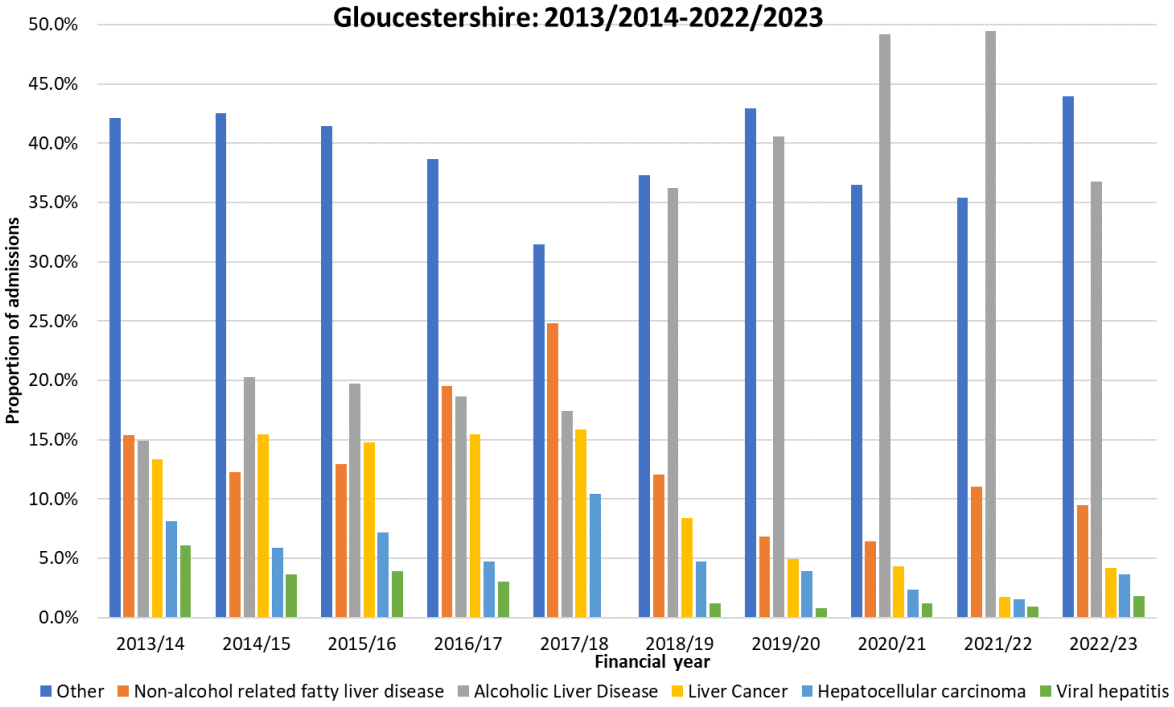
Source: Admitted Patient Care database

The top five diagnoses in this 'other category' in 2022/23 were 1) other and unspecified liver cirrhosis, 2) oesophageal varices without bleeding 3) hepatic failure unspecified 4) oesophageal varices with bleeding and 5) abscess of the liver.

Oesophageal varies without bleeding was the leading cause of admission in the other category between 2013/14 and 2018/19, however since 2019/20 'other and unspecified cirrhosis' has accounted for the highest number of diagnoses in this category. It should be noted that many of these 'other' admissions may also be accounted for due to alcohol, or for other forms of liver disease commonly seen – such as non-alcohol related fatty liver disease and viral hepatitis, either where the specific cause of cirrhosis or hepatic failure hasn't been identified or explicitly coded, or as the underlying cause of complications of cirrhosis, which includes oesophageal varices.

Figure 28 depicts the breakdown of admissions by underlying cause and shows the same trend of a rising proportion of admissions relating to alcoholic-liver disease and 'other' causes of liver disease from 2017/18 onwards. This data has been filtered by 'primary' diagnostic cause of admission for patients only, and thus avoids double counting. Except for 2020/21 and 2022/23, 'other' liver disease makes up the greatest proportion of hospital episodes, followed by alcohol-related liver disease.

Figure 28: Proportion of liver disease admissions by underlying cause, Gloucestershire: 2013/2014-2022/2023



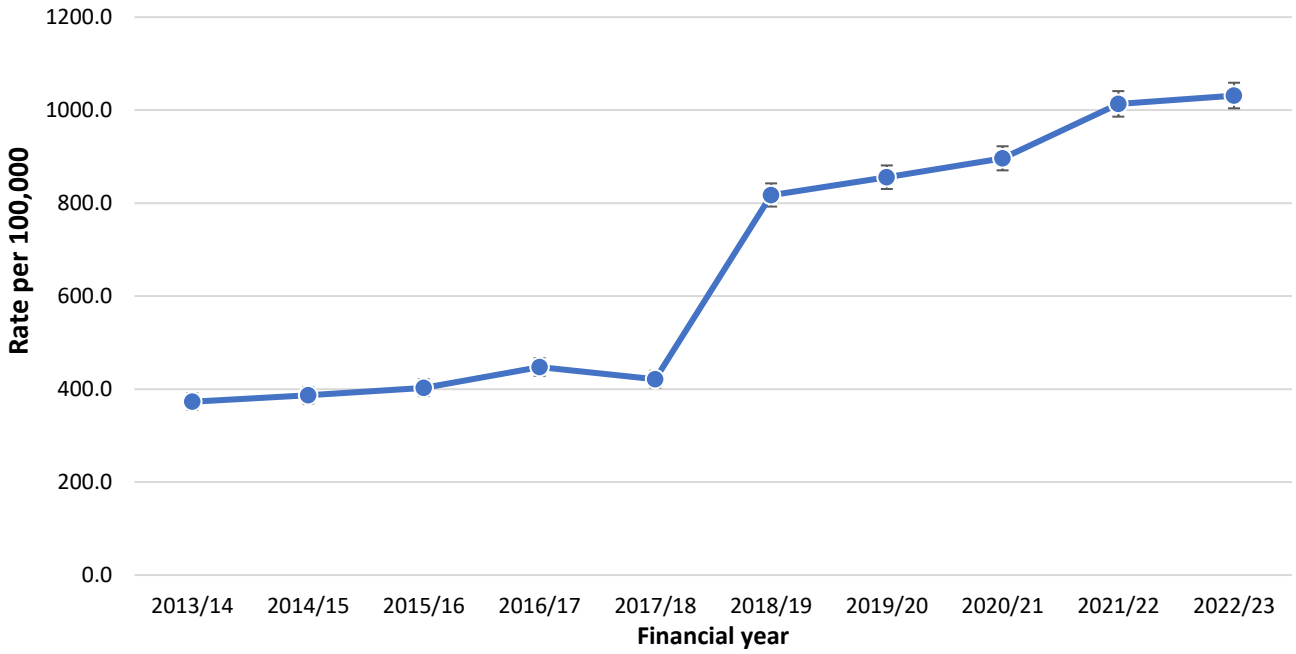
Source: Admitted Patient Care database

In 2022/23, 'other' liver disease made up 44% of all of admissions, with alcohol-related liver disease representing 36.8%. These are both significantly higher than the next leading cause of admission – non-alcohol related fatty liver disease, making up 9.5% of admissions.

It is important to note that coding patterns for alcohol-related liver disease is complex (39). The primary diagnosis may be coded as a sign, symptom, or complication of liver disease as the primary diagnosis, and then the underlying cause of liver disease – which for alcohol-related disease could be one of six codes - as a secondary diagnosis (39). Thus. the proportion of admissions where the underlying cause is alcohol-related liver disease may be underrepresented by this data which considers the 'primary' diagnosis only.

Figure 29 therefore shows the age-standardised rate of liver disease hospital episodes, where one or more of the Southwest liver disease codes features on any diagnostic field from the admitted patient care database. In this case, we see increasing numbers of hospital episodes, again with a stark increase which is statistically significant from 2017/18 onwards, suggesting that liver disease is an increasingly common cause of multimorbidity and contributing to a rising number of hospital admissions, where in some cases, liver disease will also be the primary cause of admission.

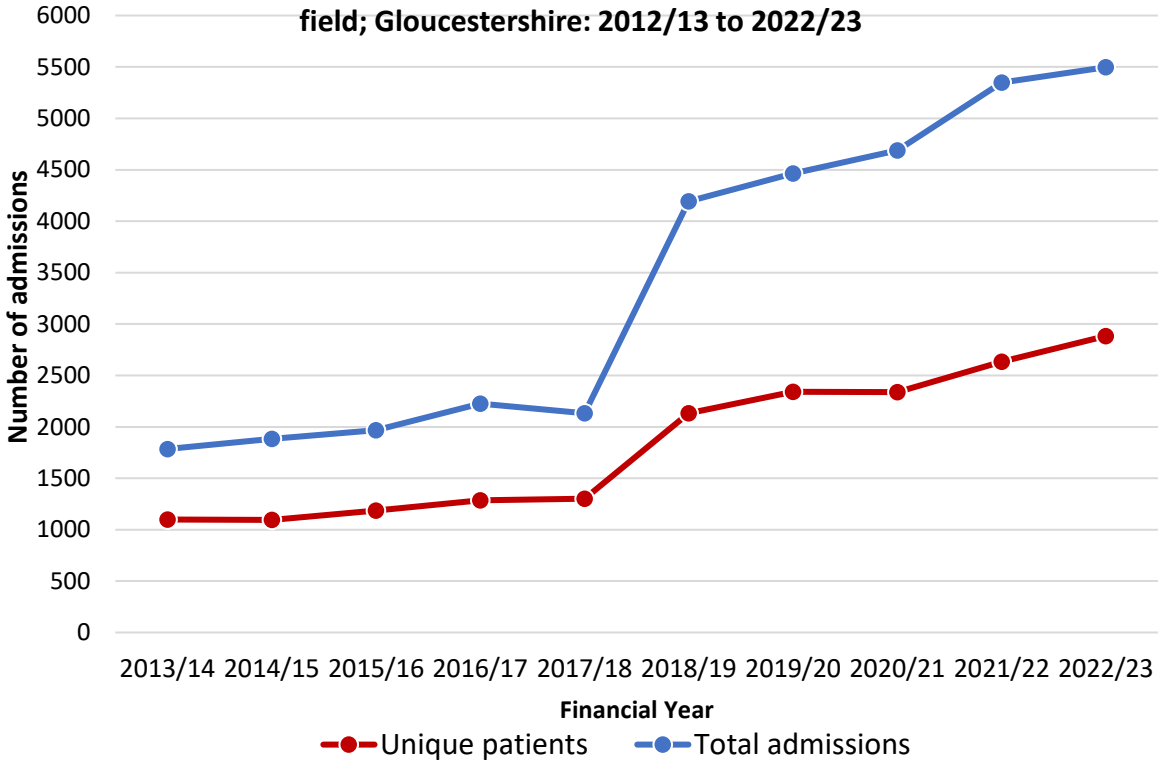
Figure 29: Age-standardized rate of admissions where liver disease features in any diagnostic in any field, admissions per 100,000 population aged 20+



Source: Admitted Patient Care database

Figure 30 shows the frequency of hospital episodes (blue line) versus unique patients (red line) where liver disease features on any diagnostic field of a hospital admission, again in accordance with the definition from the Southwest needs assessment.

Figure 30: Annual unique patient care episodes, total hospital episodes and unqiue admissions where liver disease features on any diagnostic field; Gloucestershire: 2012/13 to 2022/23



Source: admitted patient care database

This shows that there were 5500 admissions occurring in 2022/23 where liver disease was a contributing factor, which is approximately 4% of the total number of hospital episodes in Gloucestershire over the same year. Again, there is a significant disparity in individuals who are being repeatedly admitted compared to the total number of admissions per unique patient in a year. Multiple admissions are in themselves likely a marker of significant frailty and vulnerability and may represent barriers to accessing scheduled care or prevention strategies.

Rising numbers of alcohol-related liver disease admissions is important not only in relation to the significant morbidity that this represents, but also because unscheduled admission to hospital with liver disease is associated with both early and late increased mortality (40). One study found that 60-day mortality for alcoholic related liver disease post an unscheduled admission was 23.4%, and 35.4% for those admitted with hepatic failure, with long-term survival also poor for both groups (40).

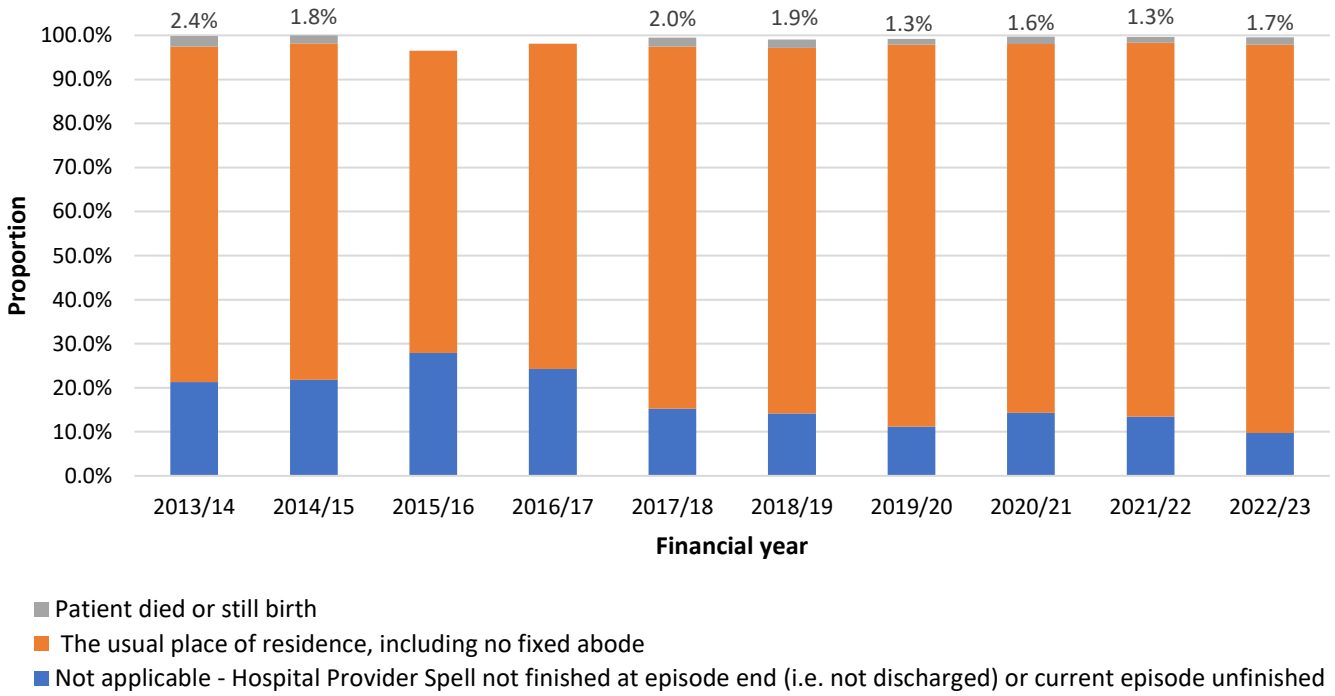
Early mortality is also reduced whereby admitted patients are reviewed or cared for by hepatologists or gastroenterologists, with an associated decrease which is greater than that seen for other specialities, suggesting that access to specialist expertise and services improves survival (40).

We also know that people with liver disease make up a substantial proportion of those admitted three or more times in their last three months of life, which is a key NHS

performance indicator, and can be suggestive that there are failings in appropriate advanced care planning and end of life provision (41).

It is highly plausible that the increased hospital admissions seen from 2018/19 onwards may be a key driver in the upward trend in mortality from 2020 onwards, and therefore mechanisms to reduce unscheduled care attendances and assuring access to specialist hepatology services are needed. Unfortunately, data linkage between the Primary Care Mortality Database (PCMD) and the Admitted Patient Care (APC) database is not possible, but Figure 31 shows the of patients admitted over time who are recorded as having died in hospital. The percentage of patients who were recorded as deceased at the end of admission are displayed at the top of the graph (the data for 2015/16 and 2016/17 has been suppressed due to small numbers) and indicates that this is the case for between 1.3-2.4% of the patients admitted to hospital with a primary diagnosis every year. It is not possible to assess whether this has changed significantly over time.

Figure 31: discharge method for patients admitted with a primary diagnosis of liver disease, Gloucestershire: 2013/14 to 2022/23

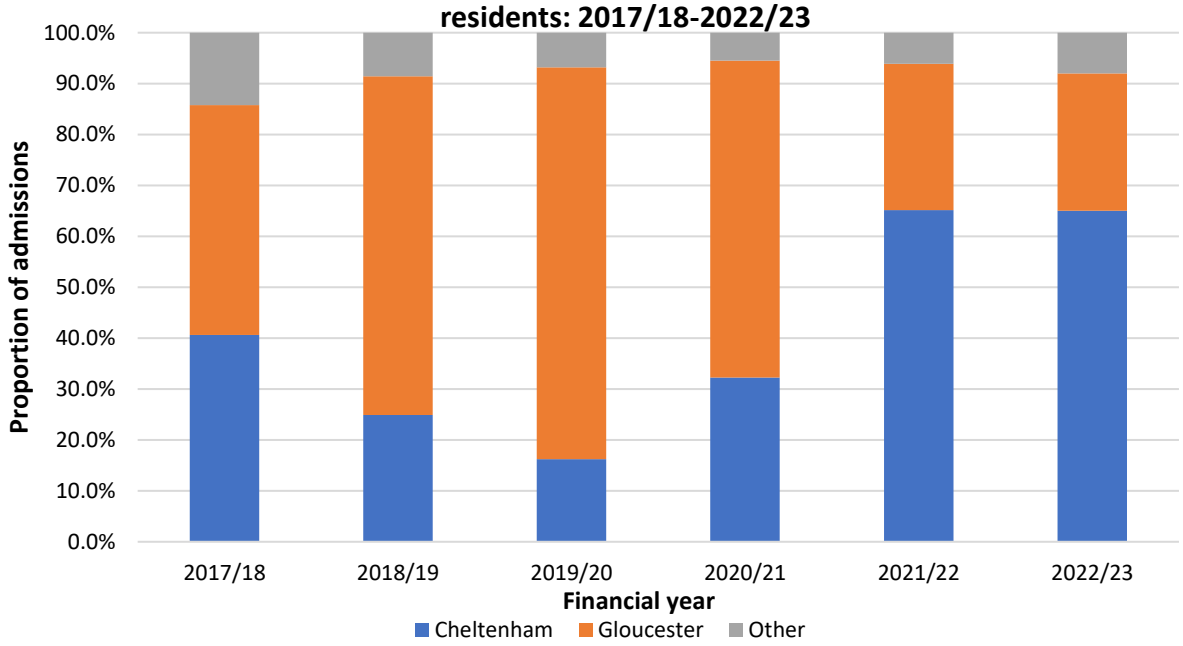


Source: admitted patient care database

We do know that many liver disease deaths are preventable, and that in many cases there are missed opportunities for earlier intervention: indeed 75% pf patients who die from liver cirrhosis were diagnosed only at the point of their first hospital admission, where disease is likely to already be significantly advanced (42).

Figure 32 compares the proportion of patients with liver disease admitted between two main hospitals in Gloucestershire from 2017/18 to 2022/23. This shows that most patients with liver disease were admitted to Gloucester Royal Hospital up until 2020/21, but from 2021/22 to 2022/23, Cheltenham General now sees the larger proportion of admissions.

Figure 32: Admissions for liver disease by hospital for Gloucestershire residents: 2017/18-2022/23



Source: admitted patient care database

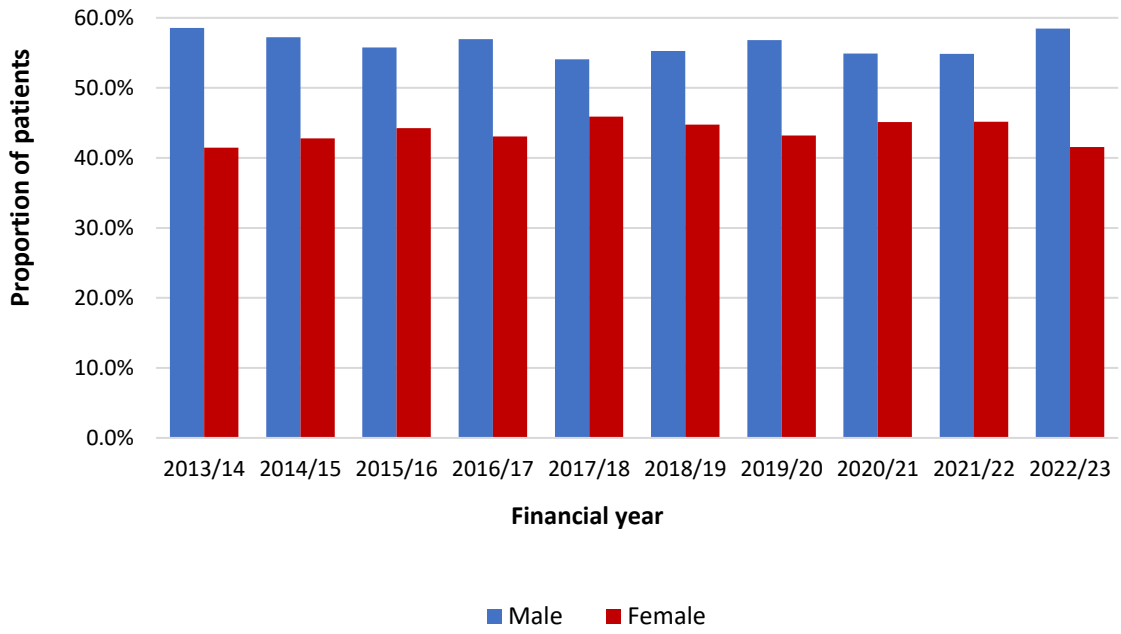
This correlates with the site of the gastroenterology ward (Knightsbridge), which moved from Gloucester to Cheltenham in 2020/21. Patients who are admitted to and remain at Gloucester Royal are therefore not admitted under a specialist hepatologist team and will also not be cared for by specialist hepatologist nurses. Whilst a referral service does operate in Gloucester Royal, whereby patients under different specialist teams can be reviewed by an on-call gastroenterologist, it is unclear how many patients with liver disease who are admitted under other teams are specifically reviewed by this service.

Characteristics of patients admitted to hospital with liver disease

Gender

As with liver disease mortality, we see gender disparity in liver disease hospital admissions (unique patients) which is relatively consistent over time (Figure 33). There is a higher proportion of men being admitted than women, with men accounting for between 54.9-58.6% of unique patients each year.

Figure 33: Proportion of patients admitted for liver disease by gender, Gloucestershire: 2013/14-2022-23

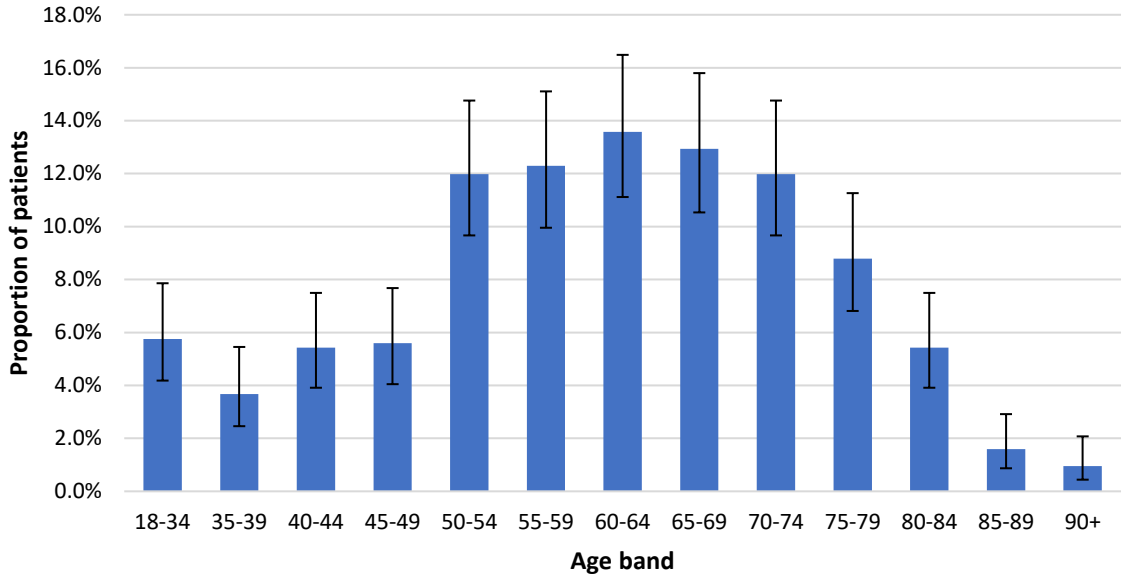


Source: Admitted Patient Care database

Age structure

Figure 34 indicates that there is a higher proportion of older people (aged 50-and-over) compared to young people who were admitted for liver disease at least once in 2022/23, reaching statistical significance. Almost 80% of the patients admitted in 2022/23 with liver disease were aged 50-and-over, with the highest proportion of admitted patients in that year aged 60-64.

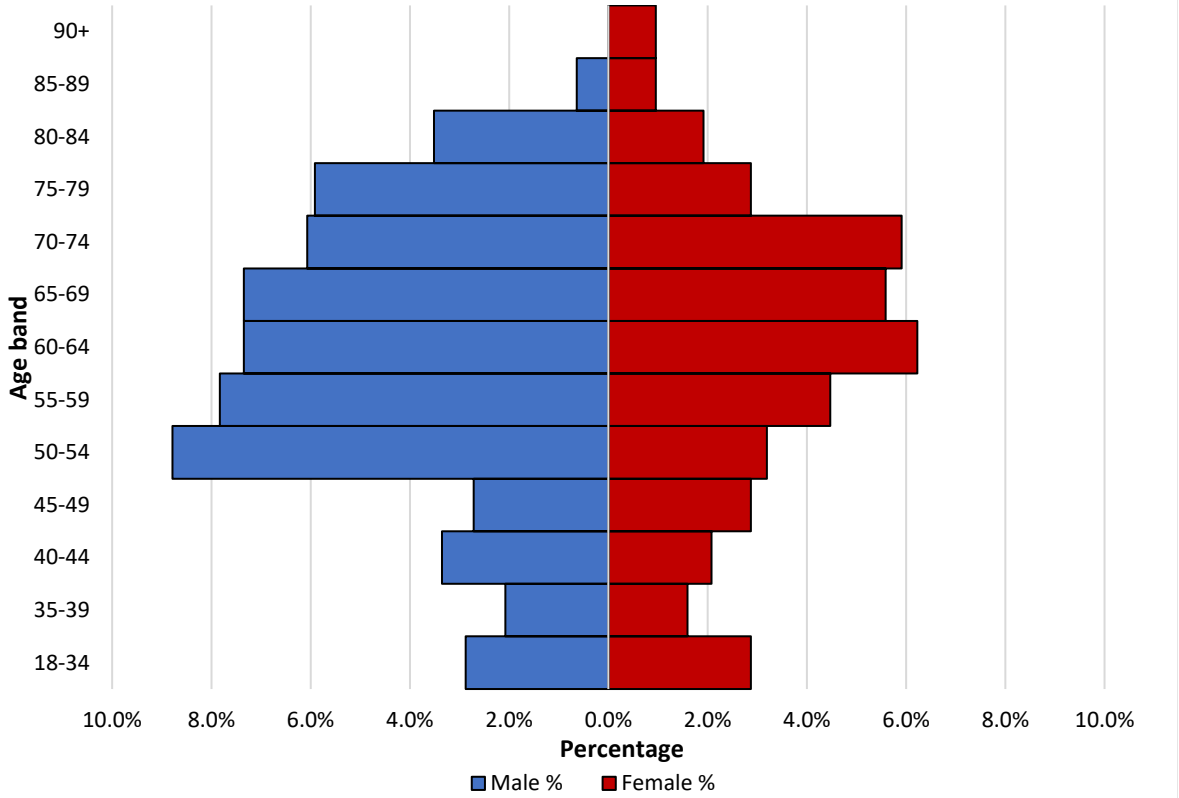
Figure 34: Proportional age distribution of patients admitted with liver disease, Gloucestershire, 2022/23



Source: admitted patient care database

Across almost all age groups, a higher proportion of men than women were admitted with liver disease in 2022/23, except for women aged 45-49 and those over the age of 85 (Figure 35).

Figure 35: The proportion of patients admitted with liver disease by age and gender, Gloucestershire: 2022/23

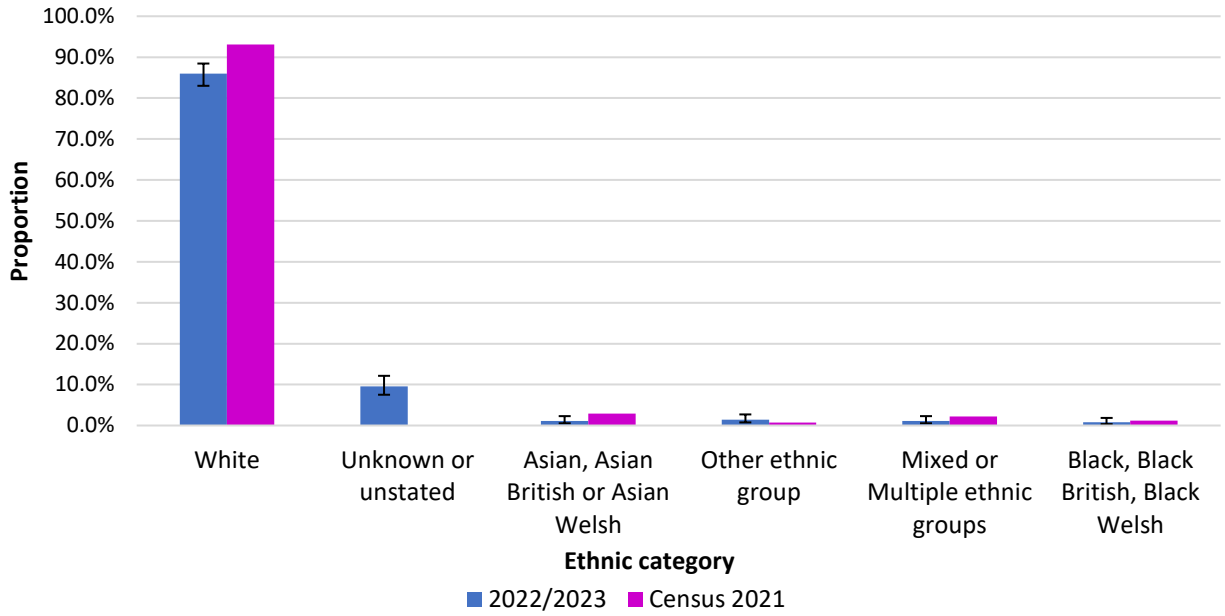


Source: admitted patient care database

Ethnicity

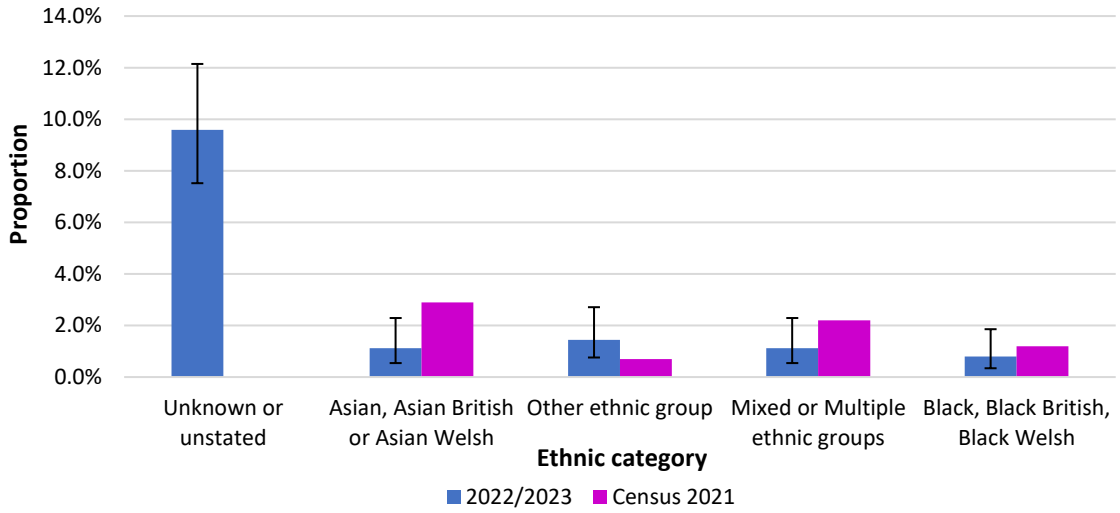
In 2022/23, most patients admitted with liver disease had their ethnicity recorded as 'White' in the hospital record (inclusive of those who identified as White British and any other White background)- approximately 85% of all people admitted fell into this category (Figure 36). Compared to the 2021 Census, there is an over representation of patients recorded as an 'other ethnic group' (Figure 37). There is no further detail regarding the ethnic background or diversity of individuals identifying within this category but does represent an inequality in hospital episodes faced by this group, that needs further investigation.

Figure 36: Patients admitted for liver disease in Gloucestershire by ethnicity, 2022/23



Source: admitted patient care database

Figure 37: Patients admitted for liver disease in Gloucestershire by ethnicity, excluding 'white', 2022/23



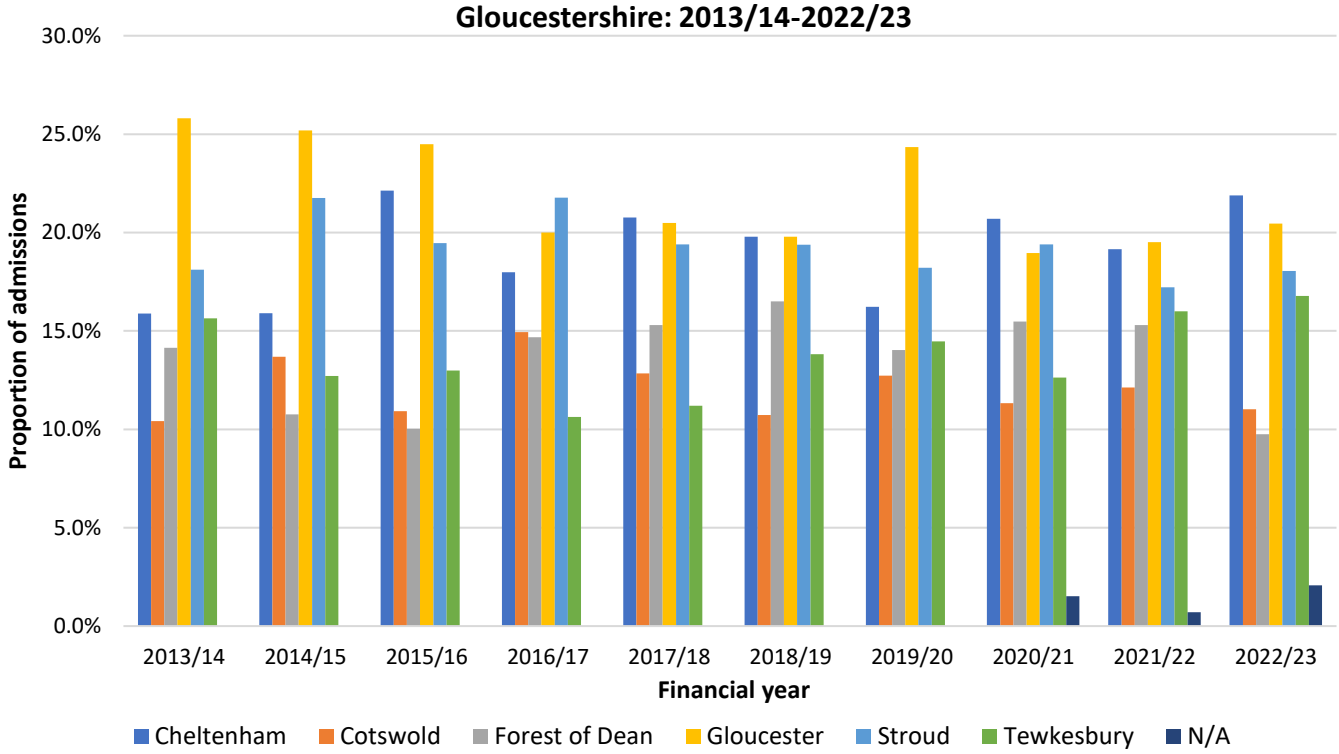
Source: admitted patient care database

District of residence

Figure 38 displays hospital admissions for liver disease by district for patients admitted with liver disease in Gloucestershire between 2013/14 and 2022/23. From this we can see that those resident in Gloucester and Cheltenham made up just over 40% of the

hospital admissions in 2022/23, and the fewest patients being residents of the Forest of Dean and the Cotswolds.

Figure 38: Proportion of liver disease hospital admissions by district of residence, Gloucestershire: 2013/14-2022/23



Source: admitted patient care database. *N/A = no home postcode (data from 2020/21 onwards only).*

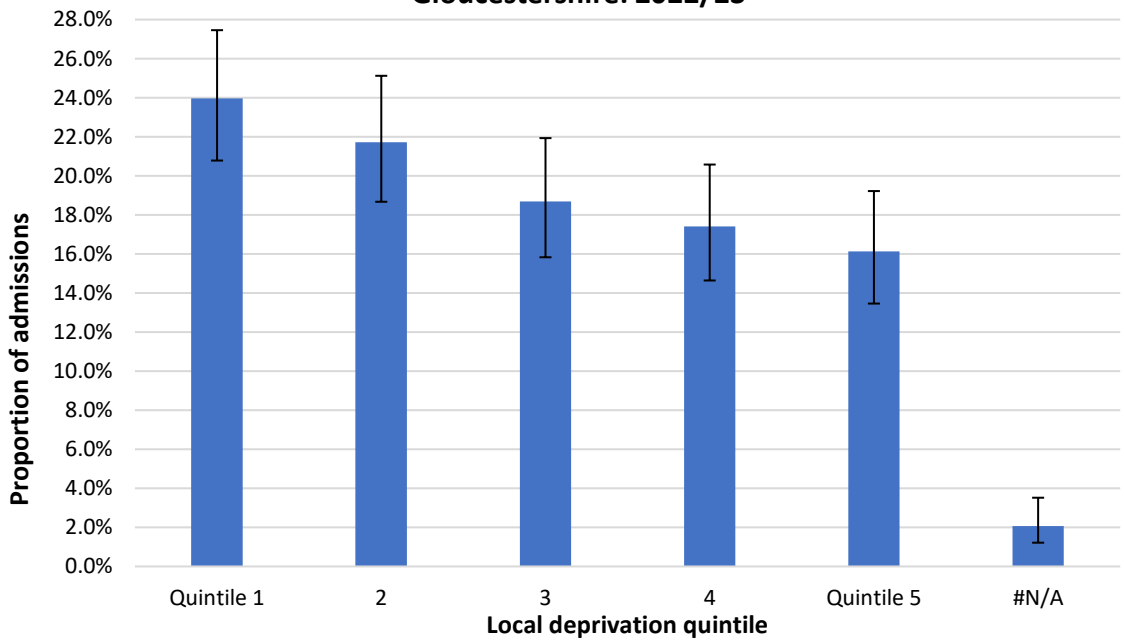
Admissions where individuals have no postcode recorded are represented by the 'N/A' bar, and data is only available for this category from 2020/21 onwards. This can be considered a proxy for individuals with no-fixed abode, but notably this will not include any individual who currently experiencing housing insecurity but has a registered address – whether that be historic, temporary accommodation, a hostel, or even a GP surgery or other service, as is sometimes seen – and so it is likely that the proportion of individuals admitted with liver disease who are identified as experiencing homelessness are under-represented by this category alone. It is possible this categorisation also includes individuals who do have a fixed address, but this was not recorded on their hospital record for any reason (unlikely to be a significant issue). As the numbers of individuals with the 'N/A' category are so small, we cannot identify whether there is a statistical difference between the numbers of people admitted to hospital in Gloucestershire who fall in this group, compared to admissions for those with a registered address.

Whilst hospital admission rates and their associated confidence intervals are not graphically displayed as they are not visually easy to interpret, when admissions were reviewed over time per 100,000, however, there is no district with a statistically significant difference compared to the admission rate for Gloucestershire as a whole, with the exception of Tewkesbury, which, in 2022/23, had a lower rate of hospital admissions in 2022/23, which reached statistical significance.

Deprivation

As with mortality, liver disease hospital admissions show clear social patterning, with the greatest proportion of admissions occurring in the most deprived quintile of Gloucestershire (~24%), and the lowest proportion occurring in the least deprived quintile (~16%), with a gradient in between (Figure 39). There is a statistically significant difference in the number of admissions occurring in quintile 1 and 5, representing a health inequality based on socio-economic status. This is in keeping with patterns seen nationally and may be due to increased incidence of liver disease in individuals who are living in more deprived areas, greater morbidity and complications, or reduced access to healthcare leading to later diagnosis and greater complications of disease.

Figure 39: Proportion of patients admitted for liver disease as the primary cause of admission by local deprivation quintile, Gloucestershire: 2022/23



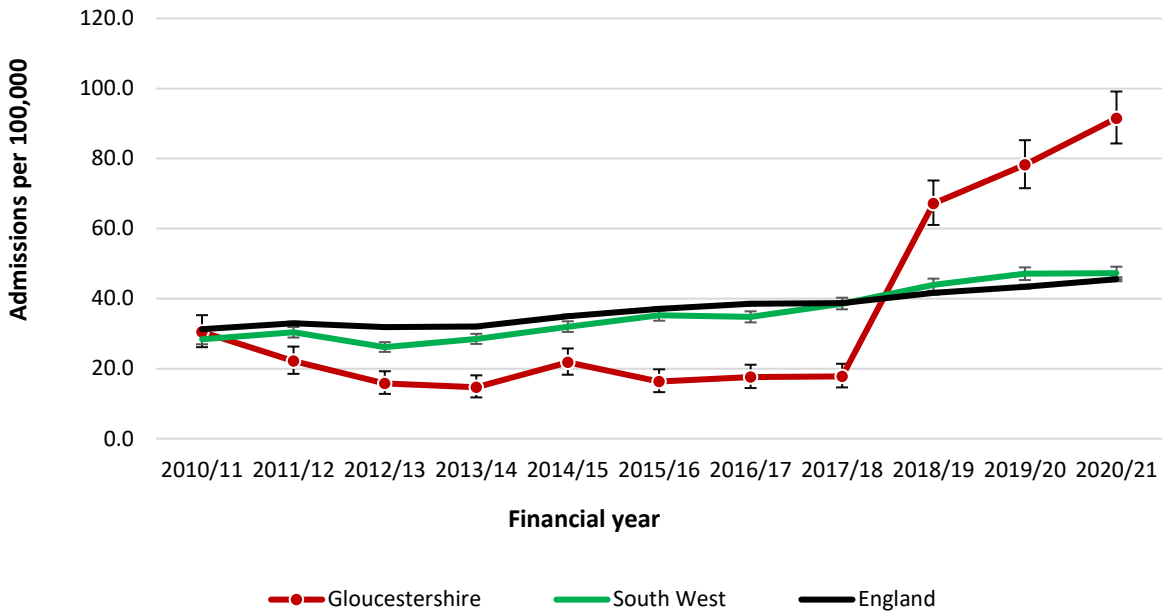
Source: admitted patient care database

Alcohol-related liver disease hospital admissions

Figure 40 shows the specific trends observed in hospital admissions caused by

alcohol-related liver disease in Gloucestershire, England and the Southwest. Again, we see that until 2017/18, Gloucestershire had admissions for alcohol-related liver disease that were below the national and regional average in terms of numbers per 100,000. Whilst the national and regional numbers have increased over time, Gloucestershire saw a sharp uptick in admissions from 2018/19 onwards and were more than double that of England and the Southwest in 2020/21.

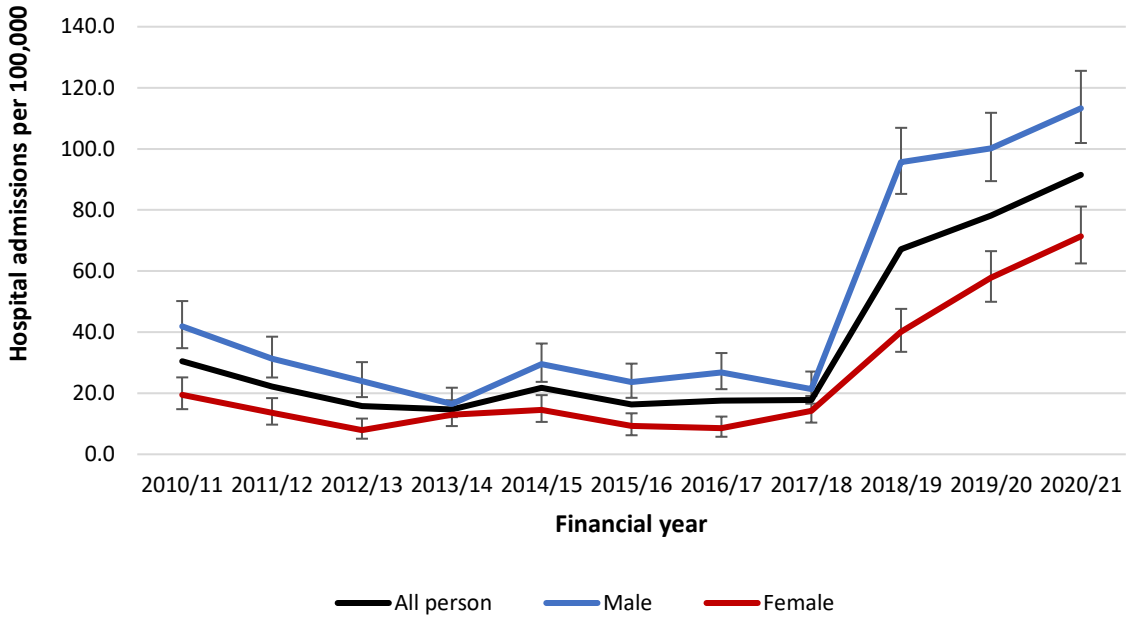
Figure 40: Alcohol-related liver disease hospital admissions in Gloucestershire, the South West and England, 2010/11 to 2020/21



Source: Fingertips

Figure 41 shows the rate of hospital admissions over time in Gloucestershire specific to alcohol-related liver disease in men versus women, and whilst men continue to outpace women in terms of the number of admissions per 100,000, the admission rate for both genders is rising significantly, with a sharp increase from 2018/19 onwards.

Figure 41: Alcohol-related liver disease hospital admissions in Gloucestershire by sex, 2010/11 to 2020/21

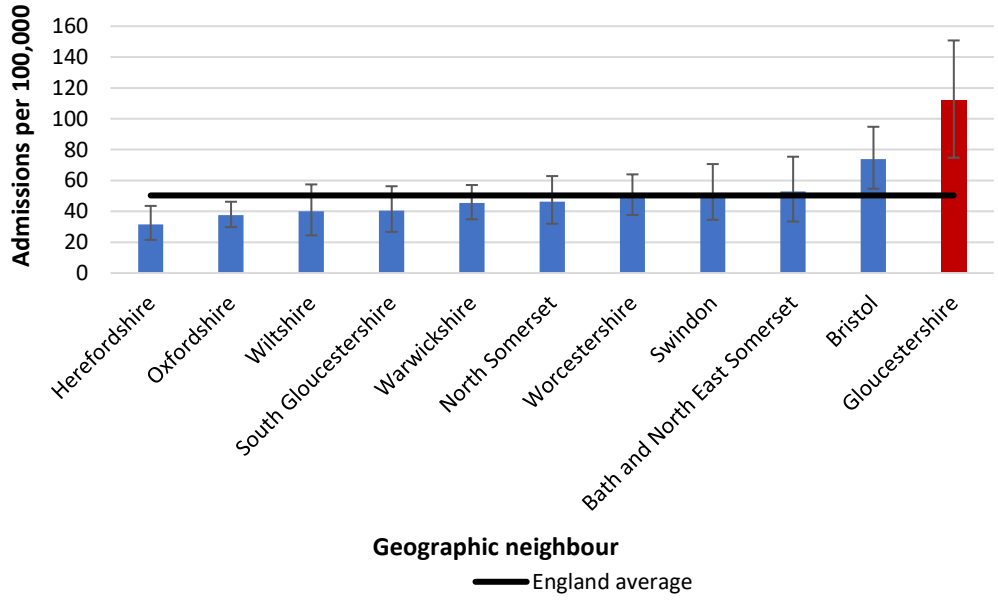


Source: Fingertips

Statistical and geographic neighbours

Figure 42 compares Gloucestershire's hospital admission rate for alcohol-related liver disease per 100,000 in 2021/22 with its geographic neighbours. This admission rate is higher than all geographic neighbours, and the difference reaches statistical significance for all neighbours aside from Bath and North-East Somerset, and Bristol.

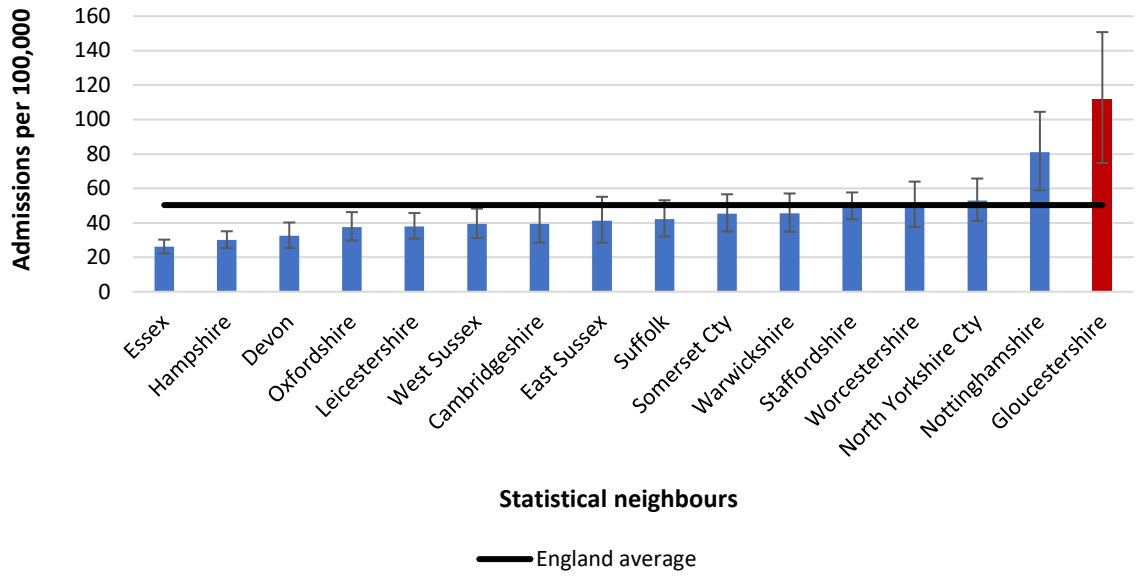
Figure 42: Alcohol-related liver disease hospital admission rate for Gloucestershire and geographic neighbours: 2021/22



Source: Fingertips

Where Gloucestershire is compared to its nearest (statistical) neighbours produced by the Charted Institute of Public Finance and Accountancy, the rate of admissions for alcohol-related liver disease in 2021/23 was higher in Gloucestershire than all fourteen neighbours, reaching statistical significance for the difference for all aside from Nottinghamshire (Figure 43).

Figure 43: Hospital admission rate for alcohol-related liver disease for Gloucestershire and its statistical neighbours: 2021/22

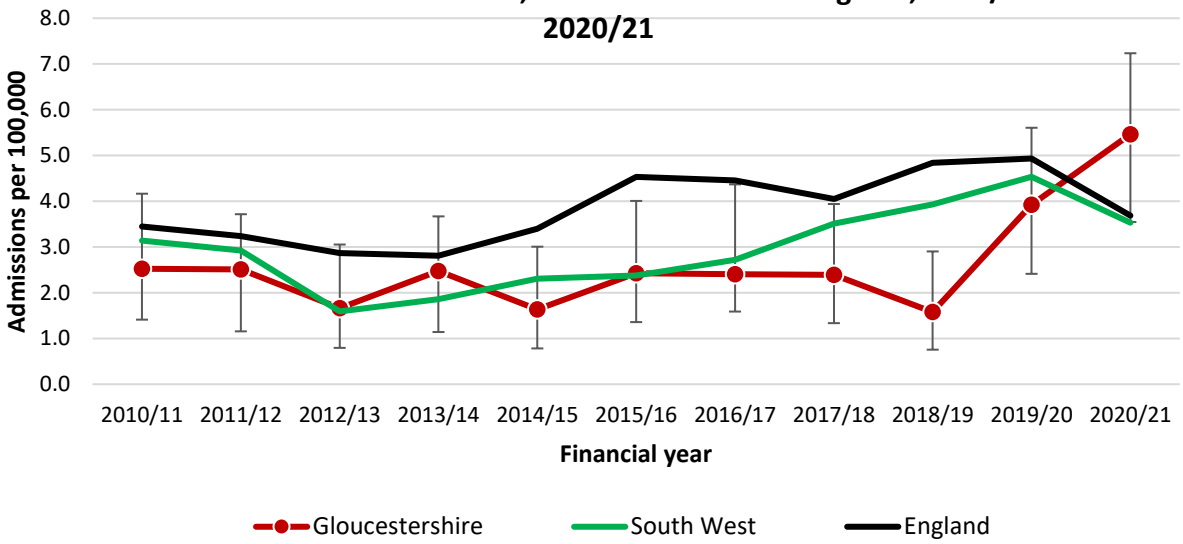


Source: Fingertips

Non-alcohol related fatty liver disease admissions

Figure 44 shows the hospital admissions in Gloucestershire, the Southwest and England for MASLD over time. This shows that for MASLD specifically, between 2014/15 and 2018/19 Gloucestershire had a significantly lower admission rate than England (and the Southwest in 2018/19).

Figure 44: Metabolic dysfunction-associated steatotic liver disease hospital admissions in Gloucestershire, the South West and England, 2010/11 to 2020/21



Source: Fingertips

Between 2018/19 and 2020/21, however, the data indicates that there has been a sharp increase in the rate of admissions for MASLD, which is statistically significant, and now similar to national and regional rates, which have not seen the same upward trend.

Compared to both geographical and statistical neighbours with data, in 2020/21 Gloucestershire had the third highest hospital admission rate due to MASLD.

Summary and themes from admissions data:

- There has been rising all-cause liver admissions in Gloucestershire from 2018/19, and the county is now an outlier compared to statistical and geographic neighbours, the region, and England.
- This predates, and likely informs, the significant rise in mortality described above by one year, and the COVID-19 pandemic.
- It is not clear why this increasing trend is being seen, and, whilst it is not possible to entirely exclude, no clear changes in coding practises have been made which would explain this.
- Most admissions are related to ALD or 'other' liver disease, noting that ALD is usually underestimated based on how it is coded, and likely will be the underlying cause of several admissions fulfilling the 'other' category.
- Both ALD and MASLD admissions rose sharply from 2018/19 onwards, with ALD admissions now higher than the national and regional average, as well as most statistical and regional neighbours.
- Large proportion of admissions are being admitted recurrently in the same year and the average number of admissions per person has risen over time and is now 2.4 per person. This suggests increasing complexity and

potentially unmet needs within a population of individuals with known liver disease, who appear to be bouncing in and out of hospital with increasing frequency and are likely to experience increased mortality risk. Linkage to palliative care services for individuals who are being recurrently admitted and/or have complex symptomatology or are thought to be in the last year of life with liver disease is an important aspect of quality of care that needs further assessment going forward – and is evidence based to reduce recurrent unscheduled hospital admissions in advanced liver disease/other chronic conditions.

- There is a significant social gradient of hospital admissions for liver disease, which suggests that there are more individuals with liver disease who live in the most deprived areas of the county, or that they are more likely to require hospital level care for complications of disease (or both). This gradient is mirrored in national trends and represents a significant local inequality.
- There are more men than women admitted to hospital with liver disease, again mirrored nationally, representing a gender inequality in the burden of liver mortality. Most individuals who are admitted identify as having a White ethnic background.
- Whilst there are more men than women being admitted, the number of admissions for both genders are increasing, and there are more women than men admitted to hospital in the age bracket 45-49 and 85 and over.
- Individuals who make up the 'other ethnic group' are also overrepresented in the number of admissions, representing an inequality in admissions for those who did not identify as falling within any of the other Ethnic group categorisations, but, unfortunately, the more granular details on the make-up of this group are not available from hospital records.
- Admissions where liver disease is present on any diagnostic field also rising, which may mean that there is an underestimation of liver disease admissions where only the primary cause of admission is considered, given that coding of ALD, for example, can be variable, or that there is an increasing burden of liver disease as part of multi-morbidity in the county which is contributing to further admissions where liver pathology is not the primary cause.
- It should be noted that 60-70% of admissions are elective in nature but the proportion of emergency to elective admissions appears quite stable over time, indicating that they are both increasing at the same rate. Unscheduled admissions for liver disease are associated with significant short- and long-term mortality, and the rise in hospital episodes, as well as increased admissions per person, may well be contributing to the jump in deaths seen from 2020 onwards.
- Data from all localities collected by the Public Health Outcomes Framework also includes both elective and emergency hospital admissions, and it is unclear whether our coding practises differ substantially from other areas which might explain why we have become such an outlier – but as stated, these do not appear to have changed over time, although it is possible

coding practises have been refined in other areas, which may be contributing to the disparity seen.

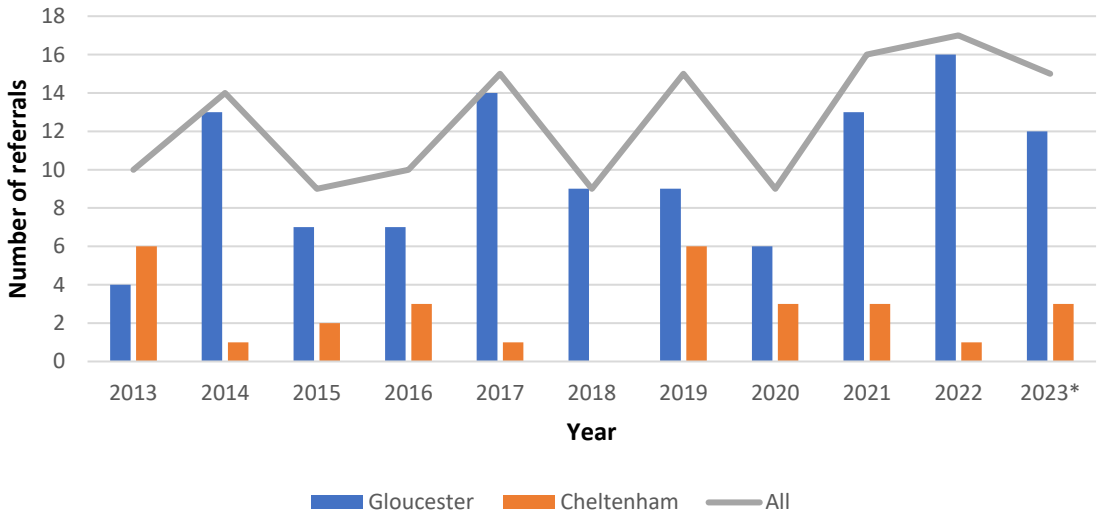
- There are a large number of individuals who are admitted and discharged on the same day, which may indicate improper coding of day-case work as inpatient activity, which was noted in the 2019 Getting It Right First Time Review of liver care in the county, but it should be noted for admissions where the primary cause was coded as 'ascites' were not included in this analysis, so it is unlikely that day-case paracentesis cases are being represented here, and actually means that this aspect of secondary care provision has not been assessed.
- In summary, rising hospital episodes and readmissions for liver disease in the county should be considered to real and worthy of further examination to understand the exact drivers and areas of unmet need.

Transplant activity

Between 2013 and 2023, there were 143 referrals from Gloucestershire NHS Foundation Trust to the liver transplant centre at Queen Elizabeth Hospital, Birmingham, of which 4 of these were for children. Of these 143, 58 went on to receive a transplant, of which 2 were children.

A general upward trend is observed over time in the number of referrals made, but it is unclear whether this is statistically significant, and it should be noted that numbers are small, and so there is an increased likelihood this could be due to chance (Figure 45). An upward trend may also suggest increasing local prevalence of individuals who meet the criteria for referral for consideration of transplantation, or that there are more individuals who are suitable for referral being identified by the hospital service, noting that there was some change in hepatology consultant personnel in 2013, which may or may not be relevant.

Figure 45: Number of referrals over time from Gloucestershire hospitals to Birmingham liver transplant centre: 2013-2023



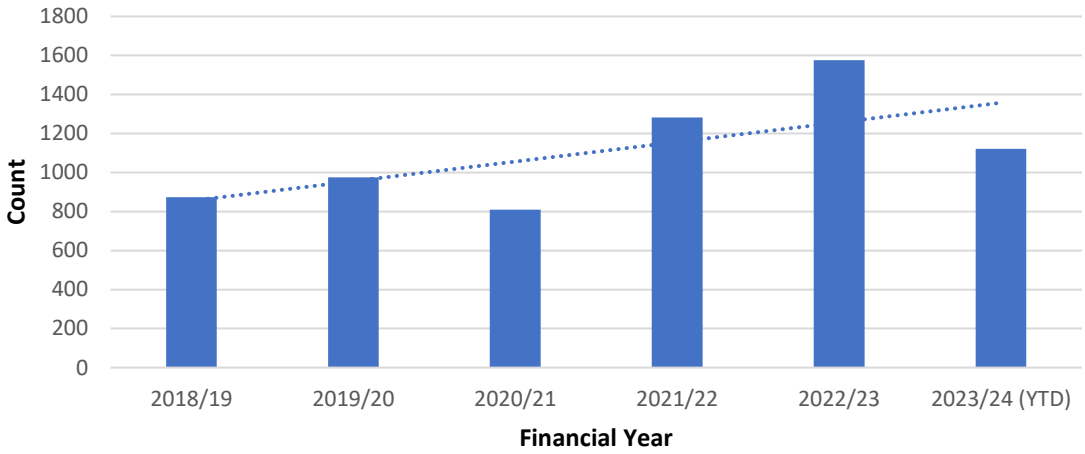
*Year to date**. Source:** Gloucestershire Hospitals NHS Foundation Trust

Prevalence of liver disease from primary care records

Data from NHS Gloucestershire's GP events table was used to assess the prevalence of liver disease in Gloucestershire and revealed a total of 6961 individuals in the county with a diagnosis of liver disease on their GP record.

Figure 46 shows the number of individuals registered to a Gloucestershire GP with liver disease from 2018/19 to 2023/24 (year to date). In the financial year 2022/23, 1574 persons were recorded as having a diagnosis of liver disease on their GP health record. There appears to be a net increase from the start of the time-series (2018/19) to the financial year to date (April to November 2023) in liver disease prevalence. Deceased patients are not considered within this data. This may indicate increasing burden of disease in the county, or potentially improved case-finding and diagnosis.

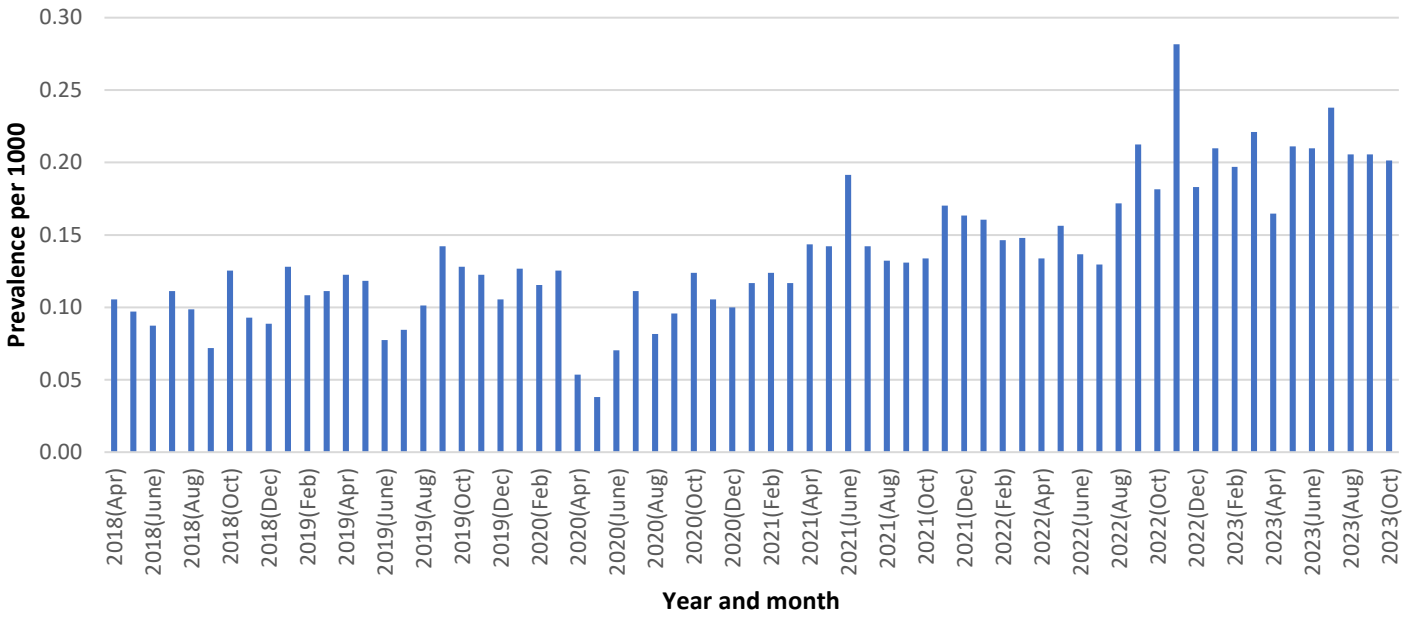
Figure 46: Prevalence of liver disease based on its first appearance on a GP practise record in Gloucestershire: 2018/19 to 2023/24 (year to date)



Source: general practise events table

Figure 47 shows that there has been a doubling of liver disease prevalence per 1,000 from 0.10, to 0.20 from April 2018 to October 2023.

Figure 47: Prevalence of liver disease per 1,000 in Gloucestershire: April 2018 to October 2023

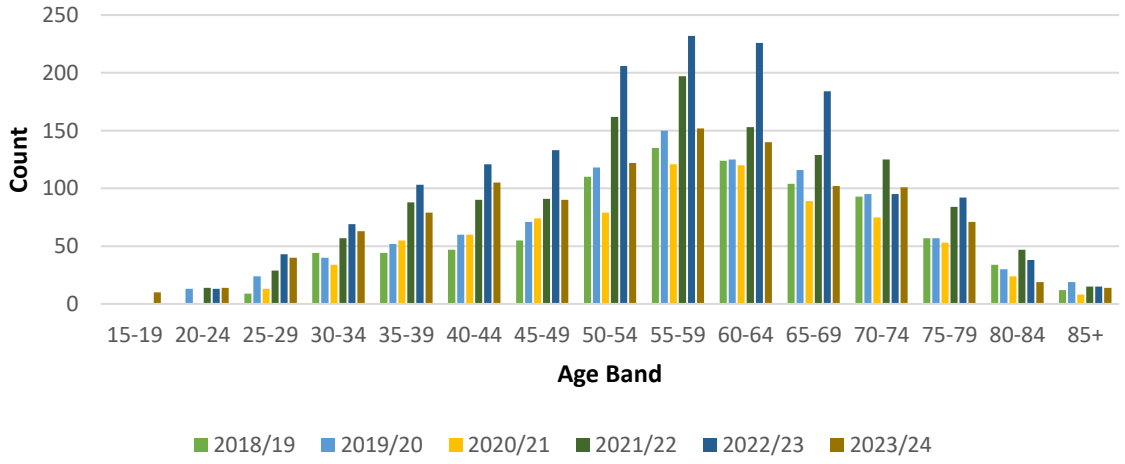


Source: general practise events table

Age breakdown

In terms of liver disease prevalence broken down by age band, liver disease is most commonly seen in those aged 50-69, in terms of when it first appeared in primary care records, which may correlate with the point of diagnosis (Figure 48).

Figure 48: Prevalence of liver disease over time from first appearance in GP record in Gloucestershire by age band: 2018/19 to 2023/24 (year to date)



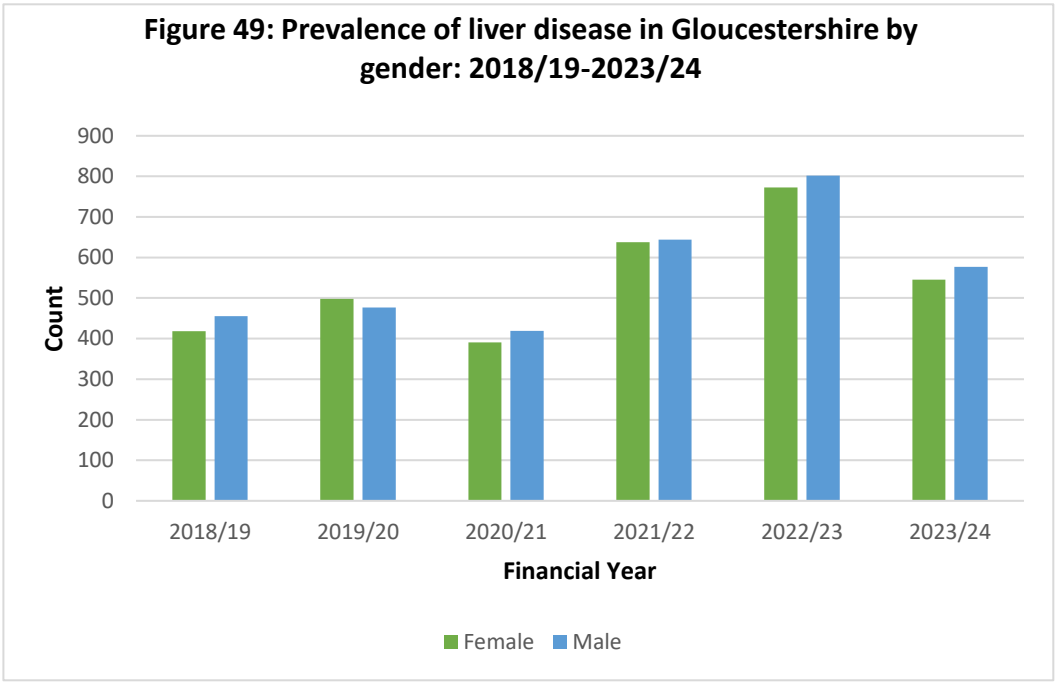
Source: general practise events table

This is in keeping with admissions and mortality data, where most hospital episodes and deaths are occurring in individuals aged over 50. It is well recognised that liver disease is often diagnosed late, where disease is advanced, and treatment options are limited. Earlier diagnosis of younger patients is likely to translate into better survival and reduced complications.

Gender

The prevalence of liver disease as per general practice records is relatively evenly matched between men and women, as seen in Figure 49.

Figure 49: Prevalence of liver disease in Gloucestershire by gender: 2018/19-2023/24

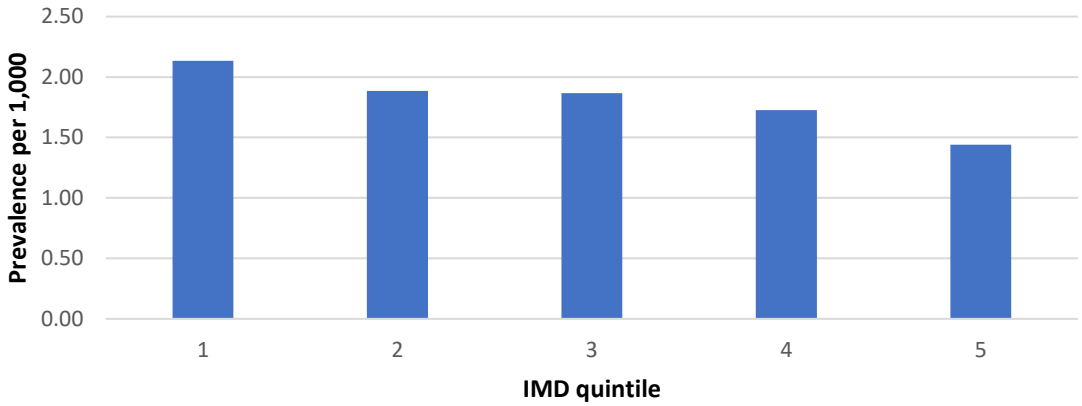


Source: general practise events table

This contrasts with admissions and mortality data, where men are clearly over-represented, and thus appear to be experiencing more complications and higher mortality from liver disease, despite similar prevalence. This may be due to differing aetiologies of disease, differences in behaviour or treatment following diagnosis, or that women are more likely to be diagnosed in primary care than men – who may be more likely to be diagnosed late, when complications have arisen leading to hospital admission.

Deprivation

Figure 50: Period prevalence of liver disease by IMD quintile for Gloucestershire: 2018/19 to 2023/24 (year-to-date)



Source: general practise events table

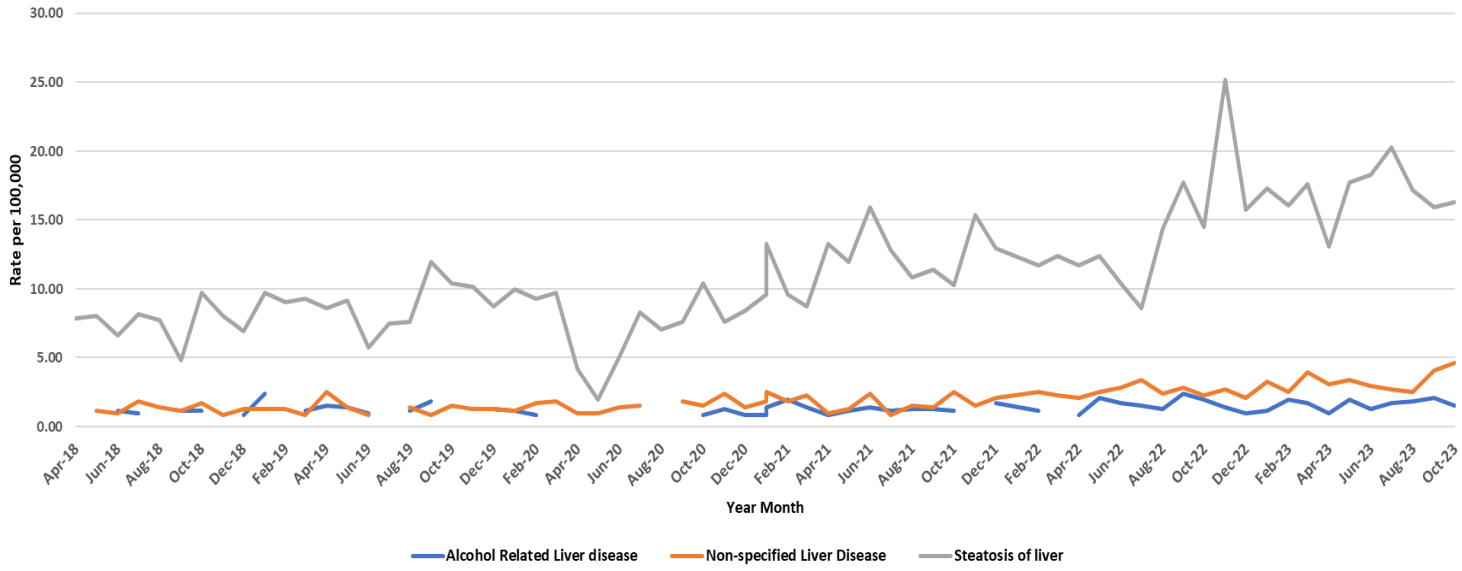
As with admissions and mortality data, the prevalence per 1,000 of liver disease appears to show a social gradient (Figure 50), with the highest prevalence seen in the most deprived areas of the county (quintile 1) and the lowest in the least deprived area (quintile 5).

Aetiology

The most common cause of liver disease seen in GP records was steatosis of the liver (77.4%), followed by 'non-specified' liver disease (13.2%), and alcohol-related liver disease (8.6%), and is displayed in Figure 51. This is in stark contrast to the underlying cause of hospital admissions and mortality, where alcohol-related disease was most prominent, and MASLD (steatosis) was rarely seen, but is in keeping with known trends in MASLD, where there is thought to be large burden of subclinical disease, with only around 10% progressing to cirrhosis.

Notably, a small proportion of patients (74) were recorded as having a diagnosis of MASLD and ALD.

Figure 51: overall incidence of liver disease (appearance on primary care record) per 100,000 from April 2021 to October 23, by underlying diagnosis



Source: general practise events table

Themes from prevalence data

- Crude prevalence and rate per 1,000 of liver disease as documented on GP records is increasing in Gloucestershire. This could represent better detection of cases or increasing burden of disease, or both.
- In terms of its first appearance in general practice records, liver disease is most commonly seen in individuals aged 50-64.
- Liver disease is occurring relatively equally between men and women, in contrast to admissions and mortality, where men are overrepresented compared to women.
- Prevalence of liver disease in Gloucestershire exhibits a social gradient, in keeping with the admission and mortality data, and wider trends.
- The most common cause of liver disease as recorded on GP records is steatosis (MASLD).

4. Epidemiology of risk factors for liver disease in Gloucestershire

Alcohol use

From Gloucestershire's Director of Public Health's annual report, the following data is available for the county:

- 1 in 4 adults drink more than 14 units per week (2015-2018)
- 13.1% of adults reported binge drinking on their heaviest days (2015-2018)

- There were an estimated 5,509 dependent drinkers in 2019.

Nationally, patterns of alcohol use were seen to national change over the pandemic, with data from a consumer purchasing showing that between 2019 and 2020 (before and during the pandemic), alcohol volume sales increased by 25.0%, an increase that was consistent and sustained for most of 2020 (43). Prior to this, the most recent sales data available for Gloucestershire are from 2014. These show a total volume of 2,154,286 litres of pure alcohol were purchased through the off-trade in the one-year period, with the majority being in the form of wine sales (37.5%). This equates to 4.4 litres of pure alcohol per adult in Gloucestershire, where on average adults purchase less alcohol in Gloucestershire than they do in the Southwest or in England, but this is likely to have changed significantly over time and with the influence of the pandemic.

When considering primary care records, which are available from April 2018, the following has been extracted from the GP events data for Gloucestershire:

- Just over 21,400 people have had their alcohol use categorised at least once, out of a registered population of 682,822 in the county (49). This represents coverage of 3% of the registered (rather than resident) primary care population.
- Total number of unique patients who have had their alcohol use categorised as problem or heavy drinking: 1,915 (2.7 per 1000) (excluding deceased patients)
- Total number of patients who have had at least one referral to alcohol services on GP record: 817 (1.15 per 1000) (excluding deceased patients)
- Total number of unique patients who have had their alcohol used categorised as problem or heavy drinking received a referral to alcohol services: 95 (0.13 per 1000) (excluding deceased).
- Only 126 patients in total with alcohol use categorised (all categorises of drinking behaviour) and documenting as having been in receipt of referral into alcohol services.

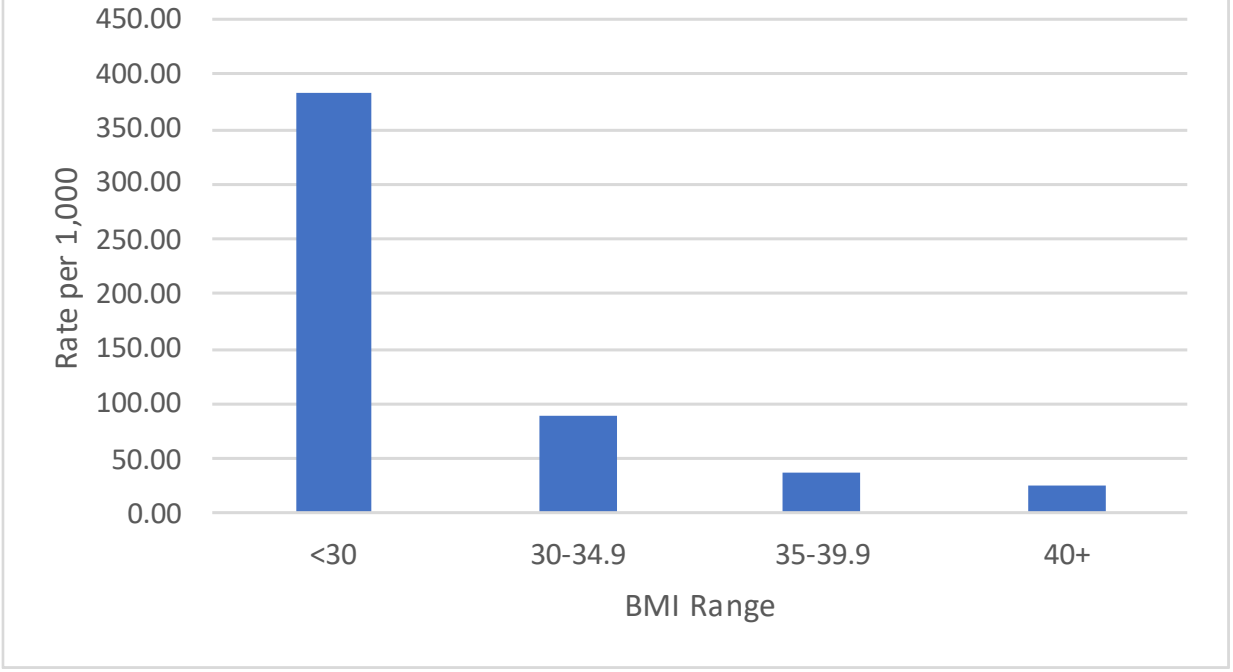
The GP events data contains information about all people registered with a GP in Gloucestershire, and thus represents only a small proportion of the population who have had their alcohol use categorised at least once, or at least have had this clearly documented. This is in keeping with wider research indicating that the use of validated screening tools such as AUDIT-C to identify alcohol-use disorder are infrequently documented within general practice, and individuals drinking to harmful levels are under-detected, as is likely to be seen here (44). The number of individuals who have received a referral to alcohol services is also extremely limited compared to the number of individuals thought to have alcohol-dependence in the county, and likely represents the tip of the iceberg in terms of need.

It was not possible to characterise the number of individuals receiving a brief intervention after being identified as drinking to higher levels, and this is likely to be documented very poorly, and recognised to be used less frequently than clinically indicated in general practice (45).

Obesity

The prevalence of obesity in Gloucestershire was reviewed using GP events data. The rate per 1,000 of individuals who have a recorded BMI of <30, 30-34.9, 35-39.9 and 40 and above is displayed in Figure 52. This data is based on the most recent BMI score recorded on the patient record, with coverage of 53% across the Gloucestershire population, and 60% coverage in women and 47% coverage in men.

Figure 52 prevalence per 1,000 of individuals in Gloucestershire with a BMI of <30, 30-34.9, 35-39.9 and 40 and above, according to first appearance on

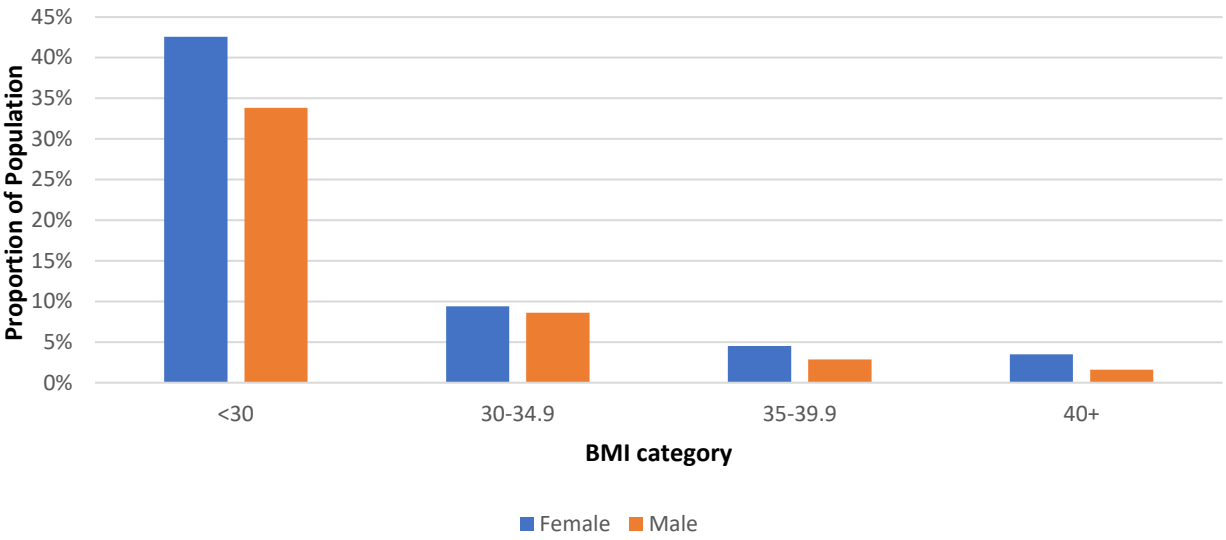


Source: GP events database

For individuals with a recorded BMI of <30, the rate in Gloucestershire is 382.53 per 1,000. For BMI category 30-34.9 the rate is 90.5 per 1,000, falling to 36.96 per 1,000 for BMI category 35-35.9, and 25.54 per 1,000 for those with a BMI of 40 and over. There is a higher rate of obesity (BMI 30 and over) in women than men across all three BMI brackets.

Figure 53 shows the proportion of Gloucestershire's population with a BMI across each bracket, split by gender. A similar proportion (approximately 9%) of men and women in the county have a BMI of 30-34.9, with 5% of women and 3% of men have a BMI of 35-35.9, and 3% of women and 2% of men have a BMI of 40 and above.

Figure 53: Proportion of male and female population registered to a Gloucestershire GP with a BMI of <30, 30-34.9, 35-39.9 and 40+

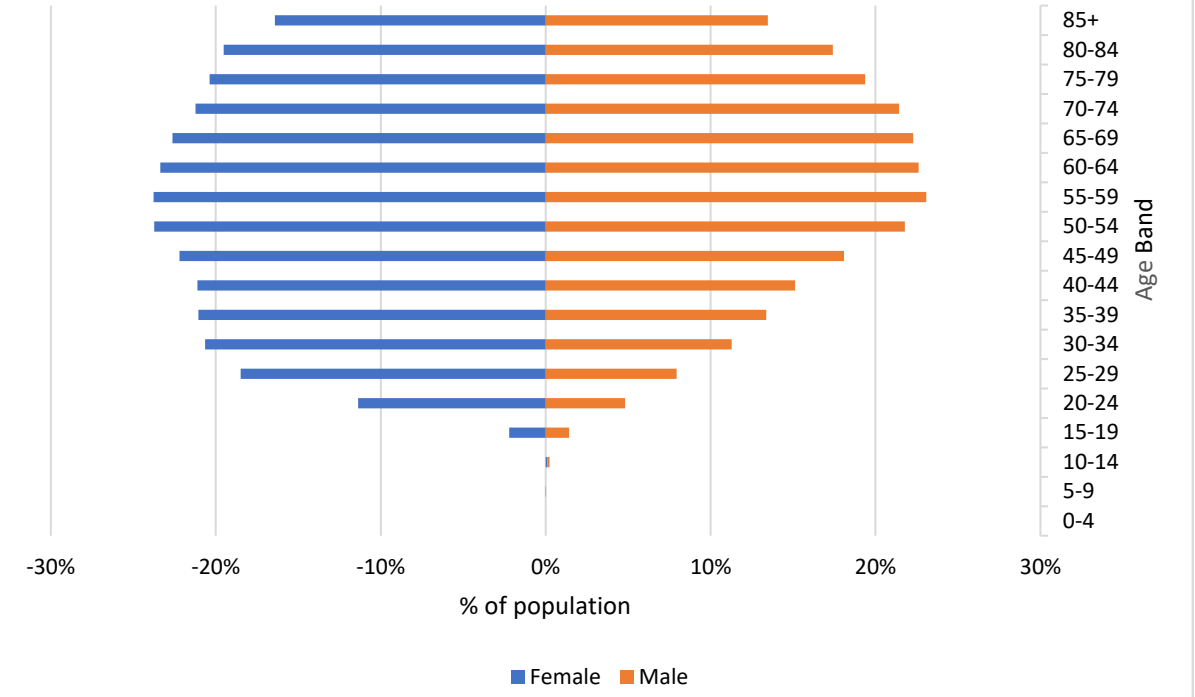


Source: GP events table

Figure 54 shows the age and gender structure of the population in Gloucestershire who have a BMI of 30 and above. This indicates that more women are affected by obesity from a younger age compared to men, with >10% of women aged 20-24 who have a recorded BMI of >30. There is a higher prevalence of obesity as the population ages, peaking in middle age, and falling again after the 6th decade. Women aged 50-59 have the highest proportion of obesity (24%), whilst the age bracket with the highest proportion of men living with obesity is between 55-64 (23%).

There is evidence of a non-linear (J shaped) dose-response relationships between BMI and MASLD, suggesting that higher BMI is an independent, dose-dependent risk factor for fatty liver, however data is limited to cross-sectional studies, so whilst there is a correlation between increasing BMI and MASLD risk, this cannot currently be deemed causal, and more work is required to investigate this relationship (46). What is more, at an individual level, BMI does not consider variation in body composition, and thus high BMI does not necessarily equate to high levels of body fat (46). However, it may be pertinent to consider active case-finding of MASLD in individuals with higher BMI results (e.g., >35 or >40) given the suggested relationship.

Figure 54: Age Structure of population living with obesity (≥30) in Gloucestershire



Source: GP events table

Data from the public health outcomes framework (Fingertips) indicates that in 2021/22, 62.4% of adults aged 18 and over were classed as overweight or obese in Gloucestershire. Compared to all areas in England, Gloucestershire had the 95th highest proportion of overweight or obese adults. Compared to its geographical neighbours, in 2021/22 Gloucestershire had the 7th highest proportion and the 10th highest proportion compared to it statistical neighbours. Throughout the period shown the proportion of Gloucestershire's 18 and over population who are classed as overweight or obese has been fairly stable, from between 59.4-64.8%.

National Child Measurement Programme

The adult obesity data presented above is limited by the paucity of coverage of BMI measurements across Gloucestershire. Data from the National Childhood Measurement Programme (NCMP) can instead be used as a proxy for adult obesity levels, as the data quality and coverage are much higher, with NCMP providing the best quantitative assessment of obesity in the county. Whilst this does not correlate exactly with adult obesity levels, we know that children and adolescents who are living with obesity are around five times more likely to have ongoing obesity in adulthood compared to those who are a healthy weight (47). Indeed, approximately 55% of children living with obesity will continue to into adolescence, with 80% adolescents living with obesity continuing to do so into adulthood, with around 70% living with obesity once over the age of 30 (47).

The National Child Measurement Programme (NCMP) provides the best quantitative data on childhood obesity levels in the county, measuring over 90% of Reception and Year Six children annually. Data from the 2022/23 school year indicates that prevalence of obesity and severe obesity amongst children has decreased compared to the prevalence recorded during and immediately after the COVID-19 pandemic.

The prevalence of obesity among Reception children in Gloucestershire was 8.6% in 2022/23, which is not statistically significantly different from South West or England levels (8.2 and 9.2% respectively). The local level is slightly lower than in 2021/22 (8.8%), and significantly lower than in 2020/21 (13.5%). The prevalence of severe obesity among Reception children in Gloucestershire (2.2%) is not significantly different from regional or national levels (1.9 and 2.5% respectively). The local level is slightly lower than in 2021/22 (2.3%) and substantially lower than immediately after the pandemic (4.2%).

The prevalence of obesity among Year 6 children in Gloucestershire was 20.4% in 2022/23 (1375 children), which is higher, but not significantly so, than the South West level (19.3%), and significantly lower than England (22.7%). The local level is slightly lower than in 2021/22 (20.8%) but remains higher than pre-pandemic levels (18.2% in 2018/19). The prevalence of severe obesity among Year 6 children in Gloucestershire (4.6%) is not significantly different from regional level (4.3%) but significantly lower than the national average (5.7%). The local level is the same as in 2021/22 (4.6%).

Based on the estimates of how much childhood obesity translates into adult obesity, approximately 756 children from the year 6 cohort in 2022/23 living with obesity will remain living with obesity as adolescents, with approximately 609 of these individuals then going on to live with obesity as adults where they may be at increased risk of liver disease, in addition to individuals who develop obesity as adults. The development of MASLD in children is also on the rise, with some studies indicating this is now the most common cause of liver disease in childhood and carries a risk of cirrhosis and liver failure at a young age (48).

Viral hepatitis

A recent review of viral hepatitis pathways in Gloucestershire has been conducted by Dr Emily Moseley for the Public Health and Communities Hub at Gloucestershire County Council (61). This revealed the following:

- Data supplied by the UK Health Security Agency (UKHSA) and the local NHS team is inadequate to assess how adults move through the pathway and the number of individuals who have been tested for hepatitis B/C and resultant tests in the county.
- Data around viral hepatitis testing is limited in terms of reliability and availability.
- The data reported by different systems (e.g., the sentinel surveillance of bloodborne viruses (SSBBV) system versus NHS laboratory data) do not corroborate each other. Unfortunately, the second-generation surveillance

system and NHS data (which are more reliable) are currently incomplete and therefore it is very difficult to audit Hepatitis B and C in the county.

Feedback from the hepatology service also identified that household contacts or siblings of migrants are not routinely being tested for Hepatitis B and Hepatitis C. This has been followed up with a contact at UKHSA, who says that the responsibility for the screening of contacts is complex. Summary of conversation:

- The Health Protection Team (HPT) inform close contacts that they should be tested and vaccinated, and a letter is sent to their GP to inform the GP of the diagnosis and recommendations for testing. However, the HPT do not have capacity to follow up contacts.
- It is not clear where responsibility lies for the testing of contacts.
- Primary Care does not have specific funding to test contacts, but some will do so it can be seen as duty of care to the patient.

Taking into account the limitations of the data described above, UKHSA found that between 2010 and September/October 2022 the areas in Gloucestershire with the highest incidence per 100,000 of Hepatitis B and C where all urban areas, where one might expect there to be a higher population of people with risk factors for viral hepatitis, for example people who use drugs, migrants from high prevalence areas, and people experiencing homelessness.

The liver disease profile produced by the Office of Health Improvement and Disparities (OHID) and published on Fingertips includes the acute hepatitis B incidence rate per 100,000 population, the number of individuals who have entered drug treatment in the county who have completed a course of hepatitis B vaccination, and the proportion of persons entering treatment for drug misuse who have received hepatitis C testing, and the data for Gloucestershire and England is presented below (Table 3):

Indicator	Data Year	Count	% or Rate in Gloucestershire	% or Rate in England
Acute hepatitis B incidence rate/100,000	2021	3	0.46 (CI:0.10-1.36)	0.31 (CI: 0.27-0.36)
Persons entering drug misuse treatment – Percentage of eligible persons completing a course of hepatitis B vaccination	2016/17	40	5.80% (CI:4.3-7.8)	8.10% (CI: 7.9-8.3)
Persons in drug misuse treatment who inject drugs – Percentage of eligible persons who have received a hepatitis C test	2017/18	803	82.90% (CI: 80.4-85.1)	84.20% (CI: 84.0-84.5)

Table 3: Viral hepatitis profile for Gloucestershire versus England; showing the acute hepatitis B incidence rate and the percentage of eligible persons who enter treatment for drug dependency who complete the hepatitis B vaccination series and receive a hepatitis C test. Taken from Dr Moseley's work, original source: Fingertips

Whilst this suggests that that the current acute hepatitis B incidence rate per 100,000 in Gloucestershire is higher than the national average, the estimated rate is imprecise given the small numbers, and thus the confidence intervals are wide and overlapping with those for England, thus we cannot say with any statistical certainty that this is the case.

The number of individuals entering drug treatment who have completed a course of hepatitis B vaccination is very limited at 5.8% and is significantly lower than the national average of 8.10%.

The proportion of individuals entering drug misuse treatment who have had a hepatitis C test in Gloucestershire sits at 82.90%, which is not significantly different from the national average but should be 100% to reach elimination targets.

Themes from risk factor data

- Limitations in data collection and coverage around risk factors for liver disease mean that the population at risk in Gloucestershire cannot be well characterised.
- Only 3% of the population registered to a GP in Gloucestershire have had their alcohol use characterised within primary care records, despite routine screening for problem drinking recommended by NICE opportunistically at various patient contacts with primary care e.g., on new patient registration or when carrying out a medication review, or when individuals are identified as being at increased risk of harm from alcohol or have what may be an alcohol related health condition (55). Improving screening and provision of brief intervention in Primary Care for problem drinking is an important area of focus going forward.
- 64% of the registered population have had their BMI recorded on general practice records, with a greater proportion of women having this recorded versus men in the county. This is likely to reflect the increased healthcare usage that tends to be seen in women versus men, as well as the type of usage per gender. Again, BMI coverage amongst adults should be strengthened locally to assess and monitor the prevalence of obesity amongst the population.
- A higher proportion of women compared to men are living with obesity in Gloucestershire. This is at odds with the national picture which suggests that obesity is more prevalent in men than women but may also be artefactual given the poor coverage of BMI recording in the county, which is more significant for men than women (56).

- The relationship between obesity and MASLD is one where MASLD is more likely to occur in in individuals living with obesity class 2 above (BMI 35 and above).
- Higher quality data with better coverage is available for children in the county via the National Child Measurement Programme. This shows prevalence of year 6 children living with obesity is 20% in the county, which is similar to the regional and national average. Whilst this is only a proxy for prevalence of adult obesity, we know that that a significant proportion of children with obesity will continue to live with obesity into adulthood and are at risk of MASLD from a young age. Prevention of obesity and reducing the risk of the metabolic syndrome are essential to promote long term liver health, noting that MASLD is predicted to be the biggest cause of liver transplantation in the future.
- The number of people living with viral hepatitis (B or C) in the county cannot be well characterised.
- Gaps in viral hepatitis prevention and treatment are present and need improvement, with Gloucestershire falling behind the national average in terms of the number of individuals who are entering drug treatment who complete hepatitis B immunisation, and we are also not meeting national targets for hepatitis C screening for the same cohort, and we do not have data around bloodborne virus screening for other high risk populations (outside of antenatal clinics).
- Anecdotally, a gap in local provision of screening and vaccination of contacts of newly diagnosed individuals with hepatitis B has been identified, with no clear pathway for this within the county.
- The uptake of immunisations such as Influenza, pneumococcal and COVID-19 for individuals living with chronic liver disease in the county has not been assessed within this Needs Assessment and is an area where consideration should be made going forward.
- The prevalence of people living with overlapping risk factors e.g., alcohol use and obesity, or those with viral hepatitis and alcohol use, has not been characterised by this Needs Assessment but are likely to represent a population with additive risk of liver disease going forward and should be considered by healthcare professionals and others within the system in terms of minimising risk of and ensuring early diagnosis of liver disease.

5. Services and service mapping

Alcohol and drugs services

In Gloucestershire, the adult drug and alcohol treatment service is commissioned as an integrated system. This means that the provider, Change, Grow, Live (CGL), delivers a full range of specialist community-based substance misuse interventions within a single service, which is also under one roof (in Gloucester) with a single point of access, regardless of individual need. This includes access routes to treatment (including drug and alcohol arrest referral, hospital in-reach, outreach etc); harm

reduction (e.g., needle exchange (including use of low dead-space needles and syringes), take home naloxone, brief interventions for substance misuse etc); psychosocial interventions (including one to one talking therapies, group-based programmes, counselling, etc.) and medically assisted treatment (including opioid substitution therapy, medically assisted withdrawal for alcohol dependency, relapse prevention medication). Whilst CGL does not directly deliver inpatient detoxification or residential rehabilitation, it does provide preparation, referral, and care-coordination for these interventions.

The number of service-users starting treatment and the total number in treatment from 2013/14 to 2022/23 is presented in Table 4, below:

Number starting treatment by year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Alcohol only	460	382	456	603	478	516	502	495	563	574
Alcohol and non-opiate only	185	126	174	204	211	242	281	239	313	356
Total number in treatment by year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Alcohol only	539	613	714	872	700	701	703	705	834	809
Alcohol and non-opiate only	226	232	278	290	264	315	380	350	432	471

Table 4: number of CGL service users starting treatment for alcohol and non-opiate dependency from 2013/14-2022/3, and the total number in treatment per year. **Source:** NDTMS (OHID) *Note: the alcohol & non-opiate cohort are service users with alcohol dependence who are also using other non-opiate drugs (e.g. cocaine, cannabis, benzodiazepines, etc).*

Notably, the number of individuals receiving treatment for alcohol dependence via CLG has remained relatively steady over time, despite the increasing number of hospital admissions we have seen for people experiencing complications of alcohol use, including alcohol-related liver disease, over the same period.

Based on figures from the Office of Health Improvement and Disparities which estimates that there are 5,452 individuals in the county with alcohol dependence, which encompasses both mild, moderate, and severe dependence. Within Gloucestershire, the alcohol treatment penetration rate for our cohort of dependent drinkers was approximately 22.5% (range 31-19%) in 2022/23, which is higher than the national figure of 19.7%. Alcohol-treatment penetration rate was most recently

measured to the end of September 2023 and was found to have risen to 24.6% (although unclear if this change is statistically significant), versus 20.9% nationally. These figures suggest that there may be more individuals with dependency in Gloucestershire who require specialist intervention (e.g., those with moderate to severe dependence, noting that those with mild dependence may never need specific treatment), or that we are doing better than national average in terms of connecting people to treatment. These figures do not take into account variations in regional practice, case mix or the play of chance, however, that may also have resulted in the difference seen It should be noted that most people receiving treatment in Gloucestershire in 2022/23 identified objectively as having moderate to severe dependence, with more than two thirds (69%) drinking more than 200 units per month, and 26% reporting that they drank more than 800 units in a 28-day period (including 17% reporting 1,000+ units).

As well as community services, CGL also employ two hospital in-reach workers who provide drug and alcohol support within Gloucestershire Hospitals NHS Foundation Trust. This in reach team provides a liaison service within the emergency department, and across the inpatient wards, where a referral has been, and provide brief interventions and make onwards referrals into specialist treatment, where necessary. This service operates from Monday-Friday within standard working hours and is predominantly based at Gloucester Royal but works across both hospital sites. Notably, the Drugs and Alcohol service is currently being recommissioned by Gloucestershire County Council, and so provision is likely to change over the next few months.

There is also an alcohol liaison team which provides additional support to inpatients within the acute trust, which is co-commissioned between NHS Gloucestershire integrated Care Board (ICB), Gloucestershire Hospitals NHS Foundation Trust, Gloucestershire County Council and Gloucester Health and Care. The main role of the liaison team is to provide specialist assessment, treatment and signposting for people who attend hospital with alcohol related issues and support to medical teams on the management of alcohol dependency. This service moved from an ‘office-hours’ service to seven-day provision in the summer of 2023, in line with NCEPOD recommendations.

Weight management

The core adult weight management provision in Gloucestershire comprises of:

- Digital weight management support for adults with obesity or type 2 diabetes and the National Diabetes Prevention Programme for adults with pre-diabetes; commissioned by NHS England and accessed by GP referral.
- A range of ‘Tier 2’ weight management support (provided by ICE Creates at the time of writing) for adults with obesity; commissioned by Gloucestershire County Council and accessed by clinical or self-referral.
- ‘Tier 3’ intensive clinical support and/or bariatric surgery (provided by Gloucestershire Hospitals NHS Foundation Trust) for adults with severe

obesity; commissioned by Gloucestershire's ICB and accessed by clinical referral.

Locally, there are also health promotion programmes that map to each of the NIHR high-impact areas for obesity prevention, but a high prevalence of obesity and associated health inequalities persist within the population - with a clear need for further work required to evaluate the impact of existing activities on the drivers of obesity, and where opportunities lie to strengthen and join-up these initiatives.

A Healthy Weight Clinical Programme Group (CPG) has been convened to oversee strengthen prevention and the further development of weight management support for adults in Gloucestershire. While there are primary care, community, and specialised weight management services available in the county, there are gaps in provision. The CPG is working to ensure that the range of available offers are best placed to meet the range of needs, address associated inequalities, and are embedded across clinical pathways. The following developments are planned:

1) Primary care management of weight:

- Gloucestershire is one of the lowest users in the country of NHS England's Digital Weight Management offer.
- A Quality Improvement Project with inner city Gloucester's Primary Care Network is underway, aiming to improve access to appropriate weight management support, which includes coaching training for primary care teams to have better conversations about weight.

2) Community-based weight management:

- The current adult offer is under review as part of the recommissioning of the adults' Healthy Lifestyles Service, beginning 1st April 2024.
- This will involve a move away from Slimming World (the current provider) and instead providing a range of weight management offers that are better equipped to meet the range of needs within the local population and reduce health inequalities.
- This will include one-to-one health coaching, digital weight management support, bespoke co-produced weight management groups for those with greatest needs, and expansion of the successful community-based 'Weigh and Go' brief intervention programme.

3) Tier 3 and bariatric surgery services:

- Whilst these are well established in the county for people living with severe obesity, the thresholds for entry into these services do not currently meet NICE guidance (BMI 35 with comorbidities)
- The demand for Tier 3 services (in line with others in the country post-Covid) currently significantly exceeds service capacity.
- New technologies are available (e.g., Semiglutide) that need to be resourced, and clinical pathways developed for their use.

- Interim measures have been put in place to prevent the Tier 3 waiting list from impeding access to bariatric surgery for those with greatest capacity to benefit, and to help manage the waiting list in the short term.
- The Healthy Weight CPG is currently developing an options appraisal to ensure the county has the right provision in place to meet the needs of the population, as well as NICE guidance and technology appraisals going forwards.

Note that the Healthy Lifestyles Service commissioned by Gloucestershire County Council also offers support around cutting down alcohol use, as well as support around increasing physical activity and healthy weight. Gloucestershire County Council also commissions a countywide community-based weight management service for children and young people with obesity, aiming to intervene early to prevent the progression of obesity into adulthood. In 2024 this will be complemented with a new clinical weight management service for children with severe or complex obesity.

Viral hepatitis

The bloodborne pathway review conducted by Dr Moseley also revealed that there is no clearly defined pathway for management of viral hepatitis in Gloucestershire. The mechanisms for Hepatitis B and C treatment are different. The commissioning for Hepatitis B in Gloucestershire is part of Hepatology commissioning. Hepatitis C has specialised commissioning with the Operational Delivery Network (ODN), where funding is sent via a centralised Hub in Bristol, before being sent to Gloucestershire.

The blood borne virus (BBV) team in Gloucestershire is hospital based with no formal community treatment teams for patients with more complex lives, however the hospital team do perform community outreach to engage with people and support them in attending appointments via a BBV nurse. People Who Inject Drugs (PWID) are a key risk group for Hepatitis B and C acquisition, and the Gloucestershire County Council Drugs and Alcohol Team (within the Public Health and Communities Hub) fund a BBV nurse who is employed by the hospital. The Drugs and Alcohol service, Maternity, Migrant and Genito-urinary medicine (sexual health) teams all test for all Blood Bourne Viruses. The positive results are all referred into the Hepatology service. The BBV nurse can initiate treatment for Hepatitis C in the community but are unable to do this for Hepatitis B which needs to be referred into the hospital clinic. The ODN meet weekly with the hospital team in a multi-disciplinary fashion to discuss and agree treatment for Hepatitis C, aiming to get people onto treatment within two weeks of this time.

Primary care liver pathway

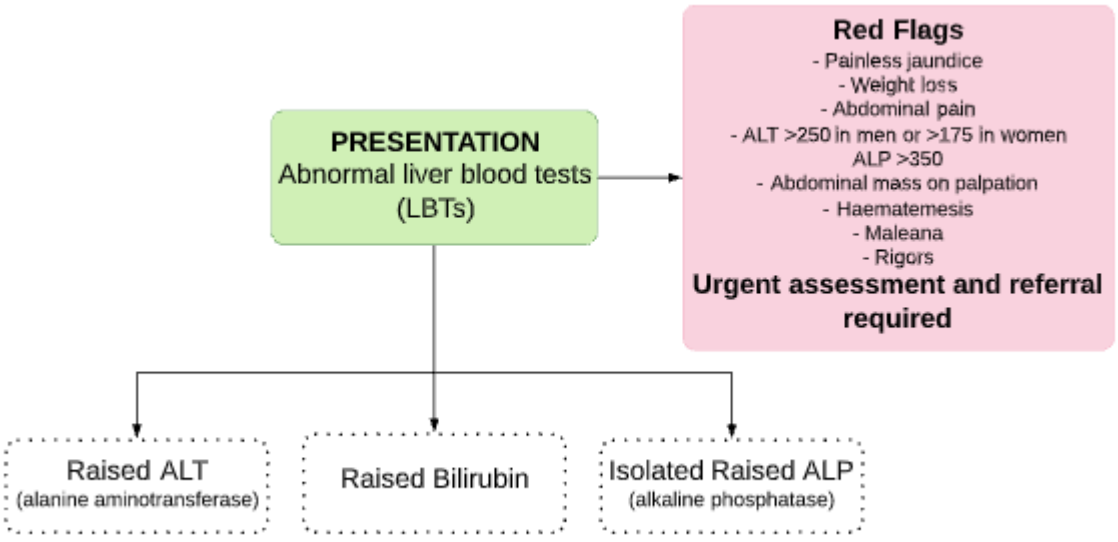
Liver disease often develops insidiously, with no overt signs or symptoms until significant complications have arisen, often when individuals have already developed

significant liver fibrosis. Abnormal liver function tests are often identified by primary and secondary care physicians, but the degree to which they adequately reflect underlying liver disease is limited. In practice, around 20% of all liver blood tests taken are abnormal, of which <10% are explained by actual liver disease, and indeed many individuals with liver disease will have normal liver tests, even where disease is advanced. The three main blood tests that make up standard 'liver function' tests are Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP) and bilirubin. ALT is most relevant when considering parenchymal liver disease where there is damage to liver cells.

When used in isolation, due to the issues described, liver blood tests cannot provide specific diagnostic information, or be used to exclude liver disease. They can be useful tools when they are incorporated into algorithms where other tests are also available, to characterise the extent of liver fibrosis and risk stratification.

Such an algorithm exists in Gloucestershire and the current diagnostic pathway for primary care and thresholds for referral to secondary care are set out 'G-care' (Figure 55), which is managed by One Gloucestershire, Gloucestershire's Integrated Care System, and was last updated in March 2021.

Figure 55: Flow chart showing the current diagnostic pathway from primary care when abnormal liver blood tests are identified. Where red flags are not present, a separate algorithm (not presented here) should be followed – with different pathways for raised ALT, raised bilirubin and isolated raised ALP available on G-care.



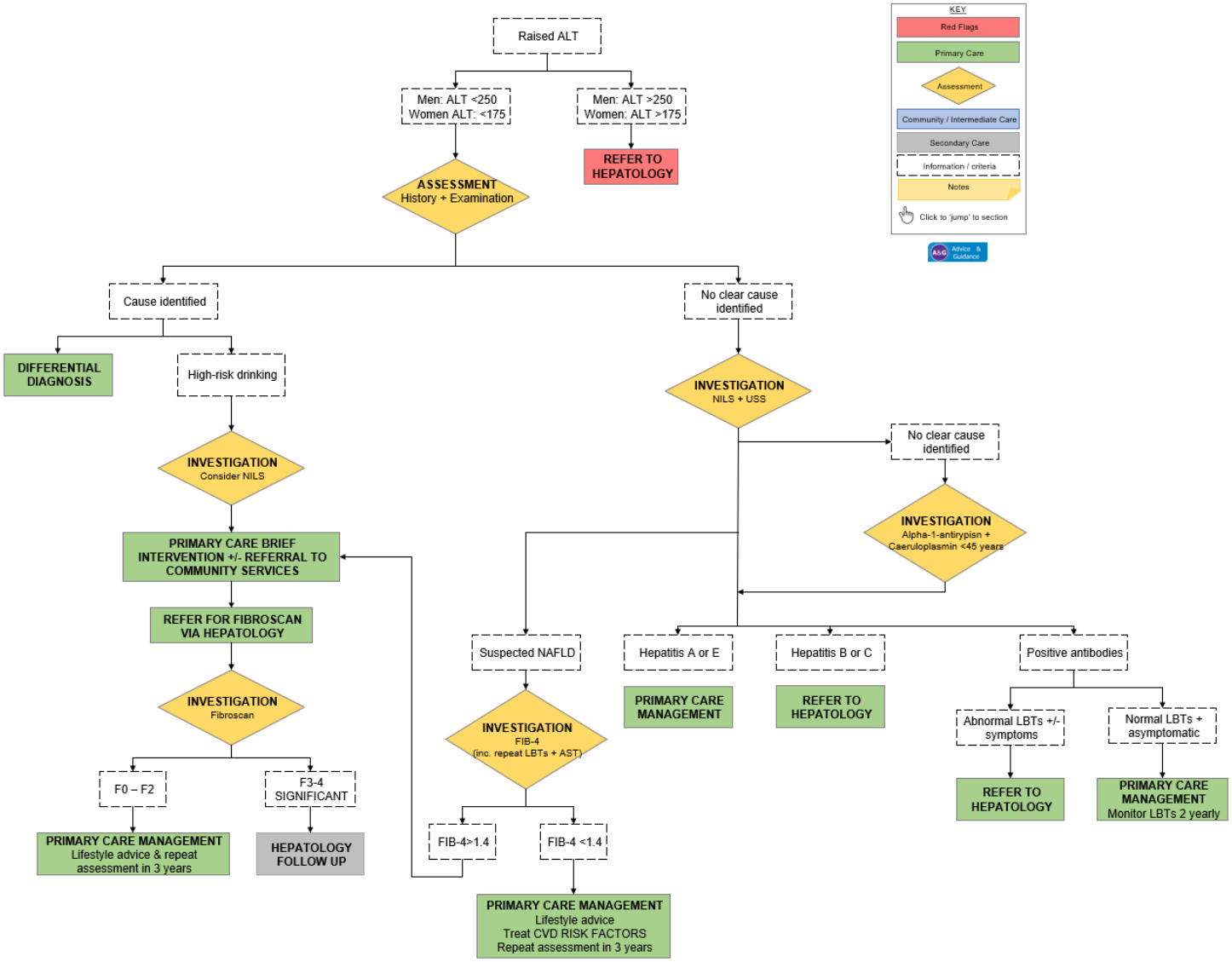
Source: G-care

Where individuals are identified as having abnormal liver function tests, all person with red flags (painless jaundice, weight loss, abdominal pain, ALT >250 (men) or >175 (women), ALP >350, abnormal mass on palpitation, haematemesis, melaena or rigors) require urgent assessment and referral to gastroenterology. Where red flags are not

present, further assessment must be performed in primary care, depending on the nature of the abnormal blood tests.

Where ALT is found to be raised with no red flags, the pathway is set out in the flow chart below, with threshold for referral given (Figure 56):

Figure 56: diagnostic pathway for raised ALT without red flags identified in primary care.



Source: G-care

In this instance, a history and examination are required in primary care in attempt to identify the cause. Where the cause is unclear, further investigations should be conducted – including a 'non-invasive liver screen' (further diagnostic blood tests looking for an underlying cause e.g., viral hepatitis or autoimmune hepatitis) and an ultrasound scan. Depending on the results, the patient will then either require referral

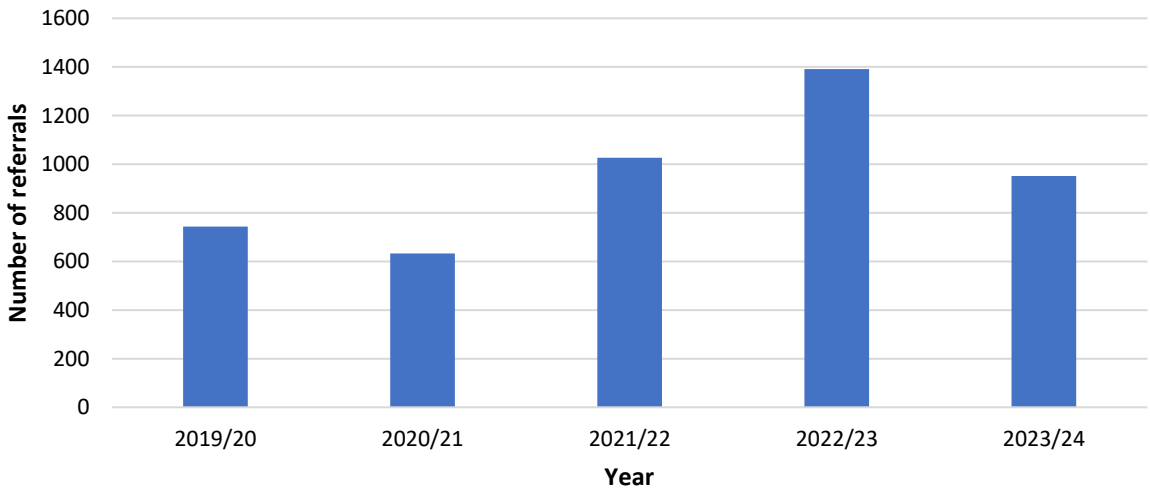
to hepatology, or can be managed in primary care, in accordance with the flow diagram below. Where non-alcoholic fatty liver disease is identified as the liver cause, patients should be risk stratified using the FIB-4 tool, with those identified as higher risk requiring community support around weight management, a Fibroscan (imaging which can detect hepatic fibrosis – scarring and damage of the liver) and referral to hepatology depending on the results of the scan.

Where individuals are identified as drinking at high risk levels, which is likely to be the cause of their abnormal liver tests, individuals should receive a brief intervention within primary care and/or referral to community services for support around reducing alcohol intake. They should also be referred to hepatology for a Fibroscan and depending on the degree of liver damage identified on the scan, they will require ongoing primary care management with a repeat assessment in 3 years as well as 'lifestyle advice', or an immediate referral into hepatology for ongoing follow-up and care. A non-invasive liver screen should also be considered to rule out other or concomitant causes of liver disease.

Individuals who require a Fibroscan (those with high-risk drinking or suspected MASLD who have been stratified as higher risk) should be referred for this via the hepatology referral service.

Data is not available at the time of writing on the numbers of individuals being assessed as part of this pathway, but from Figure 57 we can see that there were close to 1400 referrals to Hepatology in 2022/23 alone, which is an all-time high since 2019/20 (when records are first available).

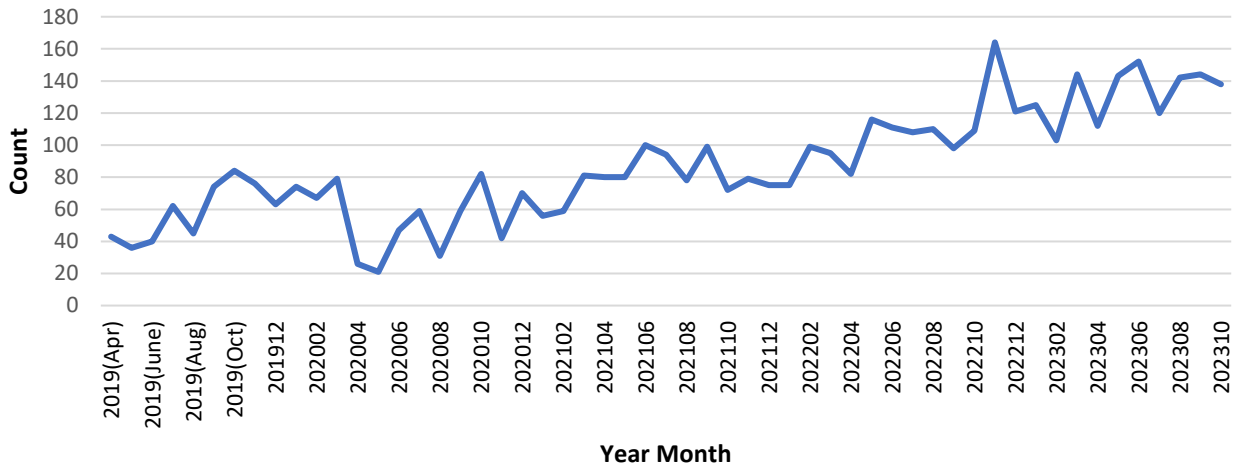
Figure 57: Number of referrals to hepatology in Gloucestershire from 2019/20 and 2023/24 (year to end)



Source: GP events table

The upwards trend in referrals to hepatology is depicted more clearly in Figure 58.

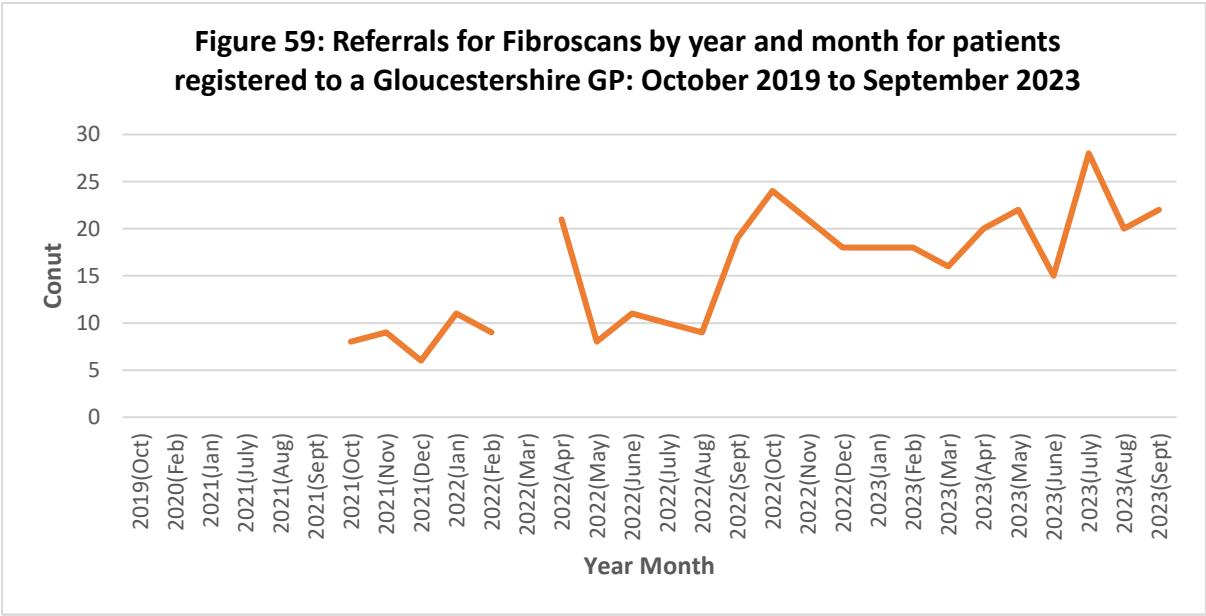
Figure 58: Referrals into Hepatology from patients registered with a Gloucestershire GP: April 2019 to October 2023.



Source: GP events table

Figure 59 shows the number of referrals for Fibroscans from October 2019 to September 2023. Again, this shows an overall upward trend in activity.

Figure 59: Referrals for Fibroscans by year and month for patients registered to a Gloucestershire GP: October 2019 to September 2023



Source: GP events table

Whilst the pathway described above is designed to investigate individuals who have abnormal liver function tests, there is currently no pathway in Gloucestershire for early diagnosis of liver disease, or case-finding of those who either have normal liver blood tests, or where these are not carried out.

The Royal College of General Practitioners (RCGP) and the British Liver Trust now recommend that locally agreed pathways should be developed where there is better provision for assessing the risk of liver disease, finding patients at risk, testing, following up and referring to secondary care (49). It is emphasised that this pathway should not solely rely on liver blood tests, as is acknowledged above, these do not adequately detect liver damage/fibrosis.

The RCGP and British Liver Trust states that systems must:

1) Identify people at risk of liver disease, particularly:

    - Men who drink >50 units/week and women who drink >35 units per week
    - Liver ultrasound showing fatty liver
    - Patients meeting the criteria for metabolic syndrome or those who have type 2 diabetes
    - Those with abnormal liver blood tests (even minor rises)
    - Those at risk of viral hepatitis, including those who have ever injected drugs.

2) Ensure services regularly consider liver disease as a possibility in those with any of the above risk factors.

Specific best practice recommendations have also been developed around enhanced primary care screening and early diagnosis:

1. Assess and code alcohol risk (both dependence and non-dependent excessive drinking) using NICE/British Society of Gastroenterology (BSG) guidelines and recognised tools at:

- New patient registrations
- During annual hypertension reviews
- As part of any NHS/other routine health check
- Opportunistically during consultations
- Aim for all registered adults to have their alcohol risk assessed (and documented) at least every 5 years.

2. Assess metabolic risk (obesity, type 2 diabetes, other metabolic risk factors) leading to MASLD, by:

- Keep a register of all patients coded as having MASLD
- Assess for MASLD every 3-5 years in all registered patients with type 2 diabetes (set up recall as for other chronic disease management)
- Code people with a liver ultrasound showing fatty liver
- Consider keeping a register of all patients meeting criteria for the metabolic syndrome and assessing for MASLD in these patients as for people with type 2 diabetes.

3. Investigate incidental abnormal liver function (enzyme) blood tests (LFTs):

- These individuals are at risk of liver disease and should be investigated regardless of level of abnormality.

- Use BSG guidelines to triage these patients and identify those at risk of common chronic liver disease as well as ruling out and referring onwards where rarer causes are identified.

4: Offer tests to those who inject drugs or have other risk factors for viral hepatitis

- People who inject drugs (PWID) should be offered testing for Hepatitis C routinely. 90% of HCV is acquired through injecting drugs
- Follow NICE guidelines to ensure testing for Hepatitis B and C is being carried out in high-risk patients
- All patients testing positive for Hepatitis B and C should be offered referral to consider treatment options

5. Diagnostic testing in patients at risk of chronic liver disease (ALD and MASLD) should focus on diagnosing/ruling out liver fibrosis:

- Assessing fibrosis can be done using blood-based algorithms, serum fibrosis markers, transient elastography (fibroscan) or these methods in combination. The choice of tests depends on local availability.
- Do not use a set of routine LFTs to rule out fibrosis in those identified as individuals at risk (including those with alcohol risk, MASLD risk or viral hepatitis risk)
- Fibrosis assessment should run in parallel with brief interventions/lifestyle advice.
- All patients where an initial liver screen, based on risk factors, has identified a cause other than alcohol or MASLD should be referred to gastroenterology/hepatology.

6. Test individuals with a high risk of ALD or MASLD related liver fibrosis according to NICE and British Society of Gastroenterology guidelines. Where alcohol consumption is identified to be high risk for ALD (>50 units/week for men, or >35 women/week for women, or AUDIT-C positive), this should involve:

- Fibroscanning of liver if available
- If Fibroscanning is not available then Enhanced Liver Fibrosis (ELF) testing should be performed, which combines quantitative assessment of three markers of fibrosis within blood to provide an overall value.
- If neither are available in the local system, then direct referral to Gastroenterology/Hepatology should occur instead.

Where MASLD risk is identified to be high (based on metabolic risk assessment or abnormal blood tests with no other cause identified or fat on ultrasound with no other cause identified), liver fibrosis should be assessed through:

- ELF testing if available
- Where ELF testing is not available, alternative serum (blood) algorithm test should be performed where possible (e.g., using the Fibrosis-4 (Fib 4) score; a non-invasive assessment of liver scarring which calculates a risk score based on age and various blood-based markers of liver function)

- If neither ELF testing nor direct access to Fibroscanning are available to request from primary care, then referral to secondary care should be made if FIB-4 is high.

7. Develop robust systems for follow up for patients identified with risk factors for liver disease:

- Individuals identified as being at low risk of liver fibrosis should have this coded in their patient record and re-assessed for fibrosis in the community using routine recall pathways, every 3-5 years.
- Follow up should include targeted brief interventions and lifestyle advice, which again should be documented, clinically coded, and repeated at an appropriate interval if risk factors remain.
- Alcohol support and weight loss services should be and considered to be commissioned or expanded to meet demand
- High risk individuals should be referred for specialist follow up. Local referral pathways should be determined by local resource availability and capacity, in discussion with primary care, secondary care and commissioners.

8. Audit any new pathway introduced to drive quality improvement, making use of the Royal College of General Practitioners quality improvement resources.

In direct response to these recommendations, NHS Gloucestershire ICB has developed a business case for a new direct access liver service within a new community diagnostic centre (CDC), which will act as a 'one-stop' nurse-led liver clinic with provision of community Fibroscanning that can be directly accessed by primary care, as well as implementing a new primary care liver pathway for patients identified as having raised ALT levels, and the provision of dietetics support for individuals with established liver disease. At the time of writing, the CDC is currently in development and has not yet opened.

Suspected cancer pathway

Where liver cancer is suspected, referrals should be made via the Upper Gastrointestinal Two-week wait pathway for an outpatient appointment, as stipulated by G-Care where the following conditions are met:

- Painless jaundice
- Abnormal imaging suspicious of Upper GI cancer (report must be appended to referral)
- Upper abdominal mass

This referral is in keeping with NICE, best practice guidance on recognition and referral of upper gastrointestinal tract cancers (50).

Secondary hepatology services

The Gloucestershire Liver Unit (GLU) provides inpatient and outpatient care across two main hospital sites in Cheltenham and Gloucester.

Services provided:

- Management of acute and sub-acute liver failure
- Fibroscan
- General hepatology
- Viral hepatitis clinics
- HCC surveillance and follow-up
- Endoscopic diagnosis and treatment of varices
- Liver transplant assessment and pre- and post-operative care
- Monthly visiting transplant hepatologist from Queen Elizabeth Hospital, Birmingham.
- Day case abdominal paracentesis
- Post-discharge clinic
- Palliative and end-of-life care in liver disease
- Trans-Catheter Chemo-Embolisation (TACE) – a treatment for liver cancer
- Satellite liver transplant service

The gastroenterology and hepatology ward (Knightsbridge) is located at Cheltenham General Hospital. Where referrals are made, patients admitted to Gloucester Royal Hospital or attending the Emergency Department with liver problems can be reviewed by the on-call gastroenterology covering this site.

GRH has five consultant gastroenterologists with an interest in hepatology, four liver specialist nurses and five specialist nurses for viral hepatitis.

Specialist palliative care services

Gloucestershire NHS Foundation Trust has an inpatient palliative care team with staff based at both Gloucester and Cheltenham between 9-5, Monday to Friday. This team aims to see patients who have been referred by other services within one working day of this referral, where possible. A community team is also able to review patients in out-patient clinics or within their own homes and operates a 9-5 service on Monday to Friday.

Specialist palliative care outpatient clinics are also offered alongside other medical speciality clinics. An Enhanced Supportive Care clinic is also currently under development, which will aim to support patients at an earlier stage following a cancer diagnosis, in conjunction with the Oncology service. There is currently no similar service for patients with non-malignant disease.

Themes from service mapping

- Change Grow Live offers a combined alcohol and drug treatment services within the community, with a single point of access within Gloucester City, offering a range of evidence-based interventions.
- The numbers of individuals accessing drug and alcohol treatment through CGL has remained stable over time, despite rises in the numbers of individuals being admitted to hospital and dying from alcohol-related liver disease in the same period. This may indicate unmet need in terms of access to this specialist service in the county. Notably, the Drugs and Alcohol service is currently being recommissioned, and so provision is likely to change in the next few months.
- Treatment penetrance for alcohol dependency has been recorded as 24.6% in September 2023, which is higher than the national average – however, case-mix, chance and variations in local practice have not been considered here. Most individuals receiving alcohol treatment in the county self-report either moderate or severe dependence, with alcohol intake of more than 200 units per week. This is likely the tip of the iceberg in terms of the cohort of individuals who are at risk of alcohol-related liver disease in the county.
- Currently, there is no service that supports active-case finding of liver disease amongst high-risk individuals – which is recommended by national guidance – where all women who drink more than 35 units per week, men who drink more than 50 units per week and anyone who is AUDIT-C positive should have a direct access fibro scan to assess for alcohol-related liver disease. The development of the new Community Diagnostic Centre (CDC) will provide this direct access service from primary care for fibro scanning but given that the majority of the alcohol treatment cohort at CGL would likely also meet these thresholds (as well as others who may be accessing their services but not on treatment), there is an opportunity here to consider whether referrals could also be made from CGL (or from the recommissioned service) into the CDC.
- A comprehensive healthy lifestyles service and weight management offer are available in the county, which again are also currently under recommissioning. However, there are gaps in this – for example, uptake of the digital weight management service for primary care is poor, and work is currently ongoing to try to improve access to this. In addition, demand for tier 3 weight management services currently outstrips the current offer. Consideration of novel technologies and development of the service is being led by the Healthy Weight CPG.
- Pathways for management of viral hepatitis in the county are unclear, as well as gaps in a commissioned service for hepatitis B vaccination for contacts of cases.
- Currently, prior to CDC commencing, patients with suspected liver disease are only referred to hepatology if they have abnormal liver function tests and/or red flags for cancer. Liver function tests are very poor at identifying chronic liver disease, and normal liver function test results does not exclude liver ill-health. This represents a significant gap in early identification and onwards referral of individuals with liver disease, many of whom are likely to be only diagnosed at the point of requiring hospital admission. This will in part be solved by opening the CDC, but in addition, there may well be a need to raise awareness of the

signs and symptoms of chronic liver disease and cirrhosis and that this cannot be ruled out with normal liver function tests and consideration of other mechanisms to have rapid specialist input e.g., a rapid access hepatology clinic for individuals have signs of either compensated or decompensated disease.

- Currently, the number of referrals from primary care into hepatology, and the number of Fibroscan referrals being made using the current pathways, is rising, although it should be noted that there has been no statistical interrogation of the data, and there are small numbers. This could, however, represent increasing demand for these services, or improving recognition of those in need for secondary level care. Notably, however, less than 10% of individuals with abnormal liver function tests go on to actually have diagnosable liver disease, and so the current diagnostic pathway in the county may be relatively inefficient, although investigation of abnormal liver function tests remains to be important and is expected within national guidance.
- It is not clear whether robust mechanisms for identifying individuals with significant risk factors for liver disease are in place across primary care in Gloucestershire (and this seems unlikely given the low numbers of individuals with document BMI and alcohol history on their primary care record), and this should be an area of review and quality improvement going forward.
- The suspected cancer pathway for upper gastrointestinal cancers (including liver cancers) is in keeping with NICE guidance, however, the pathway for six-monthly surveillance of hepatocellular carcinoma for those with identified cirrhosis is not clear and should be further explored.
- A specialist palliative care service exists in Gloucestershire but links between this service and hepatology could be further explored, to identify whether or not referrals into this service are being made based on national guidance. Given the complexity of patients with chronic liver disease, and a cohort with increasing healthcare needs and utilisation, consideration of an Enhanced Supportive Care clinic between hepatology and palliative care services at Gloucestershire NHS Foundation Trust should be made.

6. Economic impact

The economic burden of liver disease encompasses both spending in the NHS and wider societal costs. It is difficult to clearly identify the overall cost of liver disease across these parameters, but we do know that alcohol related health conditions cost around £3.5 billion per to the NHS, with the downstream effects of obesity estimated to cost around £5.5 billion – which is likely an under-estimation (1).

Analysis of financial data was conducted by NHS Gloucestershire for 11 months of 2023/24 using an indicative cost for all inpatient activity for residents of NHS Gloucestershire ICB (ordinary (elective) admissions, day cases and emergency admissions) for ICD-10 codes K70-77 (‘diseases of the liver’) was £2,576.23 per 1,000 population. When compared to the average cost of liver disease inpatient activity amongst ten of NHS Gloucestershire’s statistical neighbours, Gloucestershire benchmarks at a 26% higher proxy financial spend for 2023/24 than the peer group median. This represents a gross spend of £361,046 more than the ten statistically

closest ICBs in terms of their demographics – and a potential for an efficiency saving if prevention was strengthened.

7. Conclusions

The aim of this needs assessment was to investigate the local burden of liver disease and identify areas of unmet need throughout the system. This has found clear evidence of rising mortality and hospital episodes for liver disease in the county, as well as an overall upwards trend in the prevalence of liver disease based on primary care records. There appears to be an increasingly complex cohort of individuals with liver disease requiring secondary care services in Gloucestershire, with increasing numbers of recurrent admissions over the course of a year. There is poor characterisation and identification and early the population at risk of liver disease in the county – with opportunity for early intervention particularly around alcohol use currently being missed. There are significant inequalities in who is dying from and being admitted to hospital with liver disease, and there are opportunities for strengthening prevention at all levels.

8. Recommendations

Recommendations

A) Further data considerations

1) Use a population health management approach to increase vaccination coverage:

- Review vaccination coverage of individuals with chronic liver disease, specifically influenza, pneumococcal, COVID-19 and hepatitis B and use this insight to identify barriers to uptake.
- Review uptake of hepatitis B vaccination for groups who are high risk for liver disease and use this insight to identify barriers to uptake.

2) Review strategies to improve coding rigour for liver-related hospital episodes statistics locally – examples include using the Liverpool alcohol-related liver disease algorithm and use of multiple, grouped ICD-10 codes (46; 61).

3) Review the coverage and access to needle and syringe exchange programmes and opioid agonist therapy for people who inject drugs in Gloucestershire to ensure access is equitable. Some work already has been progressed on this following on from the recent Drug and Alcohol Needs Assessment and has not been reviewed as part of this piece of work.

B) General

1) Establish a liver disease Clinical Programme Group or multi-disciplinary group to further develop and take forward recommendations to improve liver health and outcomes within the county.

2) Undertake a root-cause analysis review of a sample of patients who are admitted as an emergency to Gloucestershire NHS Foundation Trust, including individuals who have more than one admission, to identify specific drivers of emergency hospital admissions and areas for quality improvement.

3) Review a sample of patients with liver diseased admitted electively and Gloucestershire NHS Foundation Trust, to identify what is driving high numbers of hospital episodes for elective admissions, and if coding could be improved for these encounters.

4) Share insights and learning from this Needs Assessment with relevant stakeholders to raise awareness of liver disease in the county e.g., by presenting to the Health and Wellbeing Board, Clinical Programme Board or incorporating intelligence into Gloucestershire's Joint Strategic Needs Assessment

5) Review and follow recommendations from a 2023 review of Hepatitis B and C pathways in Gloucestershire, including improving local surveillance of hepatitis B and C cases in the county through implementing a system of local data collection.

6) Review and implement recommendations from the Gloucestershire's 2023 Director of Public Health report on alcohol in conjunction with those from this HNA.

C) Primary prevention

1) Synthesise the evidence for Minimum Unit Pricing legislation for review by officers and political stakeholders.

2) Synthesise the evidence for local restriction of marketing of unhealthy commodities, including alcohol, in council-owned advertising spaces for review by officers and political stakeholders. (53).

3) Identify systems ownership of hepatitis B vaccination of contacts of individuals who have been diagnosed with hepatitis B, as well as to high-risk groups, which may need specific commissioning. Consider the feasibility of delivery of vaccinations through other settings including the Community Diagnostic Centre or through vaccine outreach.

4) Continue to strengthen obesity prevention and weight management treatment pathways, with reference to new NICE guidance when it is published, addressing key gaps (e.g., access to specialised treatment for adults with severe obesity, inequalities in access, experience, and outcomes) and including alcohol screening and advice alongside healthy weight interventions.

5) Raise awareness of the risk of liver disease within the local population – e.g., through publicising tools such as the 'Love your Liver' Screen developed by the British Liver Trust (64), school-based education and use of behavioural insights approaches in targeted communications.

D) Secondary prevention – early detection and treatment

1) Strengthen identification of at-risk drinkers in primary care using the AUDIT-C tool, followed by provision of a brief intervention, which is consistently documented using appropriate SNOWMED codes. Specifically, alcohol use should be inquired about:

- At new patient registration
- During annual hypertension reviews
- As part of any NHS/other routine 'health check'
- Opportunistically during consultation where possible

Aim for all registered adults to have their alcohol risk assessed at least every 5 years.

2) Make Every Contact Count within other settings in relation to identification of harmful alcohol use (using validated tools), brief intervention and referral to specialist services – e.g., through commissioning the delivery of these psycho-social interventions within community, Pharmacy settings, social prescribing services and the Community Diagnostic Centre, and training of providers.

3) Publicise and provide training around identification of harmful alcohol-use, brief intervention, and referral pathways for healthcare professionals within the system.

4) As per NCEPOD recommendations, all patients presenting to hospital services should be screened for alcohol misuse and all those identified with a history of potentially harmful drinking, should be referred to alcohol support services for a comprehensive physical and mental assessment. The referral and outcomes should be documented in the notes and communicated to the patient's general practitioner.

5) Establish the planned Community Diagnostic Centre (CDC) with direct access to Fibro-scanning from primary care. Offer Fibroscan for individuals with high alcohol intake (>50 units/week for men, >35/week for women, or AUDIT-C positive) as well as those who meet the relevant criteria for MASLD using the Fibrosis-4 index (as the Enhanced Liver Fibrosis (ELF) score is not locally available) as a risk-stratification tool.

6) Noting the multiplicative effect of alcohol and obesity on liver ill-health, consider the evidence base and benefits for reducing thresholds for direct access to Fibro-scanning where individuals have both elevated BMI and high alcohol use.

7) Pilot different approaches for provision of lifestyle support within the CDC e.g., for alcohol:

- All staff with patient contact to be trained in screening and brief intervention for harmful alcohol use and to have responsibility for onwards referral to specialist services where relevant, *or*,
- Consider the possibility of a commissioned alcohol liaison service to be embedded within the CDC.

For weight management/healthy lifestyles:

- Providing written information/leaflets to patients about the Healthy Lifestyle Services on referral to the CDC, *or*
- Verbal offer of referral into the Healthy Lifestyle Services to be made by staff within the CDC on review of new patient, *or*
- Consider a commissioned Healthy Lifestyles Service to be embedded within the CDC.

8) Consider delivery of vaccination for patients with chronic liver disease within CDC (hepatitis A, hepatitis B, influenza, pneumococcus) – e.g., through training CDC staff to deliver vaccinations within the centre or considering feasibility of support for vaccination within the CDC by the vaccine outreach team.

9) Establish a robust and well publicised referral pathway between the CDC and specialist hepatology services into weight-management and the healthy lifestyles services.

11) Establish a referral pathway from the current alcohol treatment provider into the CDC for direct access Fibroscanning, where access criteria are met.

12) Establish a rapid-access hepatology clinic or pathway for patients identified with decompensated cirrhosis in primary care.

13) Raise awareness of multiplication of risk of alcohol and increasing BMI within primary care, considering imbedding review of this within annual health checks and NHS health checks, as well as the risk of alcohol use with all other causes of liver disease.

14) Offer 100% of clients accessing Via a hepatitis C test, with 90% of those offered receiving a test, and 75% of those who have been diagnosed with hepatitis C going on to receive curative treatment, to achieve micro-elimination of hepatitis C within populations who inject drugs within Gloucestershire.

15) Make Every Contact Count and offer opportunistic hepatitis B and C testing for at risk groups across the system and promote the free online hepatitis C testing offer to the public.

16) All health and social care professionals in the local system should be trained to recognise alcohol use disorder and provide brief intervention, as per the Lancet Commission, with a particular focus in strengthening this in primary care and amongst accident and emergency staff.

E) Tertiary prevention

1) Audit the number of individuals identified as having alcohol dependence or drinking to problematic levels in the hospital setting who were offered an onwards referral to specialist community alcohol services, ensuring a robust referral mechanism is in place.

2) Support collaboration and avoidance of duplication between the two alcohol teams in the hospital and identify where there may be gaps in provision across both hospital sites.

3) Audit care against the NCEPOD and Lancet Commission recommendations, including the standard that all patients admitted with liver disease should be reviewed by a hepatologist within 72 hours of admission.

4) Audit referrals to palliative care services for patients, aiming for this to be offered for all patients with:

- Advanced cirrhosis
- Prognosis is expected to be <12 months
- Decompensated ALD with ongoing alcohol-use
- Irreversible decompensation where liver transplantation is not feasible.
- Two or more unplanned liver-related hospitals admissions within the last 6 months.

5) Consider developing a combined specialist palliative care and hepatology outpatient clinic for relevant patients, similar to the Enhanced Supportive Care scheme.

6) Formalise the role of a clinical 'liver champion' within secondary care to:

- Support the development of defined clinical pathways and care bundles in collaboration with acute medicine and intensive care colleagues.
- Be a point of liaison between hepatology with Public Health and Primary Care.

7) Audit uptake of bundles of care for cirrhosis/decompensated liver disease

8) Implement recommendations from the Getting It Right First-Time review, which include:

- Audit of Spontaneous Bacterial Peritonitis cases
- Root-cause analysis of patients diagnosed with hepatocellular carcinoma during an emergency presentation.

9) Review and quality assure the pathway for six-monthly ultrasound surveillance for hepatocellular carcinoma for all patients diagnosed with cirrhosis.

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