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Health of individuals with lived experience of homelessness in Wales, during the COVID-19 pandemic

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Contents

Key Findings

Background

- Homelessness covers a spectrum of poor housing arrangements ranging from insecure (or precarious) housing, to living in temporary accommodation, through to street homelessness (rough sleeping).
- Our understanding of the health needs amongst homeless populations is largely informed by research studies on the more visible street homelessness. Findings highlight poor mental health, physical illness, substance dependencies, reduced life expectancy, and excess preventable morbidities amongst this vulnerable population. This is reflected in a disproportionately higher need for healthcare services, often alongside barriers to accessing care.
- Street homelessness only represents a small proportion of homelessness experiences and health needs, captured at one point in time, and does not reflect the fact that homelessness may not be a fixed state across the life course of an individual. Previous studies are therefore likely to underestimate the impact of lived experience of homelessness on an individual's health and wellbeing, and care needs.
- In our study, through the potential of linked patient-level routine health and care datasets in Wales, we have attempted to capture the full consequences of 'lived experiences of homelessness' on an individual's health that extends beyond the actual homelessness event(s). The novel methodology developed in this study can be applied to better understand the impact of housing on health and vice versa, and to evaluate the health impact of approaches aiming to support those who are homeless or at risk of homelessness.

Characteristics of those recorded as homeless or with insecure housing in healthcare services

- In total, 15,472 adults (aged 16+ years) were identified as having 'lived experience of homelessness' recorded in their primary and/or secondary health care records from 2014 to 2020 (considered as an electronic cohort (e-cohort)).
- Housing status was most commonly recorded by substance misuse services, with over half (58%, n=8,926) of patients identified as homeless at least once in this service. Through data linkage, we are able to create a more accurate picture of an individual's health and wellbeing despite housing status being less consistently recorded in other datasets. Our findings provide valuable insight into the health needs of our e-cohort. However, care needs to be taken not to over-generalise the findings outside of our cohort as there is potential bias through the lack of recording of housing status in other datasets.
- Of the individuals identified as homeless in substance misuse services, 78% attended another National Health Service (NHS) facility within a month of being identified as homeless, but only 3% had their housing status recorded in the other NHS services accessed during this period, despite homelessness status impacting on effective treatment and care.
- Of the population with lived experience of homelessness, 69% were male and 86% were less than 55 years of age.
- Nearly a third (30%) of those with lived experience of homelessness were managing long-term health conditions at the point of being identified as homeless in routine health data.
- The three most common long-term health conditions identified amongst individuals with lived experience of homelessness were alcohol dependency (17%), depression (15%) and drug dependency (11%). In comparison, within the general population the three most common conditions were hypertension (5%), chronic pulmonary disease (3%) and cardiac arrhythmias (2%).

Secondary healthcare service activity during the COVID-19 pandemic

- Individuals with lived experience of homelessness had higher planned and emergency care activity rates than the general population both before and during the pandemic, highlighting their complex health needs and the challenges associated with accessing primary healthcare services. From January to July 2020, nearly half (47%) of individuals with lived experience of homelessness accessed at least one secondary healthcare service, compared to one in five (22%) of the general population comparison group.
- Individuals with lived experience of homelessness had increased levels of emergency care activity (2020 figures: 264 emergency admissions per 1,000 population amongst those with lived experience of homelessness, compared with 39 per 1,000 population in the comparison group; 562 A&E attendances per 1,000 population amongst those with lived experience of homelessness, compared with 83 per 1,000 population in the comparison group).
- The decline in planned care in 2020 compared to 2019 was similar for those with lived experience of homelessness (35% in outpatient attendances and 37% in elective admissions) and the general population (38% and 37%, respectively), whereas the decline in emergency care was much steeper for those with lived experience of homelessness (25% in A&E attendances and 31% in emergency admissions; 18% and 9% respectively in the general population).
- The cost of NHS health care activity between January and July of 2020 amongst those with lived experience of homelessness was £11 million more than the general population comparison group and the majority of the difference was contributed by emergency care.

Health outcomes during the COVID-19 pandemic

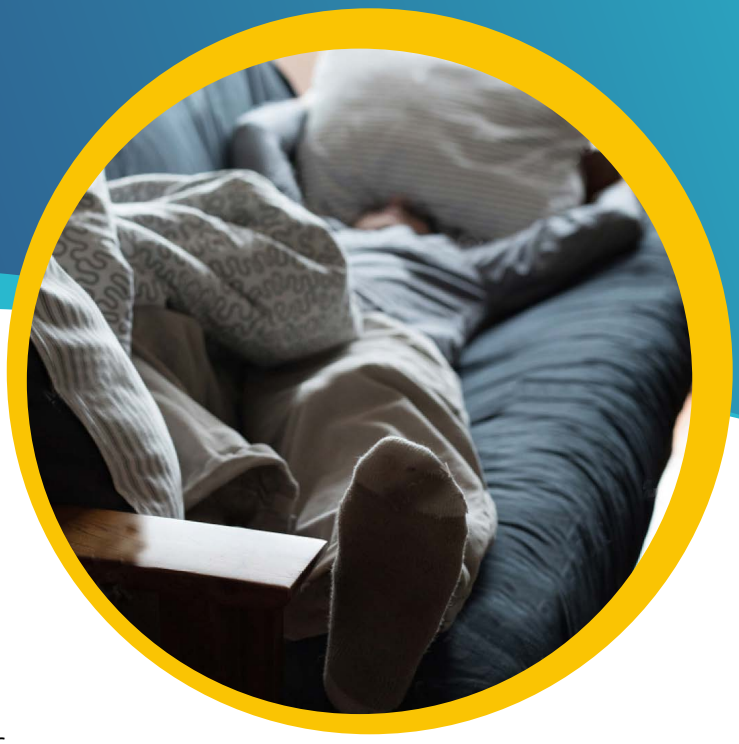
- One in ten (n=1,717) of the e-cohort of individuals with lived experience of homelessness, were homeless during the first half of 2020 (January to July) during the COVID-19 pandemic.
- From January to July 2020, 31 per 1,000 homeless individuals tested positive for COVID-19, 9 per 1,000 had at least one COVID-19 related hospital admission, and 3 per 1,000 died with COVID-19 listed as one of the causes of death. Figures for the general population comparison group were much lower: 22 per 1,000 tested positive for COVID-19, 1 per 1,000 had a COVID-19 related hospital admission, and 1 per 1,000 died with COVID-19 listed as one of the causes of death.
- Differences in the outcomes during the COVID-19 pandemic may reflect differences in access and uptake of testing, care and treatment, underlying health conditions, social and demographic factors. These findings contribute to the emerging evidence on the direct and indirect impact of the COVID-19 pandemic on those with lived experience of homelessness.

Conclusion

A key strength of this study is the ability to identify a cohort of people with lived experience of homelessness across Wales using routine health data, and to use that cohort to demonstrate inequalities in health before and during the pandemic in this population compared to the general population in Wales. This study also adds to the emerging evidence on the impact of the COVID-19 pandemic on those at a social disadvantage and the need to support all groups into recovery. Using linked, routine datasets, our findings demonstrate that healthcare needs are greater in those with lived experience of homelessness and reinforces the need to:

1. Improve preventative care and management of long-term health conditions in individuals with insecure housing arrangements, and to reduce barriers to access to healthcare for this population.
2. Improve the recording and sharing of information on housing status between healthcare services to help identify and address wider challenges to supporting an individual's health care needs.

1. Background



Homelessness is a complex and persistent public health challenge (1,2) and an extreme form of social exclusion (3). Homelessness covers a spectrum of poor housing arrangements. This ranges from 'insecure (or precarious) housing' resulting from a lack of adequate, secure or stable housing arrangements; to living in temporary accommodation, such as 'sofa-surfing' or being housed in Bed & Breakfasts (B&Bs); through to the most extreme form that is 'street homelessness' or 'rough sleeping' (4). Research has traditionally tended to focus on the more visible street homelessness, which only represents a small proportion of total homeless experiences. Similarly, homelessness is not a fixed state across the life course of an individual, rather it can be a one-off acute event that occurs in response to a transition in a person's life; a chronic event where the individual remains in this homelessness state over a longer period of time; or repeated episodes where the individual is cycling in and out of homelessness (4). It is therefore important to capture the full consequences on an individual's health occurring from their 'lived experiences of homelessness' that extends beyond the actual homelessness event(s), in order to better identify and implement solutions to increase support for this population.

Homelessness is not randomly distributed across the UK population and instead there are factors which weight certain individuals with a greater probability of experiencing poor or insecure housing arrangements (5). These factors include poverty, a lack of social support networks (5), pre-existing health problems, unemployment, older adulthood and young childhood (6), as well as having adverse experiences during childhood (4,5). The causes and consequences of homelessness exist as part of complex systems and so are difficult to dissociate (5,7). The direct consequences of poor housing include unhealthy home environments (i.e., cold, damp, mould, indoor toxins), unsuitable housing (e.g., unsafe for children and older adults), food and fuel poverty, overcrowding, infestations, noise and environments conducive to substance misuse (6). Consequences of homelessness also include the erosion of protective factors (7) such as maintaining social support networks, as well as societal issues such as stigmatisation, and difficulties accessing services such as housing and healthcare (5,7). In the context of the COVID-19 pandemic, housing security and homelessness were both found to be of critical importance to an individuals' ability to reduce their exposure to the virus causing coronavirus disease (COVID-19) (through self-isolation and minimising contact with others) (8,9). From March 2020, preventative efforts were made across the UK as part of the political response to the pandemic, to rehouse and protect homeless individuals from COVID-19 due to their greater vulnerability to high rates of transmission, high prevalence of comorbidities, and increased risk of mortality (9,10).

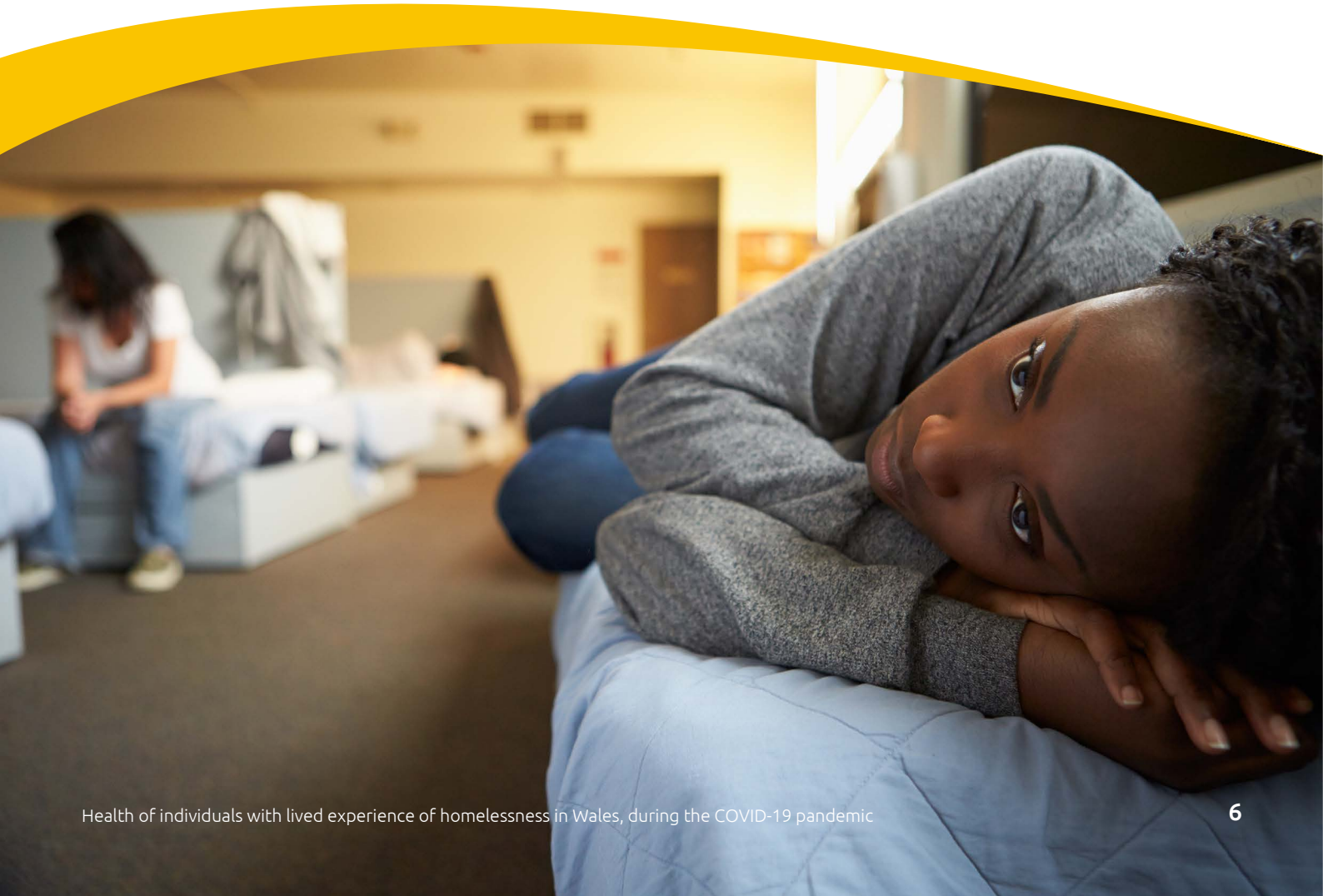
Poor health outcomes in this population are both a cause and a consequence of homelessness (4,6,11,12). The homeless population often suffer poor mental health, physical illness, and substance dependencies (13–16), reduced life expectancy (12,17,18), and excess preventable morbidities (19,20). As a result, the homeless population have a disproportionately high need for healthcare services (21), but often find it difficult to access healthcare (2,22), and the COVID-19 pandemic is likely to have exacerbated these issues (23–25). In particular, the homeless population experience challenges in accessing primary care which may result in prolonged and worsening ill health (18,26,27). Furthermore, individuals with insecure housing arrangements are especially vulnerable to the impact of disasters, including pandemics, on short and longer term outcomes (28–30). This includes being disproportionately affected by burden of infection of the virus

causing COVID-19 (23), due to existing inequalities in their health and their wider social determinants of health (28). Within the context of COVID-19, the detrimental impact on homeless populations can be both a direct consequence affecting their morbidity and mortality (31), as well as an indirect impact on their wider determinants of health (16,32).

As described earlier, homelessness is not a fixed state, and includes the impact of insecure housing as well as street homelessness on the short and longer-term health of individuals. A lack of reliable data on housing status is likely to underestimate the extent of homelessness or those with lived experience of homelessness, and their health needs (2,33). This concern regarding data exists amidst a background of increasing evidence-based policymaking to combat homelessness (34). In this study, we have linked multiple datasets of NHS healthcare records for the entire Welsh population in order to generate a more comprehensive understanding of the healthcare activity of those with lived experience of homelessness. This report provides an empirical evidence base to support policy making by detailing the health and healthcare service activity of those with lived experience of homelessness in Wales before and throughout the COVID-19 pandemic.

We aim to:

- better understand the demographic characteristics and long-term health conditions of people with lived experience of homelessness in Wales with a broad definition to include both street homelessness and precarious/insecure housing; and
- explore how the COVID-19 pandemic affected service activity and healthcare outcomes for this population.



2. Methods

2.1 Data linkage

Linkage studies are used to conduct population-based cohort and case-control studies (35), predict disease prevalence (36), assess screening and healthcare service use (37), and undertake life course and transgenerational investigations (35). This study builds on recent research that generated an e-cohort of individuals with recorded lived experience of homelessness in Wales, by combining information across four routine healthcare datasets (Welsh National Database for Substance Misuse [assessment data only], Patient Episode Database for Wales, Primary Care GP Dataset and Emergency Department Dataset) in order to identify eligible individuals (19). We identified 15,472 individuals with lived experience of homelessness in Wales since 2014, when the Housing (Wales) Act 2014 came into force. In our analysis we linked the e-cohort with electronic health records held in the Secure Anonymised Information Linkage (SAIL) Databank via an anonymised linking field that is unique to each individual (38,39). The SAIL Databank is a national resource that enables privacy-protected individual-level data to be linkable and available for research (38,39).

The e-cohort was linked with the following routinely collected datasets (40) in order to better understand the healthcare needs of those with lived experience of homelessness in Wales and their COVID-19 outcomes:

- Patient Episode Database for Wales (PEDW)
- Outpatients Dataset (OPDW)
- Emergency Department Dataset (EDDS)
- Annual District Death Extract (ADDE)
- COVID-19 Pathology Test Results (PATD)
- Welsh Demographic Service (WDS) dataset

The study did not include primary care data and as such may underestimate the health care needs and the prevalence of underlying health conditions amongst the population studied.

2.2 Study and comparison groups

2.2.1 Lived experience of homelessness

We use a broad spectrum definition of 'homelessness' that includes a range of insecure housing situations, from inadequate housing to sofa-surfing to rough sleeping (2,13,33,41,42). All individuals aged 16 years and above who had visited healthcare services in Wales between 1st January 2014 and 31st July 2020 and had been recorded, or 'flagged', in electronic health records as being 'homeless' were identified. Full criteria and methods for creating this e-cohort are described in the original paper aiming to identify homelessness in routinely collected health and care datasets (19).

2.2.2 General population comparison group: unmatched

To enable comparisons with the general population in Wales, we constructed an unmatched population comparison group with n=15,472 individuals who were randomly selected from the Welsh Demographic Service (WDS) database. The WDS is a dataset that contains demographic data derived from registration with a general practitioner (GP) in Wales, and is used as the population register within the SAIL databank. Eligible individuals were alive, aged 16 years and above in 2014, resident in Wales during 2020 and not recorded as homeless since 1st January 2014 when the study period started.

2.2.3 Homeless during the COVID-19 pandemic sub-group

In order to examine COVID-19 related health outcomes in the 'homeless during the pandemic', a sub-group of individuals with lived experience of homelessness (n=1,717) who were flagged as homeless ***during*** the COVID-19 pandemic (between 1st January and 31st July 2020 inclusive), was created.

2.3 Outcome measures

2.3.1 Underlying health: Long-term health conditions

To build an understanding of long-term health conditions, or comorbidities, any diagnoses recorded by inpatient and outpatient services were categorised using the Elixhauser comorbidity index. The index is a method for measuring comorbidities (43) based on ICD-10 diagnosis codes (44) recorded in inpatient and outpatient services. Categories and respective ICD-10 codes are presented in Appendix 1. The number of individuals with 0, 1, or 2+ of these Elixhauser long-term conditions were counted to capture the burden of multiple long-term conditions. Examination of long-term conditions in primary care was not within the scope of this analysis. A future analysis on multimorbidity is planned, combining primary and secondary electronic health records.

To provide an understanding of an individual's health at the time of being recorded as homeless, all long-term health conditions recorded in secondary care within the two years prior to the first flagged homelessness record in any primary, secondary care or substance misuse dataset were identified. During the two-year period, the individual might be experiencing homelessness and/or housing insecurity that then leads to homelessness. In the comparison group, a fixed time period of two years from January 2017 to January 2019 was applied.

2.3.2 Healthcare activity and costs: changes from 2019 to 2020

To assess the impact of the COVID-19 pandemic on healthcare activity within those with lived experience of homelessness compared to the general population, we examined healthcare activity across secondary healthcare services both for planned (outpatient attendances and elective admissions) and emergency care (emergency department visits and emergency admissions). Healthcare service activity during the pandemic (January to July[1] 2020) was compared to the same period in 2019. Rates of activity shown are the age-sex standardised rates using mid-2019 population estimates for Wales (45). Estimated care costs for the NHS from the healthcare service activity was calculated using the respective average unit cost from the National Cost Collection for the NHS (46).

[1] For healthcare usage, we limited the follow-up period to July to ensure full data coverage for the calendar month.

3. Findings

3.1 Characteristics of individuals with lived experience of homelessness

Key messages:

- In total, 15,472 individuals were identified as having lived experience of homelessness from 2014 to 2020.
- The most comprehensive recording of housing status was in substance misuse services, which have been incentivised to record housing status since 2009. Through data linkage, we are able to create a more accurate picture of an individual's health and wellbeing despite housing status being less consistently recorded in other datasets.
- Of the population with lived experience of homelessness, 78% attended another NHS service within a month of being identified as homeless, but only 3% had their housing status recorded in the other NHS services. Whilst this change may reflect a change in individual circumstances, this also highlights potential unrecognised circumstances which would be essential to understand and to better support these individual care needs.
- Of the population with lived experience of homelessness, 69% were male and 86% were less than 55 years of age.
- Nearly a third of those with lived experience of homelessness had a history of previous long-term health conditions prior to being identified as homeless. The three most common long-term health conditions identified amongst those with lived experience of homelessness were: alcohol dependency (17%), depression (15%) and drug dependency (11%). In comparison, within the general population, the three most common conditions were: hypertension (5%), chronic pulmonary disease (3%) and cardiac arrhythmias (2%).

3.1.1 Recording homelessness in healthcare services

A total of 15,472 people were identified as having lived experience of homelessness in Wales from January 2014 to July 2020. Of those, 89% (n=13,800) were identified as homeless in only one healthcare service (Table 1).

Housing status was most commonly recorded by substance misuse services, with 58% (8,926/15,472) of patients identified as homeless at least once in this service. Of these patients, 78% (6,918/8,926) accessed another NHS service within +/-1 months, but only 3% of those (172/6,918) were recorded as homeless in the other services (including primary and secondary care and substance misuse services) accessed during this period. Whilst this difference may reflect a change in individuals circumstances (e.g. the individual was no longer homeless, or their homelessness status was known but not recorded, or their homelessness status was unknown), it also highlights that not all services have access to information, such as housing status, which might help support the care delivered to that individual.

Since 2009, repeated recording of housing status has been enforced in substance misuse services that are in receipt of Welsh Government substance misuse funding (47), which means recording of homelessness is likely to be much more comprehensive in this dataset compared to that of other health services where housing status is only voluntarily recorded.

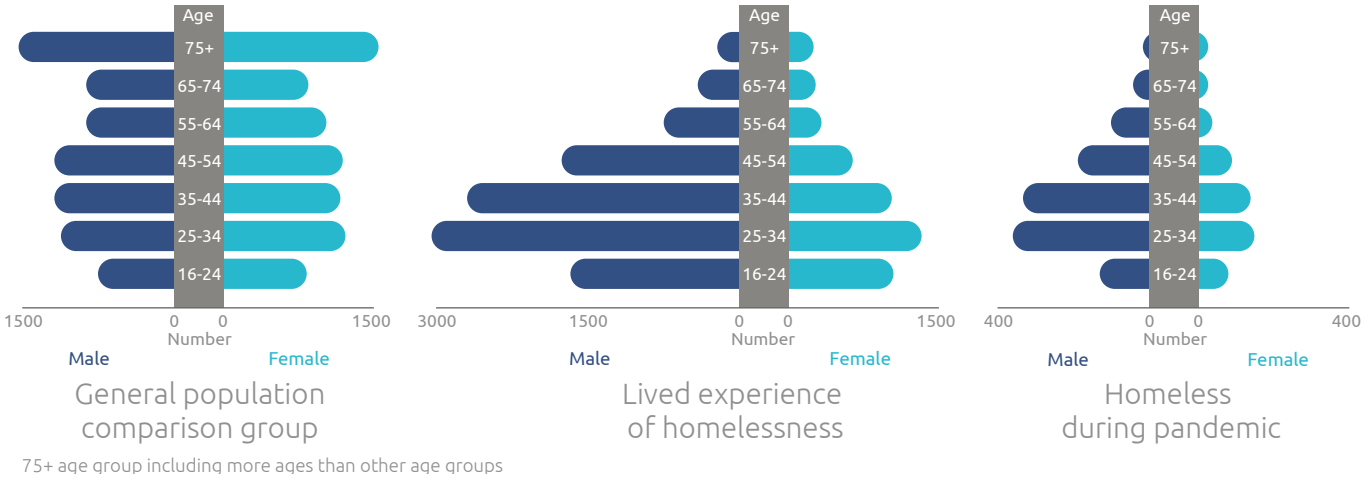
Table 1. Number of individuals with recorded lived experience of homelessness in healthcare services

Health care service	Number of individuals
Emergency department	1425
Emergency department & Inpatient	58
Emergency department & Substance misuse service	93
GP	2998
GP & Emergency department	23
GP & Emergency department & Inpatient	6
All four services	15
GP & Emergency department & Substance misuse service	21
GP & Inpatient	227
GP & Substance misuse service	909
Inpatient	1809
Inpatient & Emergency department & Substance misuse service	16
Inpatient & Substance misuse service	304
Substance misuse service	7568
Total	**15472**

3.1.2 Demographic characteristics

The demographic composition of individuals with lived experience of homelessness and the general population comparison group can be seen below, in Figure 1. A higher proportion of the individuals with lived experience of homelessness were male (69%), and in the younger age groups from 16 to 34 years (46%) and 35 to 54 years (41%) of age (Appendix 2).

Figure 1. Population pyramids for the e-cohort of individuals with lived experience of homelessness, the 'homeless during the pandemic' group, and the population comparison group

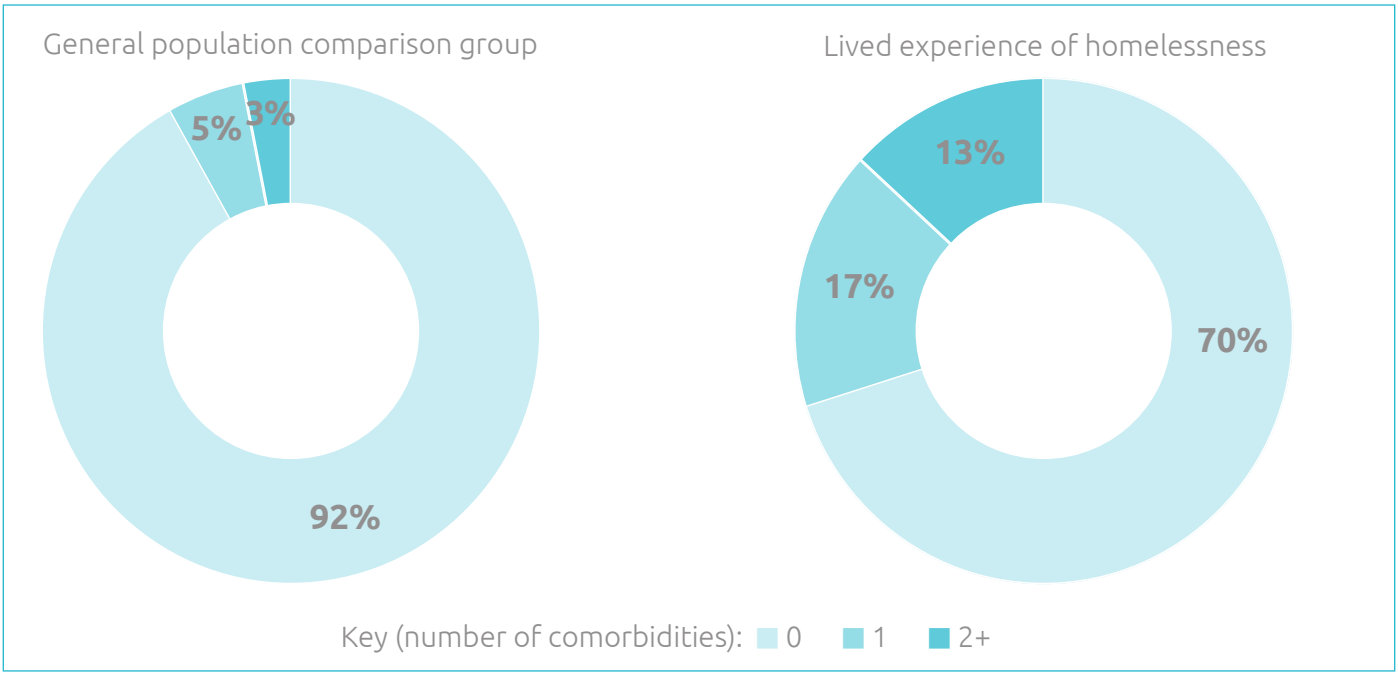


75+ age group including more ages than other age groups

3.1.3 Long-term health conditions identified in secondary care

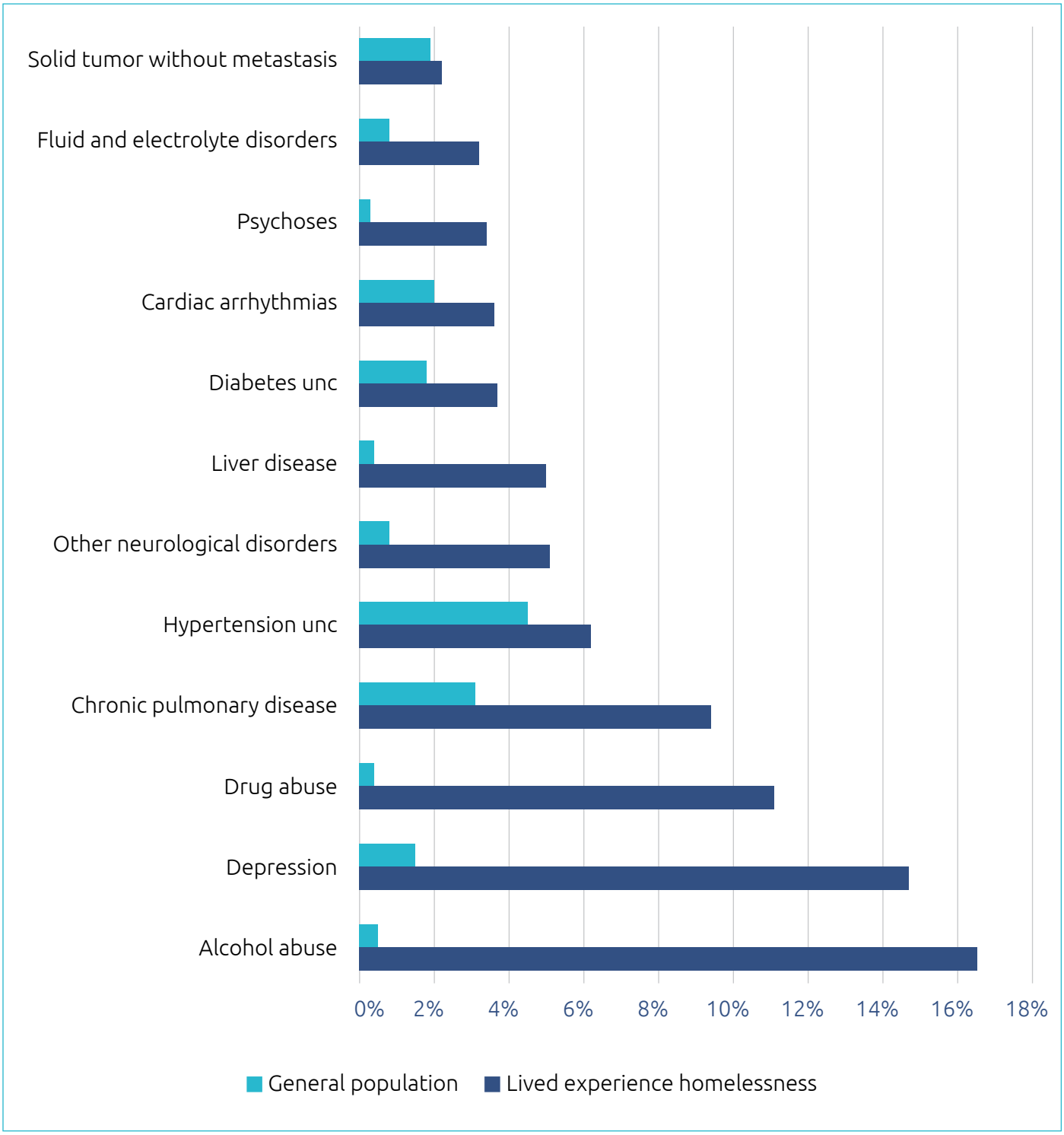
Overall, 30% of individuals with lived experience of homelessness had existing long-term conditions (measured by the Elixhauser comorbidity index) within the two years prior to being flagged as homeless, compared to only 8% of the general population comparison group. A higher proportion of those with lived experience of homelessness were also managing multiple conditions (Figure 2).

Figure 2. Proportion of (a) the general population comparison group and (b) those with lived experience of homelessness, who had multiple long-term health conditions



The three most common long-term health conditions identified in secondary care amongst individuals with lived experience of homelessness were: alcohol dependency (17%), depression (15%) and drug dependency (11%). In comparison, within the general population, the three most common conditions were: hypertension (5%), chronic pulmonary disease (3%) and cardiac arrhythmias (2%) (see summary in Figure 3, and for full list see Appendix 3). Due to the high proportion of those with lived experience of homelessness identified in substance misuse services, we conducted a sensitivity analysis to examine the long-term health conditions for those with lived experience of homelessness identified in other services. Similar results were found: alcohol dependency (16%), depression (17%) and drug dependency (9%) were the three most common long-term health conditions.

Figure 3. Proportion of individuals diagnosed with long-term health conditions in secondary care amongst the general population and those with lived experience of homelessness



3.2 Healthcare activity *during* the COVID-19 pandemic

Key messages:

- Individuals with lived experience of homelessness had higher planned and emergency care activity rates than the general population both before and during the pandemic, highlighting their complex health needs and the challenges associated with accessing primary healthcare services. From January to July 2020, nearly half (47%) of individuals with lived experience of homelessness accessed at least one of secondary healthcare service, compared to a fifth (22%) of the general population comparison group.
- Individuals with lived experience of homelessness had increased levels of emergency care activity (2020 figures: 264 emergency admissions per 1,000 population amongst those with lived experience of homelessness, compared with 39 per 1,000 population in the comparison group; 562 A&E attendances per 1,000 population amongst those with lived experience of homelessness, compared with 83 per 1,000 population in the comparison group).
- The decline in planned care in 2020 compared to 2019 was similar for those with lived experience of homelessness (35% in outpatient attendances and 37% in elective admissions) and the general population (38% and 37%, respectively), whereas the decline in emergency care was much steeper for those with lived experience of homelessness (25% in A&E attendances and 31% in emergency admissions; 18% and 9%, respectively, in the general population).
- The cost of NHS health care activity between January and July of 2020 amongst those with lived experience of homelessness was £11 million more than the general population comparison group and the majority of the difference was contributed by emergency care.

For individuals with lived experience of homelessness and those in the general population comparison group, we examined changes in healthcare activity for planned (outpatient attendances and elective admissions) and emergency care (emergency department visits and emergency admissions) from January to July 2020, and compared this with healthcare activity during the same period in 2019. A total of 1,717 individuals were flagged as homeless between January and July 2020 in Wales. We also examined their healthcare activity in 2020.

3.2.1 Changes in secondary healthcare activity

Overall, individuals with lived experience of homelessness had higher activity rates than the general population comparison group both before and during the pandemic, highlighting their complex health needs (Figure 4 and 5). From January to July 2020, nearly half (47%, 7,336/15,475) of individuals with lived experience of homelessness accessed at least one healthcare service, compared to a fifth (22%, 3,337/15,475) of the general population comparison group.

Individuals with lived experience of homelessness had increased levels of activity in emergency care. There were 264 emergency admissions per 1,000 population amongst those with lived experience of homelessness, compared with 39 per 1,000 population in the comparison group, and 562 A&E attendances per 1,000 population amongst those with lived experience of homelessness, compared with 83 per 1,000 population in the comparison group. For those who were homeless during the pandemic, compared with those with lived experience of homelessness, the dependence on emergency care was even higher: there were 1,552 A&E attendances per 1,000 population (vs 562) and 792 emergency admissions per 1,000 population (vs 264), see Figure 5 and Appendix 4.

Healthcare activity declined across all services in 2020 compared with the same period in 2019, for those with lived experience of homelessness and the general population comparison group (Appendix 4). Similar declines in planned healthcare activity were evident in both groups (declines in outpatient attendances and elective admissions ranged between 35% and 38%). Emergency care shows a different picture with a 31% decrease in emergency admissions for individuals with lived experience of homelessness, and only a 9% decrease in the general population comparison group. We observed a similar trend for A&E attendances, with a greater decline amongst those with lived experience of homelessness compared to the general population group (25% vs 18%, respectively Appendix 4).

Figure 4. Age-sex standardised healthcare activity rates per 1,000 population within the e-cohort with lived experience of homelessness and the population comparison group, January to July 2020 compared to January to July 2019

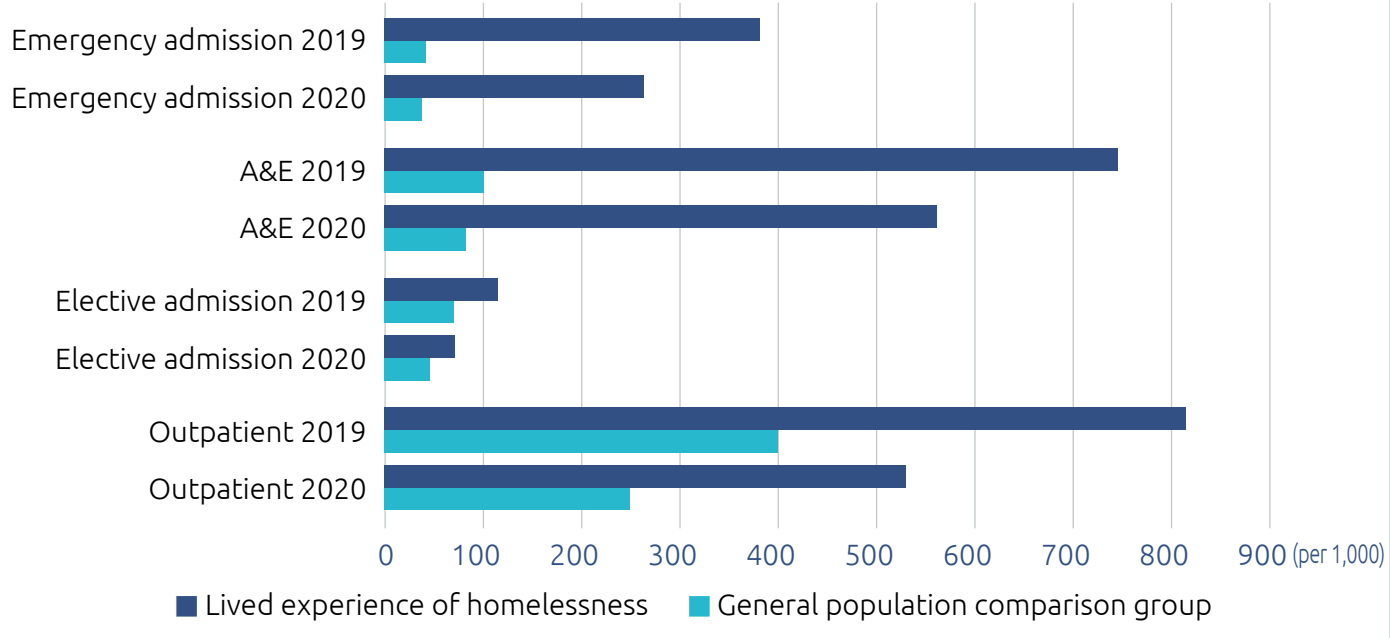
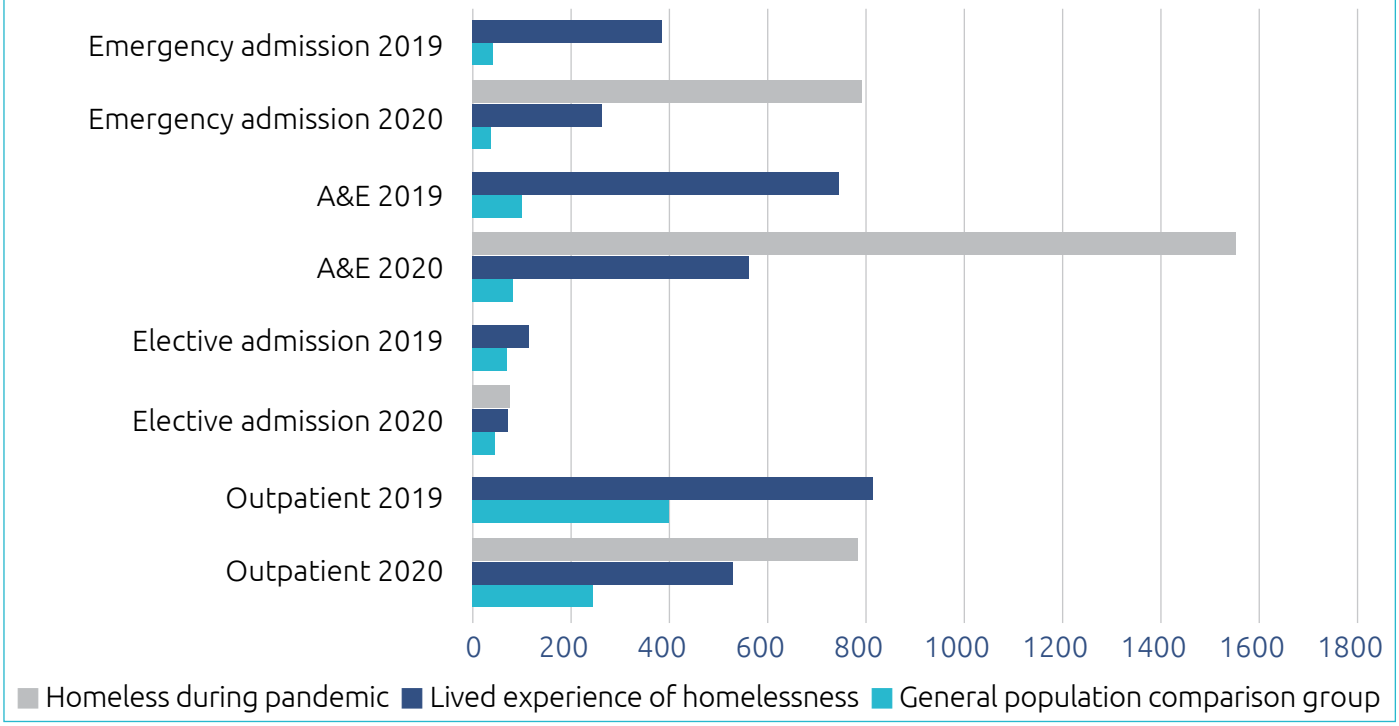


Figure 5. Age-sex standardised healthcare activity rates per 1,000 population within the e-cohort with lived experience of homelessness, those homeless during the pandemic, and the population comparison group, January to July 2020 compared to January to July 2019



In order to understand the difference in representation in care costs for the NHS from healthcare service activity among individuals with lived experience of homelessness and those in the population comparison group, the costs at the point of delivery for inpatient, outpatient and emergency care that took place between January and July of 2020 were calculated (46). It costed the NHS £11 million more to care for the group with lived experience of homelessness, largely due to the activity within emergency care (Table 2).

Table 2. Cost of healthcare activity during 2020 (January to July) within individuals with lived experience of homelessness and the population comparison group (crude unadjusted)

		Individuals with lived experience of homelessness	Population comparison group
Emergency department	Attendances	8548	1281
(Unit cost = £186)	Cost	£1,589,928.00	£238,266.00
Emergency admissions	Admissions	3340	600
(Unit cost = £3,514)	Cost	£11,736,760.00	£2,108,400.00
Total emergency care cost		£13,326,688.00	£2,346,666.00
Elective admissions	Admissions	699	692
(Unit cost = £4,612)	Cost	£3,223,788.00	£3,191,504.00
Outpatient services	Visits	7035	3849
(Unit cost = £134)	Cost	£942,690.00	£515,766.00
Total planned care cost		£4,166,478.00	£3,707,270.00
Total		**£17,493,166**	**£6,053,936**

3.3 COVID-19 related health outcomes *during* the pandemic

Key messages:

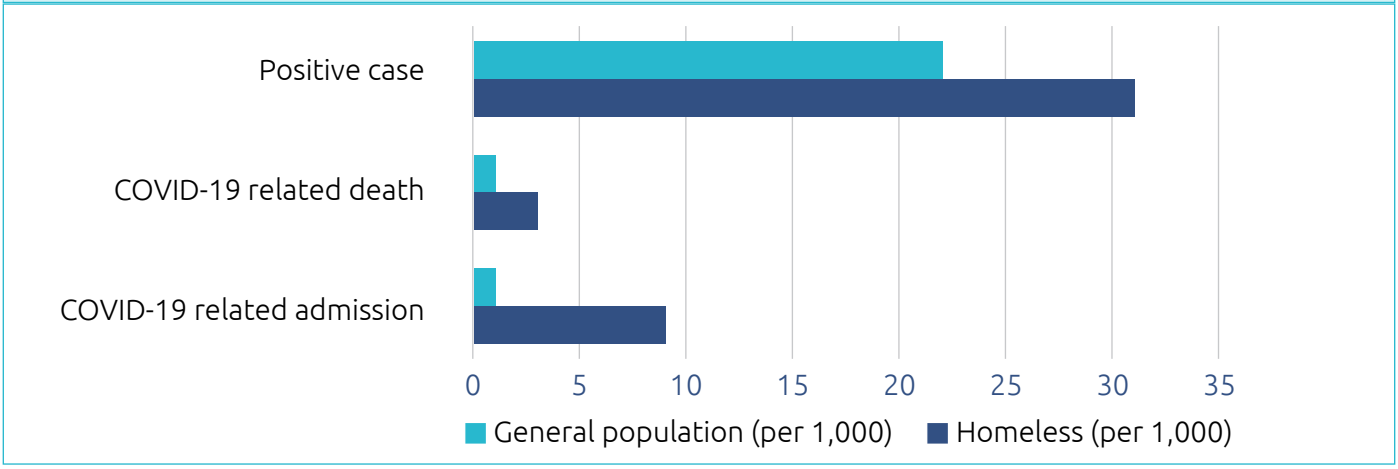
- Individuals with lived experience of homelessness were more vulnerable to adverse health outcomes from COVID-19.
- Within our e-cohort, one in ten (n=1,717) were homeless during the pandemic between January and July 2020.
- Adverse COVID-19 related health outcomes including hospitalisations and mortalities in those experiencing homelessness during the pandemic were more prevalent compared to the general population. Of the n=1,717 individuals who were homeless during the pandemic, 54 (31 per 1,000) tested positive for the virus, 16 (9 per 1,000) had COVID-19 related hospital admissions, and 5 died (3 per 1,000) with COVID-19 listed as one of the causes of death. In the general population comparison group (n=15,472), 340 (22 per 1,000) tested positive for the virus, 11 (1 per 1,000) had COVID-19 related hospital admissions, and 9 (1 per 1,000) died with COVID-19 listed as one of the causes of death.

In order to explore COVID-19 related health outcomes in a subset of those who were identified as homeless during the pandemic, we utilised the COVID-19 pathology test result dataset (48) to obtain COVID-19 Polymerase Chain Reaction (PCR) test results (as dichotomous positive/negative results for the presence of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus – that causes COVID-19 disease). We also examined COVID-19 related secondary care events (inpatient admissions and/or outpatient events) and deaths (where COVID-19 was listed as one of the causes of death) (49).

A total of 1,717 individuals were flagged as homeless between January and July 2020 in Wales. Most of them were male (70%, 1,188/1,717) and in younger age groups, 16 to 34 years (42%, 721/1,717) and 35 to 54 years (43%, 744/1,717) of age. 61% (1,053/1,717) were flagged in substance misuse services as homeless. Of the 1,717 individuals, 31 per 1,000 tested positive for the virus causing COVID-19, 9 per 1,000 had COVID-19 related hospital admissions, and 3 per 1,000 died with COVID-19 listed as one of the causes of death (Figure 6 and Appendix 5).

Within the general population comparison group (n=15,472), 22 per 1,000 tested positive for COVID-19, 1 per 1,000 had COVID-19 related hospital admissions, and 1 per 1,000 died with COVID-19 listed as one of the causes of death (Figure 6 and Appendix 5). The proportions of people testing positive for homeless individuals and the general population were similar. However, our results suggest that homeless individuals were at increased risk of COVID-19 related hospital admissions and death compared to the general population comparison group.

Figure 6. Numbers per 1,000 testing positive for the virus causing COVID-19, COVID-19 related death and hospital admissions within individuals who were homeless during the pandemic and those in the general population comparison group (see Appendix 5)



[2] Rates are not standardised due to disclosure control.

4. Discussion

4.1 Health in those with lived experiences of homelessness

In this e-cohort of 15,472 individuals with lived experience of homelessness, we found that their physical and mental health was generally poor, with nearly a third having existing long-term health conditions prior to being flagged in healthcare data as homeless. In line with previous evidence, we also demonstrated that individuals with lived experience of homelessness suffered more long-term health conditions compared to the general population comparison group (despite being younger), with higher proportions suffering with drug and alcohol dependency (50) and common mental health disorders, i.e. depression (16). The factors contributing to poor health are complex living arrangements (4), difficulties and reluctance in accessing healthcare (11,26,27), as well as pre-existing vulnerabilities, inequalities, and wider determinants of health (28).

4.2 Direct impacts of COVID-19 on this population

Emerging evidence suggests a disproportionate impact of the COVID-19 pandemic on the already disadvantaged homeless population (28,29) contributed to by underlying inequalities in the social determinants of health and a higher prevalence of chronic disease (28).

Focusing on those who were known to be homeless during the pandemic, we did not find any significant difference in the proportion of the homeless or general population testing positive for COVID-19 but this is difficult to interpret. This reflected COVID-19 test data undertaken before extensive track and trace health surveillance programs were enhanced to include community testing. Up until June 2020 the testing strategy was focused on hospitals, care homes and symptomatic critical workers (48), so our findings will be conflated with healthcare seeking behaviours, severity of symptoms and access to testing.

However, we did find that individuals who were homeless during the pandemic were at increased risk of both being admitted to hospital with COVID-19 (9 per 1,000 vs 1 per 1,000 in general population) and of dying from COVID-19 (3 per 1,000 vs 1 per 1,000 in general population). This finding is supported by evidence from other studies, which report that this population is more vulnerable to high rates of transmission in multiple occupancy accommodation, where infection control and preventative measures are challenging (9), and at greater risk of adverse health outcomes from COVID-19 (31). Differences in the outcomes during the COVID-19 pandemic may also reflect differences in access and uptake of testing, care and treatment, underlying health conditions, social and demographic factors. Looking forward, the short and long term political and economic consequences of the virus are likely to further disproportionately impact the health of the already vulnerable (28), including by contributing to housing insecurity and new threats of homelessness (30). Further research is needed to provide robust evidence on the direct and indirect impact of the pandemic on the health and wellbeing of those with lived experience of homelessness.

4.3 Indirect impact of COVID-19 on healthcare

Besides the immediate impact on health from barriers to accessing healthcare services caused by the pandemic, it is important to consider short-term effects, such as declining wellbeing and mental health of the homeless (16,32), as well as long-term effects, such as unemployment, widening of existing inequalities, and further homelessness (28,51). In addition to these factors, the behavioural and social restrictions imposed, general fear of the virus, as well as reduced healthcare appointments and accessibility appear from our data to have exacerbated the inequality in healthcare provision for individuals with lived experience of homelessness.

Previous research into the indirect impact of COVID-19 indicated that planned healthcare service utilisation decreased by about a third during the pandemic and that this may have differentially impacted the most vulnerable (25). Here, we show that individuals with lived experience of homelessness had much greater rates of emergency care and inpatient services than the general population, both before and during the pandemic. Although healthcare activity declined across all services during the pandemic, the decline was smaller in the lived experience of homelessness group. As well as indicating greater healthcare needs, the provision of secondary and urgent healthcare services cost at least £11 million more in Wales compared to the general population control group in 2020 (January to July). Although the overall higher healthcare use by individuals who were homeless during 2020 is not surprising given they needed to access healthcare services in order to be included in this analysis, the pattern of use suggests that there is an even greater reliance on secondary and urgent care while homeless. Reasons may include systemic problems that include poor access to non-emergency care and failure to prevent injury and illness in this group (52), and the differences observed in the data warrant further research in order to understand what the underlying causes both before and during the pandemic.

These findings highlight the need for an ongoing focus on developing preventative care and improving management of long term health conditions in individuals with insecure housing arrangements, and the need to reduce barriers to access to healthcare for this population (2,22). Further investment into, and robust evaluations of, evidence-based approaches to addressing causes of inequalities in accessing healthcare (53) are needed. There are a number of identified areas where action could address this issue: understanding homeless individuals' priorities for their own basic human needs, addressing the stigmatisation and bureaucratic barriers to accessing support (for example rigid opening hours and registration procedures in health care services (20), and creating environments and practices that build trust amongst those with lived experience of homelessness (1)).

4.4 Identifying housing status as a determinant of health in healthcare services

To create our e-cohort, we used a broad definition of homelessness that captured a wider diversity of individuals than using stricter definitions such as rough sleeping (12). This includes individuals along the spectrum of homelessness, from those with insecure housing, to the 'hidden homeless', i.e. those who are sofa-surfing and living in temporary accommodation, and at the extreme end those who are socially excluded or rough sleeping. Whilst this definition might be less specific to those who are street homeless, it does better capture the population size and the impact of lived experience of homelessness on health and wellbeing. Exploring healthcare needs using this broadly defined e-cohort enables a better understanding of ill health as a precursor and result of homelessness, as well as health during the acute housing event.

Insecure housing arrangements have far-reaching implications for one's health and the wider determinants of health (8,54). As such, this information is highly valuable and relevant to practitioners providing a more comprehensive assessment of individual's needs, considering appropriate treatment and support, and directing individuals to relevant authorities for help where needed. For example, substance misuse services in Wales routinely collect complete records on housing needs (55), and sharing this information would allow other healthcare services to reliably identify many vulnerable individuals.

4.5 Strengths and limitations

This study leveraged the data linkage across routine health datasets available in Wales to provide insights on the complex relationship between unstable housing situations and health, which would not otherwise be possible from a single dataset alone (35,56,57). Housing status was routinely recorded by substance misuse services, but sparsely recorded within other datasets. Through data linkage we are able to create a more accurate picture of an individual's housing needs, across health services where insecure housing arrangements were not well-recorded.

As identification of homelessness relies on practitioners and coders to record a range of homeless experiences in a patient's digital care record, particularly within substance misuse services, our analysis is likely to underestimate the extent of precarious housing status and homelessness within Wales, and the resulting short and long term impact on health (2,59). This is especially true as some types of homelessness such as sofa-surfing or temporary accommodation may not be immediately obvious or mentioned to practitioners (2). Additionally, individuals who did not access healthcare services, for example due to a loss of trust (1), were not captured in this study. Previous research has outlined some of these issues and challenges in accurately identifying homelessness status (2,19,58), using data linkage methodology (12,19), interpreting healthcare use and outcomes (19,58), as well as translating this data into real-world policies (58).

In terms of measuring health outcomes, our analysis is likely to underestimate poor health since it was restricted to inpatient and outpatient services during a two-year time window prior to the first notification of homelessness recorded in healthcare data.

5. Conclusion

This report provides an empirical evidence base to support policy making for healthcare of the homeless in the wake of the COVID-19 pandemic. Our findings highlight the complex health needs, and subsequent higher levels of healthcare activity amongst individuals with lived experience of homelessness in Wales, compared to the general population. It also demonstrates levels of poor health amongst both those who are currently homeless and those with past experience of homelessness.

These findings support insights from our earlier research, which heard from homeless individuals themselves about how causes and experiences of homelessness can further impact physical and mental health over their life course (4). This study also adds to the emerging evidence on the impact of the COVID-19 pandemic on those at a social disadvantage (28,30) and the need to support all groups into recovery.

The methods used in this report demonstrate the potential of linked data to better identify and support those living in insecure housing or those who are homeless. **Improving the recording and sharing of information on housing status between healthcare services and other sectors has the potential to help identify and address wider challenges to support an individual's health care needs**. In addition, the links between housing and health are complex. Not all individuals with lived experience of homelessness have poor health outcomes, nor do periods of homelessness result in poor health outcomes for all. **The novel methodology developed in this study can be applied to better understand the impact of housing on health and vice versa, and to evaluate the health impact of approaches aiming to support those who are homeless or at risk of homelessness**. These challenges are of increasing importance at this point in the COVID-19 pandemic, where there has been additional support to prevent people falling into homelessness, but the need to inform and target future support will be important to reduce the indirect harms of COVID-19.

Using linked, routine datasets, our findings demonstrate that healthcare needs are greater in those with lived experience of homelessness and reinforce the need to:

1. Improve preventative care and management of long-term health conditions in individuals with insecure housing arrangements, and to reduce barriers to access healthcare for this population.

2. Improve the recording and sharing of information on housing status between healthcare services to help identify and address wider challenges to supporting an individual's health care needs.

Ethics statement

This study is based on anonymised routinely collected electronic health records. All routinely collected anonymised data held in the SAIL Databank are exempt from consent due to the anonymised nature of the databank (under section 251, National Research Ethics Committee (NREC)). We have applied to and been granted approval by the independent Information Governance Review Panel (IGRP) for permission to conduct this study (project number 0968). The IGRP contains independent members from the NREC and the British Medical Association (BMA), as well as lay members. The review process has checked that the study is useful, not a service evaluation, and will not break anonymisation standards.

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Appendices

Appendix 1: Health categories and respective ICD-10 codes

ICD10 Health Classification	ICD 10 Codes
Alcohol abuse/dependency	F10, E52, G62.1, I42.6, K29.2, K70.0, K70.3, K70.9, T51.x, Z50.2, Z71.4, Z72.1
Blood loss anaemia	D50.0
Cardiac arrhythmias	I44.1 - I44.3, I45.6, I45.9, I47.x - I49.x, R00.0, R00.1, R00.8, T82.1, Z45.0, Z95.0
Chronic pulmonary disease	I27.8, I27.9, J40.x - J47.x, J60.x - J67.x, J68.4, J70.1, J70.3
Coagulopathy	D65 - D68.x, D69.1, D69.3 - D69.6
Congestive heart failure	I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5 - I42.9, I43.x, I50.x, P29.0
Deficiency anaemia	D50.8, D50.9, D51.x - D53.x
Depression	F20.4, F31.3 - F31.5, F32.x, F33.x, F34.1, F41.2, F43.2
Diabetes (combined uncomplicated and complicated)	E10.0, E10.1, E10.9, E11.0, E11.1, E11.9, E12.0, E12.1, E12.9, E13.0, E13.1, E13.9, E14.0, E14.1, E14.9, E10.2 - E10.8, E11.2 - E11.8, E12.2 - E12.8, E13.2 - E13.8, E14.2 - E14.8
Drug abuse/dependency	F11.x - F16.x, F18.x, F19.x, Z71.5, Z72.2
Fluid and electrolyte disorders	E22.2, E86.x, E87.x
Hypertension (combined uncomplicated and complicated)	I10.x, I11.x - I13.x, I15.x, I11.x - I13.x, I15.x
Hypothyroidism	E00.x - E03.x, E89.0
Liver disease	B18.x, I85.x, I86.4, I98.2, K70.x, K71.1, K71.3 - K71.5, K71.7, K72.x - K74.x, K76.0, K76.2 - K76.9, Z94.4
Lymphoma	C81.x - C85.x, C88.x, C96.x, C90.0, C90.2
Metastatic cancer	C77.x - C80.x
Obesity	E66.x
Other neurological disorders	G10.x - G13.x, G20.x - G22.x, G25.4, G25.5, G31.2, G31.8, G31.9, G32.x, G35.x - G37.x, G40.x, G41.x, G93.1, G93.4, R47.0, R56.x
Paralysis	G04.1, G11.4, G80.1, G80.2, G81.x, G82.x, G83.0 - G83.4, G83.9
Peptic ulcer disease, excluding bleeding	K25.7, K25.9, K26.7, K26.9, K27.7, K27.9, K28.7, K28.9
Peripheral vascular disorders	I70.x, I71.x, I73.1, I73.8, I73.9, I77.1, I79.0, I79.2, K55.1, K55.8, K55.9, Z95.8, Z95.9
Psychoses	F20.x, F22.x - F25.x, F28.x, F29.x, F30.2, F31.2, F31.5
Pulmonary circulation disorders	I26.x, I27.x, I28.0, I28.8, I28.9
Renal failure	I12.0, I13.1, N18.x, N19.x, N25.0, Z49.0 - Z49.2, Z94.0, Z99.2
Rheumatoid arthritis/collagen vascular diseases	L94.0, L94.1, L94.3, M05.x, M06.x, M08.x, M12.0, M12.3, M30.x, M31.0 - M31.3, M32.x - M35.x, M45.x, M46.1, M46.8, M46.9
Solid tumour without metastasis	C00.x - C26.x, C30.x - C34.x, C37.x - C41.x, C43.x, C45.x - C58.x, C60.x - C76.x, C97.x
Valvular disease	A52.0, I05.x - I08.x, I09.1, I09.8, I34.x - I39.x, Q23.0 - Q23.3, Z95.2 - Z95.4
Weight loss	E40.x - E46.x, R63.4, R64

Appendix 2: Demographic characteristics of the study and comparison groups

		Lived experience (n= 15,472)		General population comparison group (n= 15,472)	
Female	16-24	1044	6.7%	830	5.4%
	25-34	1322	8.5%	1217	7.9%
	35-44	1027	6.6%	1162	7.5%
	45-54	639	4.1%	1186	7.7%
	55-64	328	2.1%	1020	6.6%
	65-74	259	1.7%	843	5.4%
	75+	244	1.6%	1539	9.9%
Male	16-24	1680	10.9%	760	4.9%
	25-34	3061	19.8%	1122	7.3%
	35-44	2712	17.5%	1193	7.7%
	45-54	1770	11.4%	1193	7.7%
	55-64	752	4.9%	981	6.3%
	65-74	416	2.7%	877	5.7%
	75+	218	1.4%	1549	10.0%

Appendix 3: Prevalence of long term health conditions in the study and comparison groups

	Lived experience of homelessness (n= 15,472)		Population comparison group (n= 15,472)	
Long term health condition	**Crude count**	**%**	**Crude count**	**%**
Alcohol dependency	2551	16.5%	84	0.5%
Depression	2275	14.7%	233	1.5%
Drug dependency	1710	11.1%	66	0.4%
Chronic pulmonary disease	1456	9.4%	485	3.1%
Hypertension unc	964	6.2%	690	4.5%
Other neurological disorders	787	5.1%	123	0.8%
Liver disease	774	5.0%	61	0.4%
Diabetes unc	573	3.7%	283	1.8%
Cardiac arrhythmias	552	3.6%	315	2.0%
Psychoses	532	3.4%	42	0.3%
Fluid and electrolyte disorders	500	3.2%	126	0.8%
Solid tumor without metastasis	335	2.2%	299	1.9%
Congestive heart failure	227	1.5%	133	0.9%
Weight loss	215	1.4%	60	0.4%
Deficiency anemia	206	1.3%	102	0.7%
Hypothyroidism	204	1.3%	151	1.0%
Valvular disease	204	1.3%	123	0.8%
Rheumatoid arthiritis	202	1.3%	148	1.0%
Obesity	184	1.2%	73	0.5%
Renal failure	175	1.1%	113	0.7%
Peripheral vascular disease	137	0.9%	73	0.5%
Diabetes comp	114	0.7%	43	0.3%
Pulmonary circulation disorders	97	0.6%	30	0.2%
Metastatic cancer	94	0.6%	96	0.6%
Coagulopathy	90	0.6%	30	0.2%
Peptic ulcer disease	71	0.5%	19	0.1%
Lymphoma	67	0.4%	57	0.4%
Hypertension comp	12	0.1%	18	0.1%
Blood loss anemia	7	0.0%	0	0.0%

Appendix 4: Healthcare use per 100,000 population within the study and comparison groups, age-sex standardised, January to July 2020 compared to January to July 2019

		2019	2020	2020 vs 2019
Outpatient	General population comparison group	400.4	248.8	-37.9%
	Lived experience of homelessness	815.3	530.1	-35.0%
	Homeless during pandemic		781.0	
A&E	General population comparison group	101.2	82.8	-18.2%
	Lived experience of homelessness	746.4	562.2	-24.7%
	Homeless during pandemic		1551.8	
Elective admission	General population comparison group	71.1	44.7	-37.1%
	Lived experience of homelessness	114.3	72.0	-37.0%
	Homeless during pandemic		78.0	
Emergency admission	General population comparison group	42.5	38.8	-8.7%
	Lived experience of homelessness	381.2	263.7	-30.8%
	Homeless during pandemic		791.9	

Appendix 5: COVID-19 health outcomes for individuals experiencing homelessness during the pandemic and the general population comparison group

	COVID-19 related admission		COVID-19 related death		Positive case	
	Crude count	per 1,000	Crude count	per 1,000	Crude count	per 1,000
Homeless (n=1,171)	16	9	5	3	54	31
General population (n= 15,472)	11	1	9	1	340	22

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