FINAL STUDY REPORT

Healthcare issues amongst the homeless in Birmingham

Analyses of routinely collected data from a specialist homeless healthcare centre

UNIVERSITY OF BIRMINGHAM

RGU ROBERT GORDON UNIVERSITY ABERDEEN

Birmingham and Solihull NHS
Mental Health NHS Foundation Trust

WEST MIDLANDS COMBINED AUTHORITY

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1

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CONTENT

Acknowledgements

1. Executive Summary

Introduction
Homeless population face extreme social exclusion. Estimating burden of disease amongst the homeless has been challenging and often derived from self-reported data. There is a dearth of literature in the United Kingdom (UK); as such, most of the literature around healthcare issues of the homeless are of international origin. Such datasets are imperative in aiding service providers, commissioners and wider stakeholders in the development, implementation and evaluation of healthcare and public health services, including preventative services.

Aim
To conduct a feasibility study in exploring healthcare issues amongst the homeless using routinely collected datasets from a specialist homeless healthcare centre in Birmingham, West Midlands.

Methods
This study involved the extraction and analysis of routinely collected data from a specialist homeless healthcare centre based in Birmingham, West Midlands. Demographic characteristics, smoking status, and prevalence data of 21 health conditions (including mental health conditions, substance and alcohol dependence, cardiovascular conditions and infectious diseases) were explored using the Quality and Outcomes Framework (QoF) and searching of EMIS clinical records of registered patients. Multi-morbidity was defined as the presence of two or more health conditions. Accident and Emergency (A&E) attendance data for the period of November 2016 to October 2017 was also extracted. Data were analysed using descriptive and inferential statistics, and compared to existing data from the general population and homeless population from published resources.

Results
Datasets of all current registrants of the specialist homeless healthcare centre (n=928) were available. The majority were male (n=831, 89.5%), with a mean (SD) age of 38.3 (11.5) years. White British constituted the largest ethnic category (n=205, 26.3%). The majority (487, 52.3%) of patients were current smokers.

Prevalence of mental health conditions, including depression (n=108, 11.6%), substance dependence (n=125, 13.5%) and alcohol dependence (n=198, 21.3%), were higher than those in the general population. In addition, high prevalence of infectious diseases was also observed, notably hepatitis C (n=58, 6.3%). Approximately half (452, 48.7%) of the patients had at least one of the 21 health conditions with 198 (21.3%) having two or more health conditions. A total of 302 (32.5%) visited an Accident and Emergency (A&E) department in the preceding 12 months. Registrants with the diagnosis of substance dependence and alcohol dependence were respectively two and three times more likely to have visited A&E in the last 12 months compared to the registrants without such problems.

Discussion and conclusion
This study has demonstrated a high prevalence of mental health conditions, particularly substance and alcohol dependence; and infectious diseases, notably hepatitis C, amongst the registrants of the specialist homeless healthcare centre in Birmingham. The extent of multi-morbidity identified in this population, despite the mean age being 38.3 years, was comparable to 60-69 year olds in general population. The rate of A&E attendance observed

amongst the registrants is approximately 60 times the higher than the rate of A&E attendance observed in general population.

This study reinforces the findings from international literature, and also from the limited previous UK literature, on the high prevalence of multi-morbidity and particularly mental health needs of the homeless population. Additional services aimed at the prevention and early treatment of mental health issues, particularly drugs and alcohol dependence can improve mental health amongst the homeless and may reduce A&E attendance. Services that enable early and opportunistic screening of the homeless population for blood borne viruses are also warranted. The extent of multi-morbidity seen in this population is often only encountered in geriatric population. Resources to allow further diversification and expansion of services and expertise available at these specialist healthcare centres will benefit patients. Patient satisfaction for services offered in such specialist homeless healthcare setting is generally high and patients value the rapport with staff and specialist service provisions.

This study was limited from a number of perspectives. The researchers had no access to the medical records of individual patients. Data were only retrievable if they were either aggregated for the QOF or if the diagnoses were appropriately read-coded in the patient medical records. Hence it is highly likely that the prevalence rates and multi-morbidity observed in this study are an underestimation.

Future studies should aim to collect data from more than one study setting, including the collection of datasets of homeless population using mainstream general practices, hospitals and A&E departments and self-reported data to triangulate the findings. Longitudinal study designs will allow the evaluation of the impact of relevant services and interventions.

This study will aid service providers and wider stakeholders in the development, implementation, and evaluation of services aimed at tackling homelessness and alleviating the consequences of homelessness. This study will also inform a large scale epidemiological study to be conducted at a national level.

2 Background

2.1 Homelessness

Homelessness is a widespread issue in the United Kingdom (UK),[1] with an estimated 250,000 people known to be currently homeless in England alone.[2] Over 4,000 people sleep rough on any given night in England. Numbers of rough sleepers are rising,[3-5] particularly in urban areas. For example in London, the number of rough sleepers has doubled in the last six years. Approximately, 16,000 people are homeless in the West Midlands, with the numbers of rough sleepers rising recently.[6]

2.2 Health of the homeless

There exists a dearth of literature investigating the healthcare issues amongst the homeless in the UK. Findings from international literature suggest that those experiencing homelessness are significantly disadvantaged in attaining and maintaining a healthy lifestyle.[7-11] Population groups that face extreme social exclusion such as the homeless have nearly eight to twelve times higher mortality rates compared to the general population.[11] The negative health consequences of social exclusion are noted to be greater in female individuals than male individuals. Injury, assault and skin problems are commonly experienced amongst those who are sleeping rough with health status worsening as homelessness persists. A recent study identified that the rough sleepers and those occupying homeless shelters die at an average age of 47 years.[12] Opioid overdose, accidents, heart failure and infectious diseases are known to contribute to the excess mortality.[10,11,13] Health status worsens with increasing length of time as a homeless.[14]

The homeless population has been identified as frequent and repeat attenders of hospital Accident and Emergency (A&E) departments.[15,16] It is estimated that visits by the homeless population constitute approximately 7.5% of regular attenders to A&E in the UK.[16] There is a dearth of literature investigating the reasons for such repeat attendance. Repeat attendance could be linked to their poor general health and lifestyle, as well as non-access to or non-use of available primary healthcare services. Greater use of A&E may impact on patient care, as patients seeing a known and trusted clinician in primary care is imperative for ensuring the continuity of care.[17] A&E attendance is also linked to higher cost implications for the health services. An A&E consultation on average costs up to twice as much as a general practice consultation and as many as five times compared to a pharmacy consultation.[18]

2.3 Primary healthcare service provision for the homeless

There has been an emergence of specialist healthcare centres focused on the healthcare of the homeless across the UK. To our knowledge there is at least one such practice in most major cities of the UK which mainly offer primary general practice services. The establishment of these services has been led mainly by the specialist healthcare needs of this population. In addition, the preference of homeless population to have dedicated drop-in centres and outreach services instead of facilitated access to mainstream primary healthcare centres are amongst other drivers.[19] Most of these services are homeless general practices and general practices with particular expertise in homelessness.[20] Such services are often staffed by general practitioners, nurse practitioners, dieticians, drugs and alcohol workers, and podiatrists, as well as social support workers including solicitors offering free legal advice, benefits advisor, and housing facilitators. Some of the establishments also offer services to asylum seekers, gypsies and travellers; people with no recourse to public funds and sex workers.[20]

2.4 Literature review

Currently, there is very limited literature that reports the healthcare issues of the homeless population of the UK. A search of MEDLINE and Google Scholar databases was undertaken using keywords (homeless, health conditions, healthcare issues, morbidity, mortality), and limited to year 2000 onwards. Only eight UK based studies were identified. A summary of the study aims, methodology, key findings are listed in table 1.

Table 1 Previous UK literature on the healthcare issues of the homeless population

Study	Aim	Study setting	Participants and inclusion and exclusion criteria	Data source	Key results
Hassanally et al. 2018[21]	To characterise the mortality of homeless patients registered in two specialist homeless practices in the London boroughs of Tower Hamlets and Hackney	Two general practice surgeries specialising in care for the homeless in East London	203 deaths were examined. All patients had been marked as deceased for the study period 2001-2016.	Electronic records of patients, causes of death taken from the death certificate, coroners' reports or hospital discharge letters	Average age of death was 47 years with accidental overdose contributing to 23% of deaths, followed by liver disease (18%), cardiac events (13%, of which mostly acute myocardial infarction), lung cancer (8%), homicide (8%), upper GI bleed (11%), suicide (6%)
Queen et al. 2017[22]	To describe the health of users of a specialist homeless health	Specialist homeless health service in Glasgow, Scotland	All permanently registered patients at the Glasgow Homeless Health Service as of 15 October 2015 (n=133)	Information gathered from medical records and correspondence with secondary and social care)	Multi-morbidity of the homeless, with a mean age of 42.8 years, was comparable to those aged ≥85 years in the general population. Mean number of long term conditions was 2.8 per patient with over three in five (60.9%) of patients having both mental and physical comorbidities. 62.4% misused substance, 56.4% misused alcohol, 48.1% attended A&E in the past year
Paudyal et al. 2016[23]	To investigate the general practice prescribing of medicines for homeless patients	Specialist homeless health service in Aberdeen, Scotland	Approximately 385 patients	Dispensing datasets, as available from the PRISMS database	The most commonly prescribed medicines related to Central Nervous System (CNS) with 7965 items prescribed in one year. Amongst the medicines for CNS related health conditions, most medicines were prescribed for the management of substance dependence
McMillan et al. 2015[24]	To investigate the prevalence of admissions to hospital with a head injury in the homeless	General practitioner services in the locality of 55 homeless hostels	Homeless people with and without a record of hospitalized head injury compared to the Glasgow population	Development and production of local registers of homeless people	The prevalence of admission to hospital with head injury in the homeless over a 30-year period (13.5%) was 5.4 times higher than in the Glasgow population
Homeless Link UK 2014[25]	To determine the current health state of the homeless in England	Homeless people from 19 areas across England	2590 participants	Self-reported data from homeless people who took part in local health audits	A total of 41% reported a long-term health condition, 45% mental health problem, 36% depression, 36% substance misuse, 27% alcohol misuse, 77% were regular smokers, 35% had been to A&E in the past 6 months
Dibben et al. 2011[26]	To evaluate the impact of homelessness on the risk of death for young drugs misusers	NHS hospitals in Scotland between 1986 and 2001	Mortality related to drug misuse for people born between 1970 and 1986 and aged over 15 years n=13 303	Datasets of all admissions to NHS hospitals	Over a 3-year period the risk of death for those who were homeless was 3.5 times greater (CI 95% 1.2 to 12.8) than housed population

CI: Confidence intervals

Study	Aim	Study setting	Participants and inclusion and exclusion criteria	Data source	Key results
Hewett et al. 2011[27]	To compare the frequency of diagnoses of health condition between 2003 and 2009 in the computerised records of a specialist practice for the homeless	A specialist primary healthcare service for homeless people in Leicester (approximately 1000 patients). All registered patients were included	All patients registered at the practice for each year that data were extracted for (approximately 1000 patients per year). A survey of the all computerised diagnoses at the health centre between 2003 and 2009	Diagnoses of all morbidities that were available in the practice	A high majority (74.7%) reported a longstanding illness, disability, or infirmity. Average age at death for the 131 patients seen by the service since 1989 was 40.5 years, with alcohol implicated as a cause of death for 62 (47.3%) clients and accidental overdose of drugs of abuse implicated in the deaths of 32 (24.4%) clients. Prevalence of depression was reported as 29.7%, substance dependence 66%, alcohol dependence 29%, hepatitis C 11.3%
Morrison 2009[7]	To describe mortality among a cohort of homeless adults and adjust for the effects of morbidity and socio-economic deprivation	Retrospective 5-year study in Greater Glasgow National Health Service Board area for comparison.	Two fixed cohorts, 6,757 homeless adults and an age- and sex-matched random sample of 12,451 local non-homeless population	Information Service Division, Scotland and Glasgow City Council	After adjustment for age, sex and previous hospitalization, homelessness was associated with an all-cause mortality hazard ratio of 1.6 (95% CI: 1.3-1.9). Among patients who had been hospitalized for drug-related conditions, the homeless cohort experienced a 7-fold increase in risk of death from drugs compared with the general population

CI: Confidence intervals

2.5 Why is it important to undertake this study?

The lack of studies in the UK that have investigated the prevalence of key health conditions necessitates strengthening of the evidence around the healthcare needs of the homeless population. Identifying the burden of disease is often challenging in socially excluded population as social disadvantage is not recorded in patient medical records and vital registrations. Homeless population have very limited coverage in routine health surveys due to their often secluded and unstable location. There is also a need to address the current gap in the range of methodology that has been used to explore the healthcare issues of the homeless. For example, survey methodology, as used in one of the previous studies above[24] provide good coverage of the non-users of the healthcare services, however, missing data from the non-respondents, small sample size of the survey population and inherent lack of reliability of the self-reported data are some of the known limitations. Gathering and analysing healthcare utilisation datasets from a specialist homeless healthcare centre, including its outreach services, will therefore, provide data on the disease burden amongst the homeless population. In addition, this will also provide important methodological considerations for conducting a larger study across the UK in using routinely collected datasets to aid the understanding of the primary healthcare issues amongst the homeless. Such knowledge will aid the service commissioners, local authorities, and health service providers in the planning, implementation, and evaluation of services, including preventative public health services that can mitigate the negative health impact of homelessness. In addition, the areas for improvement and extension of currently available services can also be informed to tackle the health causes and consequences of homelessness.

2.6 Strategic Context

Addressing health inequality requires specific focus on disadvantaged population. Government policies in the UK have highlighted creating and funding new primary health care and anticipatory programmes for vulnerable groups that are at the highest risk of health problems.[28] Evidence based information on the healthcare needs of the homeless population is imperative in putting such policy into practice. The homeless reduction act in England[29] that mandates city authorities and health service providers to offer key anticipatory and corrective measures to reduce homelessness, came into force in England in April, 2018.

The evaluation contributes to Public Health England's priorities for action in understanding and improving the health of the homeless; wider determinants of health; inclusion health; vulnerable groups; access to services and partnership working.[30] It emphases the use of local and national data systems in recording information about patients and service users in informing the planning and delivery of services and is an approach that can be scaled up in other local areas. This study was offered full support by the Birmingham and Solihull Mental Health Foundation Trust, who oversee the NHS services provisions made through the specialist homeless health care centre in Birmingham, and also relates to its one of the key priorities in managing mental health issues being both the cause and consequences of homelessness. Tackling homelessness by identifying and eliminating the causes of homelessness has been set out as one of the key priorities of the newly elected Mayor of Birmingham and the Chair of the Steering Group. The UK government aims to minimise the attendance in secondary care by effective planning and delivery of primary healthcare services. Having robust datasets on the epidemiological issues in primary care is imperative in designing and delivering the services that can reduce unplanned admissions to secondary care. The outcomes of this study will contribute to such undertaking.

3 Aim and Objectives

3.1 Aim

To conduct a feasibility study in exploring healthcare issues amongst the homeless using routinely collected datasets from a specialist homeless healthcare centre in Birmingham, West Midlands.

3.2 Objectives

1. To identify the prevalence of healthcare conditions amongst registrants of a specialist homeless healthcare centre in West Midlands
2. To explore multi-morbidity amongst the registrants of the specialist homeless healthcare centre and to identify any underlying patterns in demography
3. To determine the attendance rates of the registrants to the Accident and Emergency Departments (A&E) and to explore association with morbidity data
4. To explore the feasibility of undertaking analysis of routinely collected data in specialist homeless healthcare centre

4 Methodology

4.1 Design and setting

This study involved the collection and analysis of routinely collected data from the specialist homeless healthcare centre in West Midlands. The healthcare centre provides general practice services to the homeless population in Birmingham. Patients currently have access to a variety of services including general practitioners (GPs), nurse practitioners, psychotherapy counsellor, podiatrist, alcohol dependence intervention nurse, and outreach services in liaison with the street outreach team of Birmingham City Council. At the time of the study, a total of 928 patients were registered with the practice. The specialist healthcare centre does not provide substance dependence services as patients are referred to a dedicated service based in the City.

4.2 Data source

Two sources of data were used - Quality and Outcomes Framework (QOF) and EMIS data of patient medical records. The QOF is an annual reward programme for general practice achievements, an aspect of which involves the building of disease registers.[31] These registers are lists of patients who are registered at the general practice and have been diagnosed with the relevant condition.[32] The QOF holds information about each individual general practice as well as information about the general population, and so the QOF registers have been used to compare the registrants with the general population throughout this study. EMIS is an online database, which is used by a majority of general practices across the UK to store the clinical data of patients.[33] A search function allows the prevalence of health conditions to be gathered amongst the practice registrants.

4.3 Inclusion and exclusion criteria

Inclusion criteria
- Patients registered with specialist homeless healthcare centre in Birmingham
- For A&E attendance, search was run to identify patients EMIS datasets from 12 October 2016 – 11 October 2017

Exclusion criterion
- None

4.4 Data collection

The data search was undertaken by staff at the general practice with routine access to the datasets using the queries specific for a health condition. All data were anonymised prior to their handing to the research team at the University of Birmingham.

The following demographic datasets were obtained:

- Age
- Gender
- Ethnicity
- Smoking status

The prevalence of 21 health conditions amongst the registrants was explored. These conditions were split into eight different categories:

I. Cardiovascular diseases
- Coronary heart disease
- Stroke/Transient Ischaemic Attack (TIA)
- Hypertension
- Atrial fibrillation

II. Mental Health Conditions
- Mental health register
- Depression
- Alcohol dependence
- Substance dependence

III. Infectious diseases
- Hepatitis C
- HIV diagnosis
- Sexually Transmitted Infections (STIs)

IV. Respiratory health conditions
- COPD
- Asthma

V. Neurological disorders
- Epilepsy
- Migraine

VI. Cancer

VII. Diabetes mellitus (types 1 and 2)

VIII. Other health conditions
- Learning disabilities
- Rheumatoid arthritis
- Leg ulcers
- GI ulcers or bleed

The World Health Organisation (WHO) definition of multi-morbidity was used which relates to 'the coexistence of two or more chronic conditions in the same individual'.[34] Of the 21 health conditions, STIs were excluded from the multi-morbidity analysis.

A&E attendance data for the last 12 months was also searched.

4.5 Data storage and analysis
All study materials were stored and processed in accordance with the University of Birmingham; and Birmingham and Solihull Mental Health NHS Foundation Trust research governance policies.

Data were analysed using descriptive and inferential statistics. The descriptive statistics involved the analysis of prevalence of the listed chronic diseases and most frequent reasons for consultation. Inferential statistics included the association of prevalence data with gender and patient age. The comparison of prevalence data across gender was conducted based on the evidence from international literature that health inequality is found to affect socially excluded female population more than the male population.[11] These comparisons also allowed any differences in prevalence between genders and different ages to be compared to the corresponding data in the general population. Data relating to the English or UK general population was taken from a variety of sources including the QOF, national statistics, and existing research. In addition, comparison was made to prevalence data as available in international literature that related to homeless population.

Binary logistic regression analysis was conducted to identify factors that were associated with patient A&E attendance. A&E attendance in the last 12 months was used as an outcome variable. Explanatory variables related to disease areas and any demographic characteristics which showed an association (p value≤0.25)[35] with the outcome 'A&E attendance in the last 12 months' in the univariate analysis.

4.6 Ethical approval

Ethical approval was obtained from the University of Birmingham Research Ethics Committee. Birmingham and Solihull Mental Health NHS Foundation Trust classified this study as an 'audit' and hence detailed NHS Ethical submission was not required.

5 RESULTS

5.1 Demography characteristics

Datasets for a total of nine hundred and twenty-eight (n=928) registrants were available. The youngest registrant was 17 years and the oldest registrant 81 years. Of these, the majority were male (n=831, 89.5%) with a minority of 97 (10.5%) being female registrants. The mean (SD) age of registrants was 38.3 (11.5). Male registrants were significantly older [mean (SD) of 38.8(11.6) years] compared with female registrants [mean (SD) of 34.0 (10.1) years] (mean difference=4.810, 95% CI=2.396-7.223, p value<0.001). White British constituted the largest ethnic category with a total of 205 registrants.

Table 2 Participant demography

Demographic characteristics	Female n=97 n(%)*	Male n=831 n(%)*	All participants N=928
Mean age (SD) (years)	34.0 (10.1)	38.8 (11.6)	38.3 (11.5)
Age (years)			
Range	17-81	19-68	17-81
10-19	5(5.2)	7(0.8)	12(1.3)
20-29	32(33.0)	199(23.9)	231(24.9)
30-39	37(38.1)	247(29.7)	284(30.6)
40-49	13(13.4)	224(27.0)	237(25.5)
50-59	8(8.2)	117(14.1)	125(13.5)
60-69	2(2.1)	32(3.9)	34(3.7)
70-79	0(0)	3(0.4)	3(0.3)
80-89	0(0)	2(0.2)	2(0.2)
Total	**97 (100%)**	**831 (100%)**	**928 (100%)**
Ethnicity			
Asian/Asian British	**3(3.1)**	**44(5.3)**	**47(5.1)**
Bangladeshi	0(0)	4(0.5)	4(0.4)
Chinese	0(0)	1(0.1)	1(0.1)
Indian	0(0)	6(0.7)	6(0.6)
Other Asian	3(3.1)	21(2.5)	24(2.6)
Pakistani	0(0)	12(1.4)	12(1.3)
Black/African/Caribbean/Black British	**8(8.2)**	**56(6.7)**	**64(6.9)**
African	4(4.1)	31(3.7)	35(3.8)
Caribbean	0(0)	13(1.6)	13(1.4)
Other black	4(4.1)	12(1.4)	16(1.7)
Mixed/multiple ethnic groups	**8(8.2)**	**44(5.3)**	**52(5.6)**
Other mixed	4(4.1)	30(3.6)	34(3.7)
White and Asian	1(1.0)	3(0.4)	4(0.4)
White and black African	1(1.0)	1(0.1)	2(0.2)
White and black Caribbean	2(2.1)	10(1.2)	12(1.3)
White	**23(23.7)**	**221(26.6)**	**244(26.3)**
White British	18(18.6)	187(22.5)	205(22.1)
White Irish	1(1.0)	9(1.1)	10(1.1)
Other white	4(4.1)	25(3.0)	29(3.1)
Other ethnic group	**0(0)**	**11(1.3)**	**11(1.2)**
Arab	0(0)	2(0.2)	2(0.2)
'Any other'	0(0)	9(1.1)	9(1.0)
Unknown ethnicity or not recorded	**55(56.7)**	**455(54.8)**	**510(55.0)**
Total	**97(100)**	**831(100)**	**928(100)**

Note: Modal categories appear in grey; *% reflects proportion within gender category

5.2 Smoking status

A total of 487 (52.3%) were current smokers. There were no significant differences between proportion of male (n=437, 52.3%) and female (n=50, 51.5%) smokers (p=0.931). The highest proportion (% within age groups) of male and female patients who smoked were in the age brackets 40-49 and 50-59 respectively (table 3).

Table 3 Smoking prevalence by age and gender

Age (years)	Male n (% smokers within age groups)	Female n (% smokers within age groups)	All registrants (% within groups)	Prevalence data in general population (England)
10-19	1 (14.3)	3 (60)	4 (33.3)	
20-29	78 (39.0)	15 (46.9)	93 (40.1)	
30-39	134 (54.3)	22 (59.5)	156 (54.9)	
40-49	134 (59.8)	5 (38.5)	139 (58.6)	
50-59	71 (59.2)	5 (62.5)	76 (59.4)	
60-69	19 (59.4)	0 (0)	19 (55.9)	
70-79	0 (0)	0 (0)	0 (0)	
All registrants	**437 (52.3)**	**50 (51.5)**	**487 (52.3)**	**15.5%**[36]

Note: Extraction of smoking data occurred on a different day to all other data. The total number of registrants included in the smoking data is 932 (835 males, 97 females)

5.3 Disease prevalence

Prevalence data for a total of 21 health conditions were available in mental health, cardiovascular, infectious diseases, respiratory, neurological and other disease areas including cancer and diabetes.

5.3.1 Mental health conditions

Prevalence data on four domains were available; including depression (as a diagnosis), patients on the mental health register (which includes those diagnosed with schizophrenia, bipolar affective disorder, and other psychoses, and other patients on lithium therapy), alcohol dependence, and substance dependence.

The highest prevalence was observed with alcohol dependence (n=198, 21.3%) followed by substance dependence (n=125, 13.5%). Those with alcohol dependence were significantly older than those without the diagnosis (table 4). Statistically significant association with age was not observed with any other mental health conditions or their listing into the mental health registry. Prevalence rates were not associated with gender (table 4).

5.3.2 Cardiovascular conditions

Prevalence data for a total of four cardiovascular health conditions were available. These included Coronary Heart Disease (CHD), stroke/TIA, hypertension and atrial fibrillation. Those with a diagnosis of all four health cardiovascular conditions were significantly older and predominantly males (table 5).

Table 4 Prevalence of mental health conditions/register

Mental health conditions/ register	Mean age (SD) of those with the health condition (in years)	Mean age (SD) of those without the health condition (in years)	P value	Prevalence n (%)				Prevalence in English or UK general population	Prevalence data in homeless population (UK or international literature)
				Male n (%)	Female n (%)	P value	**All registrants n %**		
Mental Health Register	40.0 (9.6)	38.2 (11.7)	0.169	54 (6.5)	6 (6.2)	1.000	**60 (6.5)**	0.9%[37]	Data in existing literature[38-42] not readily comparable
Depression	39.6 (10.4)	38.2 (11.7)	0.172	95 (11.4)	13 (13.4)	0.567	**108 (11.6)**	9.1%[37]	42.1% - Glasgow[22] 36% - England[24] 29.7% - Leicester[27] 50% - Dublin[43]
Alcohol Dependence	43.3 (10.2)	37.0 (11.5)	<0.001	176 (21.2)	22 (22.7)	0.733	**198 (21.3)**	1.4%[44]	29% – Leicester[27] 56.4% – Glasgow[22] 53% - Dublin [43] 37.9% – systematic review Western Countries[39]
Substance dependence	39.5 (7.9)	38.1 (12.0)	0.102	109 (13.1)	16 (16.5)	0.356	**125 (13.5)**	4.3% men[45] 1.9% women[45]	66 – Leicester [27] 62.4 – Glasgow [22] 33% - Dublin[43] 24.4% – Systematic review Western Countries [39]

SD: standard deviation

Table 5 Prevalence of Cardiovascular Health Conditions

Cardiovascular health conditions	Mean age (SD) of those with the health condition (in years)	Mean age (SD) of those without the health condition (in years)	P value	Prevalence n (%)				Prevalence in English or UK general population	Prevalence data in homeless population (from other studies in the UK), systematic reviews of international literature
				Male n (%)	Female n (%)	P value- Chi square test	All registrants n %		
Coronary Heart Disease Register	53.0 (12.0)*	38.1 (11.4)	<0.001	14 (1.7)	0 (0.0)	N/A	**14 (1.5)**	3.2% UK 3.09% West Midlands[37]	Not available
Stroke/TIA Register	62.0 (34.0)*	38.3 (11.5)	<0.001	3 (0.4)	0 (0.0)	N/A	**3 (0.3)**	1.7%[37]	20%-US[46] 2% - Dublin[43]
Hypertension Register	55.0 (13.0)	37.7 (11.2)	<0.001	37 (4.5)	2 (2.1)	0.420	**39 (4.2)**	13.8%[37]	27%[47] -US has a much larger proportion of African-Caribbean a population with much higher rates of hypertension[48] However, a study from England has found that the prevalence of hypertension in those aged under 40 to be just 3.3%[48] and 40.9% of this study participants are under 40 22% - Dublin[43]
Atrial Fibrillation Register	69.5 (23.0)*	38.3 (11.5)	<0.001	2 (0.2)	0 (0.0)	N/A	**2 (0.2)**	1.8[37]	Not available

*Median (IQR) SD: standard deviation

5.3.3 Infectious diseases

Prevalence data for a total of three infectious diseases were available. These included Hepatitis C, HIV and STIs (table 6). Hepatitis C had the highest prevalence rate of 6.3%. A total of six patients (0.6%) were diagnosed with a HIV infection, and 87 (9.4%) with a STI. No statistically significant differences in the prevalence rates were identified across males and females in any of the infectious diseases (table 6). Patients diagnosed with hepatitis C infection were significantly older than those without the diagnosis (table 6).

5.3.4 Respiratory health conditions

Data were available for Chronic Obstructive Pulmonary Disease (COPD) and Asthma (table 7). Prevalence rates of 1.5% and 4.2% respectively were observed. In both disease areas, those with confirmed diagnosis were significantly older than those without a diagnosis. Female registrants had significantly higher prevalence rates for asthma than males (table 7).

5.3.5 Neurological disorders

Data were available for epilepsy and migraine. A prevalence rate of 1.45% and 1.1% was observed respectively (table 8).

5.3.6 Other chronic health conditions

Data were available for six other health conditions including diabetes, cancer, learning disabilities, rheumatoid arthritis, leg ulcers and GI ulcers or bleed. Low prevalence rates were observed for diabetes (2.8%) and cancer (0.4%). Those with a diagnosis of diabetes, cancer and leg ulcers were significantly older than those without a diagnosis (table 9).

Table 6 Prevalence of infectious diseases

Infectious diseases	Mean age (SD) of those with the disease (in years)	Mean age (SD) of those without the disease (in years)	P value	Prevalence n (%)				Prevalence in English or UK general population	Prevalence data in homeless population (UK or international literature)
				Male n (%)	Female n (%)	P value-Chi square test	All registrants n (%)		
Hepatitis C	42.0 (8.6)	38.1 (11.7)	0.002	50 (6.0)	8 (8.2)	0.390	**58 (6.3)**	0.67[49]	24.8 – Glasgow [22] 11.3 – Leicester[27] 23% - Dublin [43]
HIV	38.0 (17.0)*	38.3 (11.6)	0.833	4 (0.5)	2 (2.1)	0.123	**6 (0.6)**	0.16[50]	0.5 - Leicester[27] 6% – Dublin [43]
Sexually Transmitted Infections	40.0 (9.4)	38.2 (11.7)	0.100	73 (8.8)	14 (14.4)	0.071	**87 (9.4)**	-	0.9-52.5% - US[51] 8% - Dublin[43]

*Median (interquartile range) SD: standard deviation

Table 7 Prevalence of respiratory health conditions

Respiratory health conditions	Mean age (SD) of those with the disease (in years)	Mean age (SD) of those without the disease (in years)	P values	Prevalence n (%)				Prevalence rate in UK or English general population	Prevalence data in homeless population (UK or international literature)
				Male n (%)	Female n (%)	P value	**All registrants n %**		
COPD Register	54.5 (13.0)*	38.1 (11.4)	<0.001	13 (1.6)	1 (1.0)	1.000	**14 (1.5)**	1.9%[37]	1.7% - Leicester[27] 3% - Dublin[43] 4-5% in homeless and socioeconomically deprived of UK, Europe and US[52-54]
Asthma Register	42.0 (8.8)	38.2 (11.6)	0.011	30 (3.6)	9 (9.3)	0.015	**39 (4.2)**	5.9[37]	16% - Leicester[27] 21 % - Dublin[43] Research in the homeless and socioeconomically disadvantaged has found asthma to be at least as prevalent as in the general population, with most studies finding it more prevalent.[14,55,56]

*Median (interquartile range)   SD: standard deviation

Table 8 Prevalence of neurological health conditions

Disease areas	Median age (IQR) of those with the disease (in years)	Median (IQR) of those without the disease (in years)	P values Independent t-test	Prevalence n (%)				Prevalence rate in English general population	Prevalence data in homeless population (UK or international literature)
				Male n (%)	Female n (%)	P value-Chi square test	All registrants n %		
Epilepsy	38.0 (15.0)	38.3 (11.6)	0.279	11 (1.3)	2 (2.2)	0.637	**13 (1.4)**	0.8%[37]	8.1% - Paris[57] 4% - UK[58] 6% - Canada[59] 8%- Dublin[43]
Migraine	40.5 (24.0)	38.3 (11.5)	0.897	7 (0.8)	3 (3.1)	0.077	**10 (1.1)**	Migraine in UK in last 12 months – 15%**[61]	25-36% - Canada[62,63]

*IQR: inter quartile range ** Chronic migraine globally – 1.4-2.2%[60]

Table 9 Prevalence of other health conditions

Disease areas	Mean age (SD) of those with the disease (in years)	Mean age (SD) of those without the disease (in years)	P values Independent t-test	Prevalence n (%)				Prevalence rate in English general population or UK	Prevalence data in homeless population (UK or international literature)
				Male n (%)	Female n (%)	P value-Chi square test	All registrants n %		
Diabetes	54.0 (14.0)*	37.9 (11.3)	<0.001	25 (3.0)	1 (1.0)	0.509	**26 (2.8)**	6.7%[37]	8.0% - Ireland[64] 6.1% - Paris[65] 8.0-12.0% - USA[38,47] 4% -Canada[38] 8% - Dublin [43]
Cancer	52.0 (10.0)*	38.3 (11.5)	0.043	3 (0.4)	1 (1.0)	0.357	**4 (0.4)**	2.6%[37]	3% - Dublin[43]
Learning Disabilities	40.0 (29.0)*	38.3 (11.5)	0.763	3 (0.4)	0 (0.0)	1.000	**3 (0.3)**	0.5[37]	12% - England[66] 36% - Canada[67] 29.5% - Netherlands[68] 39% - Japan[69]
Rheumatoid Arthritis	40.0 (NA)*	38.3 (11.6)	0.885	1 (0.1)	0 (0.0)	1.000	**1 (0.1)**	0.7[37]	6% - Dublin [43]
Leg Ulcers	44.1 (10.6)	37.9 (11.5)	<0.001	51 (6.1)	9 (9.3)	0.234	**60 (6.5)**	1%[70]	No exact figures -homeless experience higher rates of cutaneous issues, including leg ulcers, than the general population.[71,72] 23% had skin ulcers – Dublin[43]
GI Ulcers or Bleed	43.0 (20.0)*	38.3(11.6)	0.619	6 (0.7)	0 (0.0)	1.000	**6 (0.6)**	10% lifetime prevalence[73] 0.12-15% yearly[74]	11% - Dublin[75]

*Median (inter quartile range)   SD: standard deviation

5.4 Multi-morbidity

A total of 452(48.7%) patients had at least one chronic medical condition, with a total of 198 (21.3%) patients having at least two chronic medical conditions. There was no difference in the mean (SD) of the number of chronic medical conditions across the gender groups.

Table 10 Total number of conditions per registrant

Number of chronic medical conditions	n(%)	Prevalence data in UK or English general population	Prevalence data in homeless population (UK or international literature)
None	476 (51.3)		
1	254 (27.4)		
2	110 (11.9)		
3	56 (6.0)		
4	25 (2.7)		
5	6 (.6)		
6	1 (.1)		
Registrants with multi-morbidity	198 (21.3)	14% in under 40 years[76]	77.4% - Glasgow[22] 84% - Dublin[43] 46.3% - Western Australia[77]

5.5 Visits to A&E

A total of 302(32.5%) registrants visited A&E department in the last 12 months.

To explore registrant demography with A&E visits, A&E attendance data were linked to diagnosis of individual health conditions. In univariate analysis, alcohol dependence (unadjusted odds ratio=3.951, p value<0.001), substance dependence (unadjusted odds ratio=2.688, p value<0.001), epilepsy (unadjusted odds ratio=4.776, p value=0.013), hepatitis C (unadjusted odds ratio=2.735, p value<0.001), leg ulcers (unadjusted odds ratio=2.191, p value=0.004), and STI (unadjusted odds ratio=2.196, p value<0.001) were significantly associated with A&E visits. Patients who had these diagnoses were significantly more likely to have visited A&E in the last 12 months. There were no significant differences in the mean ages of those attending and not attending A&E in the last 12 months. A&E attendance was not associated with gender (table 11).

In the binary regression analysis, alcohol dependence and substance dependence were associated with A&E attendance with adjusted odds ratio (95% CI, p value) of 2.85 (2.27-4.34, p<0.001) and 2.31 (1.83-3.94, p=0.001) respectively (appendix 1).

Table 11 Accident and Emergency attendance by the registrants

A&E attendance	Mean age (SD) of those attending A&E in the past 12 months (years)	Mean age (SD) of those attending A&E in the past 12 months (years)	P values	Prevalence n (%)				Prevalence data in English or UK general population	Data in homeless population (from other studies in the UK and Ireland, systematic reviews of international literature)
				Male n (%)	Female n (%)	P value	All registrants n %		
A and E within last 12 months	38.8 (10.3)	38.1 (12.1)	0.352	264 (31.8)	38 (39.2)	0.174	**302 (32.5)**	200.2–552.7 per 1000 population (includes repeat attendances)[78]	48.1% – Glasgow[22]

A&E: Accident and Emergency SD: standard deviation

6 Discussion

6.1 Key findings and comparison with existing literature

This study aimed to explore the burden of disease amongst registrants of specialist homeless healthcare centre in West Midlands. Datasets of a total of 928 patients were retrieved and analysed. Demographic characteristics, a range of health conditions, including alcohol and drug misuse, and A&E attendance data were explored. This study adds to the limited evidence that exists around the prevalence of health conditions and multi-morbidity in homeless population by using a large sample size.

This study has demonstrated a high prevalence of multi-morbidity, mental health conditions particularly substance and drug misuse; and infectious diseases, notably hepatitis C, amongst the registrants of the specialist homeless healthcare centre in Birmingham compared to the general population. There is a substantial literature on the linkage between homelessness and substance and/or alcohol dependence; these issues are cited as both cause and consequences of homelessness.[79] Previous studies have looked at the extent of self-harm[80] mortality linked to mental health conditions including suicide amongst homeless population.[21]

This study has also demonstrated that multi-morbidity amongst the registrants was high. Given the mean SD age of the registrants of the homeless healthcare centre was 38.3 years, the proportion of patients with at least two long-term health conditions compares to those aged 60-69 year olds in general population**.**[76] The proportion of patients who are multi-morbid was identified to be far less than that reported in a Scottish study.[22] The reasons for these differences should be explored. However, it is likely that despite a small sample size in the Scottish study[22] researchers had access to individual patient medical notes. Similarly, the prevalence of mental health conditions, particularly depression, alcohol and drug misuse, despite being higher than in the general population, was less compared to other studies with the homeless population in the UK.[22,25,27,39,43]

The prevalence of some cardiovascular health conditions such as hypertension, as well as respiratory health conditions, diabetes, and cancer were noted to be lower. However, literature suggests that the homeless and socioeconomically disadvantaged have both higher mortality rates than the general population and less deprived backgrounds.[8,38,72] It is highly likely that some of these conditions were not appropriately coded in patient medical records or due to potential under-diagnosis. Health conditions such as hypertension are asymptomatic and it may not be routine practice to record blood pressure in every consultation given the constrained resources that are available in these settings. In addition, some patients may have been registered at the healthcare centre for a brief period of time and, as such, previous medical records may not have been carried forward or that they may not have had made enough diagnostic visits to confirm their health conditions as poor follow up is often a barrier identified in the existing literature.[81,82] Information on the length of time the registrants were registered at the practice was not available for this study. Registrants of similar services in other studies have demonstrated participants also reported using mainstream general practices.[43]

The lower mean age of the registrants could be a likely contributing factor for the lower prevalence observed for cancer. The prevalence seen here is much lower than the 2.6% of the general population who were on the cancer QOF register in 2016-2017.[37] It is also known that the homeless tend to have low rates of cancer survival and present at later stages of the disease.[83] Registrants also demonstrated high prevalence of leg ulcer 6.5%,

much higher than the estimated 1% of the general population of Western countries who will develop a leg ulcer at some point during their lifetime.[70]

The number of health conditions investigated for the multi-morbidity analysis in this study compares favourably with other studies. There are no international standards on how many long-term conditions should feature in the measurement of multi-morbidity, however an average of 18.5 chronic health conditions were featured in a systematic review of international literature featuring 39 studies.[84] The prevalence of all cardiovascular health conditions, COPD, hepatitis C, diabetes, cancer and leg ulcers were linked to older age and this supports the epidemiological trend in general population.[47,85-93]

A high rate of A&E attendance was observed amongst the study population. We did not look into repeat attendance of A&E by the study population. Considering all A&E visitors amongst study participants made a minimum of one visit to the A&E, this translates to approximately 60 times the rate of A&E attendance made by the general population.[78] A previous study has identified that homeless, including rough sleepers, constitute approximately 8% of all repeat users of the service.[16] There is a lack of research investigating in-depth the reasons for such repeat attendance.

Although these analyses may give an indication of reasons for the registrants to visit A&E, they should still be treated with caution. This is due to the possibility of unknown confounders and also that the visits may not be linked to the conditions.

6.2 Implications for practice

This study provides compelling evidence that there exists a high burden of disease amongst the homeless population. Healthcare professionals facing homeless patients are more likely to encounter multi-morbidity than in mainstream healthcare centres. The extent of multi-morbidity seen in this population is often only encountered in geriatric population and hence specialist clinical knowledge, alongside multi-disciplinary management, is required for many of these patients. Diverse skill sets are imperative at these specialist healthcare centres. Literature suggests that patients with multi-morbidity often are disadvantaged due to the fragmentation of care.[94]

The high level of multi-morbidity in this population could both be linked to socioeconomic deprivation as well as to the uptake of behaviours such as smoking, alcohol and drug misuse, or both.[94] Public health interventions, particularly preventative services, can prevent multi-morbidity where such outcomes are linked to the implications of the uptake of risky behaviours. Future longitudinal studies are needed in identifying contribution of key factors linked to multi-morbidity. There is a continued need to diversify the provision of mental health support including those for substance dependence and alcohol dependence that are easily accessible for this population. Community screening of blood borne viruses, particularly opportunistic screening when presenting for other services, as has been recently piloted in some areas of England[95] are imperative.

6.3 Feasibility of methods adopted and implications for research

This study has demonstrated that using routinely collected data to estimate disease burden in homeless population is feasible. However, a number of methodological limitations were realised in this study. As in most other studies utilising routinely collected datasets in investigating disease prevalence and multi-morbidity, this study relied on the diagnosis of the health conditions being accurately noted in patient medical records. Therefore, the prevalence of the health conditions and multi-morbidity, as identified in this study, are likely

to be an under-estimation. Particularly, we noted that health conditions such as CHD, stroke, diabetes, cancer, asthma, learning disabilities, and rheumatoid arthritis were found to be under-prevalent in the study participants compared to the findings in the literature.[27,38,55,64,66,72,85,96]

This study looked into the datasets of those who presented at the specialist homeless healthcare centre. This study did not explore the level of engagement of the registrants with the healthcare centre. Therefore the datasets may have been limited because of the inclusion of information of those who regularly attend the practice.

Future studies should consider using multiple data sources in estimating disease burden. These include consideration of aggregated datasets as utilised in this study, access to individual medical notes, health related data available in council housings, datasets from outreach services, surveys of homeless population to gather self-reported data, and inclusion of datasets from homeless population using mainstream services.

This study aimed to gather prescribing and or dispensing datasets; however, resource constraints at the specialist homeless healthcare centre did not allow these datasets to be gathered during the study time frame. Prescribing datasets allow triangulation of findings obtained from the disease burden analyses to service provision, and patient access to medicines and polypharmacy burden in this population. It is also important to collect mortality data to explore key causes of mortality in this population.

A&E attendance data as reported in this study should be treated with caution. This is due to the possibility of unknown confounders and also the chance that visits were not linked to the conditions. Data should be supplemented from A&E departments to identify key reasons for repeat attendance.

6.4 Conclusion

This study has demonstrated a high prevalence of multi-morbidity, mental health conditions particularly substance and drug misuse; and infectious diseases, notably hepatitis C, amongst the registrants of the specialist homeless healthcare centre in Birmingham. The extent of multi-morbidity identified in this population, despite their mean age of 38.3 years, is comparable to 60-69 year olds in general population.

This study reinforces the findings from the international literature and limited previous UK literature on the mental health needs of the homeless population. Additional services aimed at the prevention and early treatment of mental health issues, particularly drugs and alcohol dependence can improve mental health amongst the homeless and may reduce A&E attendance. Services that can enable early screening of the homeless population for blood borne viruses are also warranted. The extent of multi-morbidity seen in this population is often only encountered in geriatric population and hence specialist clinical knowledge, alongside multi-disciplinary management are required to manage their health conditions. This may require further resources to allow diversification of expertise available at these specialist healthcare centres that are available across the UK.

This study will aid service providers and wider stakeholders in the development, implementation and evaluation of services aimed at tackling homelessness and alleviating the consequences of homelessness. This study will also inform a large scale study to be conducted at a national level.

6.5 Dissemination

The evaluation report has been presented and made available to Public Health England, West Midlands; Birmingham; the West Midlands Combined Authority and Solihull Mental Health Foundation Trust; as well as the practice team at the specialist homeless healthcare centre in Birmingham. The evaluation findings will also be presented at local and national clinical practice; public health, NHS forums and conferences. The principal investigator (VP) will actively liaise with the service providers, commissioners, Public Health England and the West Midlands Combined Authority in enabling the use of findings to inform future services delivery as well as the conduction of a larger scale study.

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Appendix 1
Output from the regression analysis relating to A&E attendance

| | | A&E attendance | | P values | Unadjusted Odds ratio | | | Exp(B) | Adjusted odds ratio | | |
		Yes	No		Odds ratio	Lower 95% CI	Upper 95% CI		P value	Lower 95% CI	Upper 95% CI
Alcohol and substance dependence	Yes	30 (63.8%)	17 (36.2%)	<0.001	3.951	2.143	7.286	1.432	0.402	0.618	3.321
	No	272 (30.9%)	609 (69.1%)								
Alcohol dependence	Yes	106 (53.5%)	92 (46.5%)	<0.001	3.139	2.271	4.339	**2.850**	<0.001	1.958	4.150
	No	196 (26.8%)	534 (73.2%)								
Substance dependence	Yes	66 (52.8%)	59 (47.2%)	<0.001	2.688	1.833	3.940	**2.306**	0.001	1.406	3.784
	No	236 (29.4%)	567 (70.6%)								
Coronary Heart Disease Register	Yes	4 (28.6%)	10 (71.4%)	1.000	0.827	0.257	2.658	-	-	-	-
	No	298 (32.6%)	616 (67.4%)								
Hypertension Register	Yes	12 (30.8%)	27 (69.2%)	0.947	0.918	0.458	1.838	-	-	-	-
	No	290 (32.6%)	599 (67.4%)								
Diabetic Register	Yes	9 (34.6%)	17 (65.4%)	0.987	1.100	0.485	2.498	-	-	-	-
	No	293 (32.5%)	609 (67.5%)								
COPD Register	Yes	8 (57.1%)	6 (42.9%)	0.079	2.812	0.967	8.177	1.659	0.379	0.537	5.122
	No	294 (32.2%)	620 (67.8%)								
Epilepsy Register	Yes	9 (69.2%)	4 (30.8%)	0.013	4.776	1.459	15.637	**2.878**	0.102	0.811	10.206
	No	293 (32.0%)	622 (68.0%)								
Mental Health Register	Yes	24 (40.0%)	36 (60.0%)	0.258	1.415	0.828	2.418	-	-	-	-
	No	278 (62.0%)	590 (38.0%)								
Depression	Yes	43 (39.8%)	65 (60.2%)	0.108	1.433	0.949	2.164	1.126	0.600	0.722	1.756
	No	259 (31.6%)	561 (68.4%)								
Asthma Register	Yes	15 (38.5%)	24 (61.5%)	0.528	1.311	0.677	2.537	-	-	-	-
	No	287 (32.3%)	602 (67.7%)								
Hepatitis C	Yes	32 (55.2%)	26 (44.8%)	<0.001	2.735	1.599	4.680	1.414	0.483	0.537	3.721
	No	270 (31.0%)	600 (69.0%)								
Migraine	Yes	3 (30.0%)	7 (70.0%)	1.000	0.887	0.228	3.455	-	-	-	-
	No	299 (32.6%)	619 (67.4%)								
Leg Ulcers	Yes	30 (50.0%)	30 (50.0%)	0.004	2.191	1.295	3.708	1.173	0.592	0.655	2.100
	No	273 (31.4%)	596 (68.6%)								
STI	Yes	43 (49.4%)	44 (50.6%)	0.001	2.196	1.407	3.427	1.222	0.622	0.551	2.712
	No	259 (30.8%)	582 (69.2%)								

A&E: Accident and Emergency

End of study report