

Type 2 diabetes management in the homeless population: health inequality and the Housing First approach

FEE BENZ

Abstract

Homelessness is a significant public health concern, with a substantial homeless population in England. Homeless individuals face unique challenges, including a heightened risk of violence, inadequate nutrition, limited healthcare access and increased prevalence of co-morbidities. Type 2 diabetes (T2DM) is notably more prevalent among homeless individuals compared to the general population, leading to higher rates of diabetes-related emergency department visits and hospitalisations.

There is limited research examining diabetes management specifically in homeless populations, and a comprehensive review addressing the barriers and targeted interventions for this vulnerable group is currently lacking. This article aims to explore the health inequalities experienced by homeless individuals in relation to T2DM management, and to evaluate the Housing First approach as a potential intervention. Housing First, which provides immediate access to permanent housing, has demonstrated efficacy in enhancing housing stability and healthcare behaviours among homeless populations. Moreover, the available evidence suggests that Housing First programmes may improve diabetes-related outcomes, including HbA_{1c} testing and medication adherence, and may lead to fewer hospitalisations.

Br J Diabetes 2023;23:69-76
<https://doi.org/10.15277/bjd.2023.421>

Key words: type 2 diabetes mellitus, housing first intervention, homelessness

Case Study

A 56-year-old homeless man with a history of hypertension, alcoholism and poorly controlled type 2 diabetes (T2DM) was brought to the emergency department by paramedics after being found unresponsive at night on the street. He was noted to be hypotensive, febrile and severely dehydrated. A glucose

measurement revealed severe hyperglycaemia at 31 mmol/L, and subsequent blood tests confirmed a diagnosis of diabetic ketoacidosis (DKA). The medical team started the patient on IV fluids, insulin and potassium.

On physical examination, the patient was further noted to have multiple necrotic ulcers with surrounding erythema and purulent discharge on his lower legs. The examination also revealed several other infected scrapes and cuts on his extremities. The medical team added IV antibiotics and sterile saline irrigation to the treatment regimen to treat the patient's wounds.

During his hospital stay, his care was complicated by his poorly managed co-morbidities, alcoholism and general aversion to the hospital setting. Eventually, despite the medical team's best efforts, the wound care was declared unsuccessful, and the decision was made to amputate the patient's left second and third toes.

Introduction

Homelessness is a significant public health concern. There are more than 271,000 homeless individuals living in England, among whom 3,069 are rough sleepers without access to hostels, shelters or campsites on any night.^{1,2} The homeless population is a uniquely vulnerable patient group, facing increased risk of sexual and physical violence, poorer nutritional status, lower medication compliance rates, less dependable wound care, reduced access to healthcare causing delayed presentations, and higher rates of co-morbidities.³⁻⁵ As the case study exemplifies, these complexities complicate and hamper T2DM care for homeless individuals. Indeed, it is estimated that the prevalence of T2DM is 33% more common in homeless individuals (8-22%) compared to the UK population-wide prevalence (6%).⁶⁻⁸ Within a given year, homeless individuals with T2DM are five times as likely to report diabetes-related emergency department visits or hospitalisations compared to stably-housed individuals.⁵ These figures highlight the need for effective public health interventions to address poor T2DM management and to reduce severe complications among the homeless population.

Despite the significant burden of homelessness on diabetes management, limited research has been conducted on diabetes management in the homeless population. To the author's best knowledge, there is no specific review addressing the unique barriers to diabetes treatment and efficacy of the Housing First approach in homeless individuals living with diabetes. Hence,

University of Oxford, Medical Sciences Teaching Centre, Oxford

Address for correspondence: Dr Fee Benz
School of Medicine and Biomedical Sciences, Medical Sciences
Division, University of Oxford, Medical Sciences Teaching Centre,
Oxford, OX1 3PL / John Radcliffe Hospital, OX3 9DU
E-mail: fee.benz@some.ox.ac.uk

this paper examines homelessness as a source of health inequality, addresses the specific barriers to T2DM management that homeless individuals face, and evaluates the Housing First public health initiative as a potential prevention tool for poor T2DM management among homeless individuals.

Homelessness and health inequality

The 1996 UK Housing Act defines homelessness as:

1. having no accommodation available for continued occupation,
2. having accommodation without secure entry to it, or
3. having moveable accommodation (e.g. a tent, car) without a permanent legal space to place it.⁹

Here, we expand upon this legal definition and define homelessness as individuals sleeping rough (e.g. in the open air, in tents, bus shelters or parks), sleeping in temporary accommodation (e.g. shelters or hostels) or sleeping in unsuitable housing (e.g. sofa surfing).¹⁰

Health inequality is a systematic discrepancy in health outcomes between different populations.

Homelessness is associated with significant health inequality and poor health outcomes. The UK Office for National Statistics (ONS) found that homeless individuals are up to three times more likely to die prematurely compared to the general population, with an average life expectancy of just 47 years compared to 87 years in the general population.^{11,12} Moreover, the estimated number of deaths among homeless people has increased by 53.7% since ONS began recording homeless deaths in 2013.¹² In 2020-2021, approximately one in three deaths were related to drug poisoning, 13% were due to suicide, 10% were caused by alcohol-specific pathology and 8% were due to assault.¹²

Homelessness is also associated with T2DM-specific health inequalities. In 2021, T2DM accounted for 1% of deaths in homeless individuals aged 20-44 years, compared to 0.01% of deaths in the same age group in the general population.^{12,13} Homeless people with diabetes also report higher average glycated haemoglobin levels (HbA_{1c}), indicating poorer diabetes control; one cross-sectional study reported that 40% of homeless participants measured an HbA_{1c} level above 64 mmol/mol.⁶ Moreover, people with diabetes without housing are four times more likely to experience diabetes-related hospitalisation;⁵ 56% of hospitalisations were due to mixed hyperglycaemic coma with acidosis and 36% due to diabetic ketoacidosis (DKA).¹⁴ Lastly, homeless people with diabetes have significantly higher rates of lower limb amputations than housed people with diabetes.⁶

Causes of health inequalities in homelessness

Two Canadian interview-based studies^{15,16} of 96 participants with lived experience of homelessness and diabetes highlighted the significant challenges faced by homeless individuals living with T2DM.^{15,16} These studies identified ten key barriers to diabetes management in this population: (i) pre-existing mental health disorders, (ii) alcohol/drug addiction, (iii) chronic medical conditions, (iv) exposure to harsh weather, (v) poor access to

Table 1. Barriers to T2DM management in the homeless population

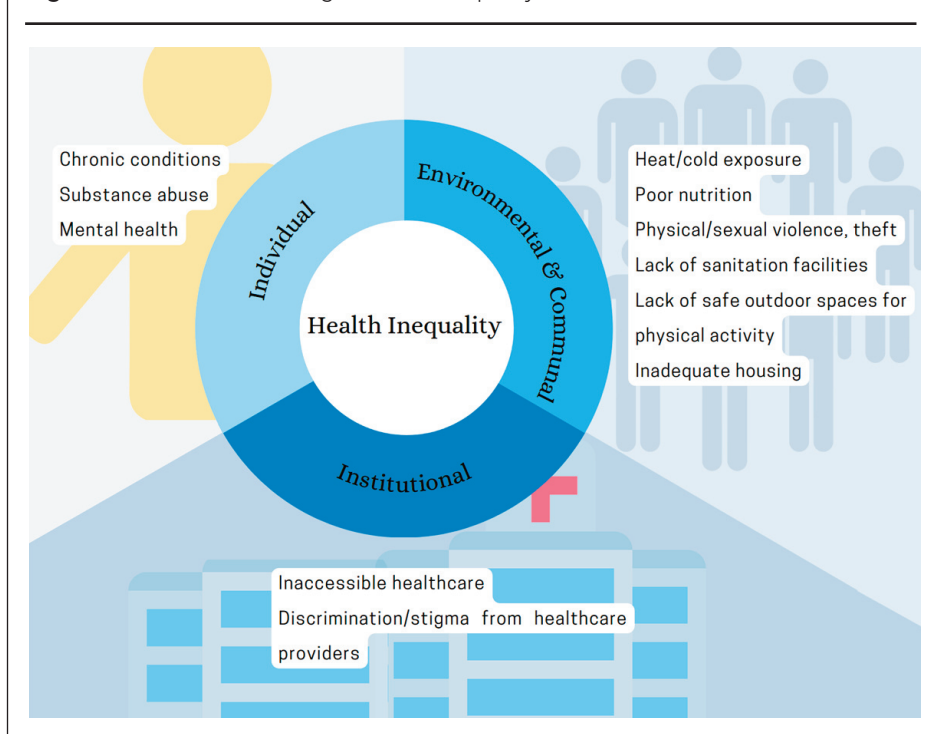
Barrier	Quote
Mental health	<i>I had been depressed and shy. I cannot help myself. Sometimes I get very depressed. I stay under the bridge.</i> ¹⁵
Alcohol/drug addiction	It is hard to manage the interaction between alcohol/drugs and diabetes treatment. ¹⁶
Chronic physical conditions	I had broken my back at my previous workplace. So walking is painful to me and getting anywhere is difficult with my back and knee pain. ¹⁵
Exposure to harsh weather	My feet are immersed in snow and soggy. I catch my feet soaking in wet socks in the cold. ¹⁵
Lack of T2DM-friendly food	Food in shelters and community meals are not diabetic-friendly. ¹⁶ Some days I go without eating much when I cannot panhandle. ¹⁵
Theft of medication/footwear	I cannot take off my shoes; someone will steal them. ¹⁵ People steal your medication. ¹⁶
Inaccessible sanitation	There are no washrooms and no way to shower or clean clothes or socks. ¹⁵
Lack of housing	I need a warm place to care for myself. ¹⁵
Difficult to navigate services	If [you] are not in the shelters [at the right time] or on the streets where the street nurses visit, [you] miss getting treated by the nurse. ¹⁵
Stigma/discrimination	I did not feel comfortable with the way they [the medical team] interviewed me regarding my drinking and drug issues. I feel anxious in this situation. ¹⁵

T2DM-friendly food, (vi) theft of medication and footwear, (vii) inaccessible sanitation, (viii) lack of housing, (ix) difficult-to-navigate services and (x) stigma/discrimination (see Table 1).

Homeless individuals experience significantly higher rates of mental illness, alcohol/drug dependency and chronic physical illness than housed individuals. In 2020/2021, ONS found that 59% of individuals sleeping rough have a history of mental health problems, 47% of alcohol/drug dependency, 33% of chronic physical illness, and the incidence of chronic health conditions is three times greater in the homeless population compared to housed individuals.^{17,18}

Homeless individuals are also exposed to harmful environmental/communal factors, including extreme weather conditions, poor food supply, abuse and inadequate access to facilities. Up to 62% of homeless individuals are affected by heat-related illness,¹⁹ and 43-78% of homeless individuals report being unable to meet their daily nutritional needs.^{20,21} Further, 80% of homeless individuals have experienced antisocial behaviour or sexual/physical abuse within the last year, including being deliberately urinated on or kicked.²² Individuals who lack secure housing have limited access to sanitation facilities such as restrooms and showers, which puts them at a significant risk of being exposed to hazardous chemicals, waterborne diseases, pollution, unclean sanitation facilities and unsafe water sources.²³

Homeless individuals also face barriers to accessing medical care. They experience higher rates of discrimination and

Figure 1. Factors contributing to health inequality in homelessness

unprofessional behaviour from healthcare professionals, which leads to a lack of confidence, feelings of professional inadequacy, and negative attitudes towards the care environment.²⁴ This can decrease and delay seeking healthcare, which may lead to more severe illness at presentation.^{14,24} Notably, failure to see a primary care physician in the previous year was the strongest predictor of diabetes-related hospital admission in a study exploring hospitalisation among diabetic homeless individuals.¹⁴

The evidence presented here highlights the need for public health interventions to address barriers to T2DM management in the homeless population. Figure 1 summarises the various factors contributing to health disparities in diabetes management among homeless individuals. Each of these factors presents a potential opportunity for intervention.

Public health interventions for the management of T2DM

Public health interventions for T2DM traditionally focus on improving individual health behaviours and healthcare access. While such interventions have moderate to good success in the general population, homeless individuals face unique and often complex barriers to diabetes care that population-wide interventions do not address.²⁵ Table 2 presents the findings of a brief scoping review of traditional public health interventions offered to homeless individuals with type 2 diabetes.²⁶⁻³¹

We identified seven studies assessing diabetes management interventions among homeless individuals, including a meta-analysis of six studies not otherwise included in our total. Offered interventions included diabetes education programmes, medicine distribution, food resource guidance and provision of targeted

medical care. Notably, all studies reported high attrition rates: only a median 32% of participants were retained for the full duration of the intervention. Participants reported several barriers to continued participation, including lacking facilities (e.g. to inject medication, charge electronic devices or prepare food), competing priorities (e.g. securing a sleeping place) and (iii) inaccessible services (e.g. inability to track scheduled appointments, lack of online resource and limited access to transportation).

Findings of the included studies were mixed. Two studies reported short-term declines in HbA_{1c} levels, but these did not persist after six months. Three studies reported improved diabetes knowledge and perceived peer support, although perceived empowerment did not increase in any study. Lastly, two studies reported improved quality of diet compared to baseline, but most participants were unable to achieve a diet of three adequate meals per day.

Importantly, despite some positive outcomes, the high drop-out rate indicates low efficacy of the evaluated interventions among the homeless populations. Overall, the identified barriers to continued participation highlight the need for secure housing prior to engaging with secondary, diabetes-specific interventions.²⁵

The Housing First approach

Housing First is an intervention that emerged in the last decade. It is rooted in the belief that housing is a fundamental human right, access to which should be provided immediately and without requiring proof of 'readiness' for housing.³²⁻³⁴ The Housing First intervention provides wholistic, open-ended support typically supplemented with specialist support and additional services such as addiction counselling. Conventional housing initiatives require homeless individuals to progress stepwise from emergency shelters to transitional accommodation before they become eligible for permanent supportive housing. Moreover, access to permanent housing is often conditional on meeting strict requirements, such as sobriety and acceptance of psychiatric treatment, to demonstrate 'housing readiness.'³²

The Housing First approach was developed in 1992 in New York and has since been widely adopted across North America, Denmark, Finland and France.³⁵ The first UK Housing First project was established in Scotland in 2010 and since then several Housing First projects have been set up in London, Liverpool, Greater Manchester and the West Midlands.³⁵ In 2017, the UK government released £28 million pounds of funding for Housing First pilot projects across the UK.³⁶ In 2020, a total of 87 services had been established that supported a total of 1,995 individuals.³⁷

Table 2. T2DM interventions in the homeless population

Target	First author (year)	Sample size	Country	Description of intervention	Assessment of intervention	Summary of outcomes	Attrition	Barrier to care
Individual behaviour	Davis (2016) ²⁶	31	USA	A 4-week peer-led diabetes education programme	Surveys and interviews	Participants' self-reported knowledge of diabetes, but not self-reported empowerment increased	33% of participants were retained	Inability to implement learned knowledge due to lack of resources
	Wilk (2002) ²⁷	23	USA	Free-of-charge insulin pens distributed via a community centre	HbA _{1c} levels at three and six months	Average HbA _{1c} measurements did not change significantly	70% of participants were retained at 6 months	Inability to safely inject and store medication (theft) and poor access to top-up medication
	Marpadga (2019) ²⁸	143 (10 homeless)	USA	A food resource referral programme for food-insecure diabetics	Semi-structured interview	10/31 interviewed participants successfully connected to food resources	18% of referrals resulted in engagement with the referred services 21% of participants were retained	Perceived ineligibility, inaccessibility due to location/opening hours, and lacking access to cooking facilities
Healthcare access	Nelson (2021) ²⁹	506 (58 homeless)	USA	Monthly phone coaching to improve diabetes care	HbA _{1c} levels at six and 12 months	HbA _{1c} scores significantly decreased at six months, but not at 12 months	88% of participants were retained at 12 months	Lack of mobile phones, lack of resources to implement learned knowledge, competing priorities and poor family/friend support
	Savage (2008) ³⁰	43	USA	A nurse-run clinic set up in a meal-providing facility for homeless individuals, open on two evenings per week	Survey	At two months, mental health and self-reported vitality improved but physical health did not	32% of participants were retained	Limited availability of care, competing priorities, and difficulty tracking opening times
	Moczygemba (2021) ³¹	30	USA	Free smartphones with an in-built app linking hospital staff to community paramedics to facilitate post-discharge care	Survey	Mental health and medication adherence improved when the app was used	The app was only used in 19% of hospital visits	Theft of phones, lack of charging facilities and competing priorities
Meta-analysis	Constance & Lusher (2020) ²⁵	6 studies	Canada (3), USA (3)	Diabetes education (4), blood glucose monitoring supplies (2), medication and prescription assistance (3), food resources (4)	Interview (2), surveys (2), HbA _{1c} levels (2), LDL levels (2), LDL levels (1), fasting blood glucose (1)	One of four studies reported improved diet, although only 27% consumed three meals as they left the shelter after breakfast. Significant decrease in HbA _{1c} levels among the intervention group in one of two studies. Improvement in diabetes awareness and emotional support in two studies	Where participant retention was reported it ranged from 5% to 56%	Inability to implement learned knowledge. Inability to and safely inject medication. Limited exposure to interventions, due to leaving shelters after breakfast. Poor access to transportation and appointment management tools

Housing First has demonstrated significant success in increasing housing stability.^{33,34} Analysis from the multi-site Canadian Housing First project 'Chez Soi' following 7,862 adults over two years found that Housing First clients were over four times (RR=4.12) more likely to remain housed after two years compared to treatment as usual (TAU).³³ In England and Scotland, Housing First pilots achieved a tenancy sustainment rate between 80-89% over two years (2018 to 2020).^{38,39} Moreover, a recent report from the Centre for Social Justice concluded that Housing First can prevent vulnerable individuals from becoming homeless by expanding services to at-risk groups (e.g. prison leavers, care leavers and victims of domestic abuse).^{38, 40-54}

Although Housing First programmes effectively improve housing stability and physical health, some authors have raised concerns about the lack of compulsory engagement with supportive services. They suggest this may negatively affect health outcomes, as individuals may not have the necessary incentives to engage with employment, social and psychological/addiction counselling.⁴⁰ Indeed, Housing First users have a high rate of mental health and substance-use comorbidities.⁵⁵ Despite this criticism, evidence from European Housing First projects in Amsterdam, Copenhagen and Glasgow indicate good uptake of supportive services, with clients receiving support for 4.5 to 10 hours each week.³² Moreover, data from the Canadian Chez Soi project indicate improved mental health and quality of life in Housing First clients compared to TAU.^{34, 41,42}

Findings relating to substance abuse among Chez Soi users are mixed. While most studies report significant reductions in substance abuse among Housing First clients,^{46, 49-52} some have found no significant effects,^{45,53} and one study reported increases in alcohol consumption compared to baseline.⁴¹

In England, 66% of surveyed Housing First users reported improved mental health since joining the programme and reduced rates of severe mental illness (ARR=34%), although a minority of individuals experienced deteriorating mental health.⁵⁶ A 2015 evaluation of nine Housing First services in England found that Housing First programmes reduced the incidence of drinking alcohol on the street (ARR=22%), drinking alcohol until intoxication (ARR=15%) and illicit drug consumption (ARR=13%) compared to baseline.⁵⁶ Similarly, an international review of Housing First projects in Canada, Australia, the Netherlands, Denmark, Portugal and the UK concluded that overall Housing First is associated with improvement or stabilisation of mental health and substance use symptoms, and that Housing First programmes perform at least as well as TAU in addressing mental health and substance use disorders.^{39,58,59}

A second concern with Housing First programmes is the cost-effectiveness of its implementation and the integration of programmes into existing housing markets. In 2020, the National Housing Federation (NHF) assessed the willingness of Housing Associations to participate in Housing First models. NHF found that Housing Associations overwhelmingly considered participation in Housing First projects 'attractive' and that participating associations incurred no additional costs in

providing Housing First services compared to other general needs properties.⁵⁹ Further, a 2022 report published by the UK Department for Levelling Up, Housing and Communities estimated that the provision of 16,450 Housing First places over three years would cost £9,700 per client per annum, while an additional £15,100 per client would be saved each year on other costs such as homelessness services, criminal justice systems, the NHS, mental health services and substance disorder services.^{38,55,60}

Housing First and diabetes management

To the author's best knowledge, only two studies are currently available that assessed the impact of Housing First programmes on diabetes management in homeless individuals. One of the studies was conducted on a small scale and involved 10 homeless individuals with diabetes who were enrolled in a Housing First programme and followed up for three months.⁶¹ The study found that the Housing First programme led to a significant reduction in HbA_{1c} levels (an average reduction of 22%), and a significant increase in self-efficacy and diabetes foot self-care.⁶¹

The second study was conducted by Lim *et al.*³³ and followed 7,525 previously homeless individuals participating in a Housing First programme based in New York over two years. The programme provided permanent housing to chronically homeless adults with serious mental illness, substance use disorders, HIV/AIDS, and former foster youth at risk of homelessness. The evaluation focused on 7,862 eligible adults who were Medicaid recipients during at least 80% of their follow-up time. The study evaluated two subgroups: 1,489 adults diagnosed with diabetes and 6,036 without a record of a diabetes diagnosis.

Overall, persons in the Housing First programme received more medical evaluations (RR=1.05) and experienced fewer hospitalisation (RR=0.73) and fewer emergency department visits (RR=0.73).³³ Among individuals with diabetes, those in the Housing First programme were more likely to receive HbA_{1c} testing (RR=1.10), lipid testing (RR=1.09) and diabetes medication prescriptions (RR=1.23). Moreover, diabetic individuals in the Housing First programme experienced fewer diabetes-related hospitalisations (RR=0.77) and emergency department visits (RR=0.63).³³ Finally, Housing First participants without diabetes at baseline had a lower risk of developing new-onset diabetes than TAU participants during the two-year follow-up period (RR=0.87).³³

In summary, Housing First interventions have successfully improved housing stability and reduced the burden on the healthcare system for homeless individuals, including those with serious mental illness and substance use disorders. Two studies on the impact of Housing First programmes on diabetes management in homeless individuals have found that Housing First participants received more medical evaluations, experienced fewer hospitalisations and emergency department visits, and were more likely to receive diabetes-related testing and medications. While these findings are promising, there is still a lack of research on the specific impact of Housing First



Key messages

- ▲ T2DM Prevalence and Complications: There is a higher prevalence and rate of T2DM complications among the homeless population, leading to increased emergency visits and hospitalisations.
- ▲ Complex Barriers to Management: Homeless individuals face multifaceted barriers to T2DM management, including mental health issues, substance abuse, and environmental challenges.
- ▲ Limited Success of Traditional Interventions: Conventional public health interventions for T2DM show high attrition and limited efficacy in homeless populations.
- ▲ Housing First Efficacy: The Housing First approach improves housing stability, healthcare behaviours and T2DM management outcomes in the homeless population.
- ▲ Research Gap in Homeless Diabetes Care: There is a need for more focused research on the effectiveness of Housing First in T2DM management among the homeless.

programmes on diabetes management in homeless populations. Future studies could explore the long-term effects of Housing First programmes on diabetes outcomes and investigate potential barriers to diabetes management in homeless people and how Housing First programmes can address these challenges. More research is needed to determine the appropriate population for Housing First programmes and to integrate substance use services better.

Conclusions

Homelessness is a significant public health concern that leads to health inequality and poor health outcomes, particularly in the management of T2DM. Homeless individuals face unique and complex barriers to diabetes care that traditional public health interventions do not adequately address.

The Housing First approach has emerged as a promising public health intervention that has demonstrated significant success in increasing housing stability, healthcare behaviours and overall survival. In addition, Housing First programmes have been shown to reduce the financial burden of homelessness on the healthcare system significantly, with an average cost reduction of £15,100 per person per annum.

Although there is a lack of research on the specific impact of Housing First programmes on diabetes management in homeless populations, the available studies suggest that Housing First programmes may improve diabetes-related testing and medications, reduce diabetes-related hospitalisations and emergency department visits, and increase self-efficacy and diabetic foot self-care. Further research is

needed to determine the appropriate population for Housing First programmes and to explore the long-term effects of Housing First programmes on diabetes outcomes.

Overall, effective public health interventions are urgently needed to address the barriers to T2DM management faced by homeless individuals and to reduce serious T2DM complications among this vulnerable population.

Conflict of interest None.

Funding None.

References

1. UK Government. Rough sleeping snapshot in England, 2022. <https://www.gov.uk/government/statistics/rough-sleeping-snapshot-in-england-autumn-2022/rough-sleeping-snapshot-in-england-autumn-2022>.
2. Shelter. At least 271,000 people are homeless in England today - Shelter England, 2023. *Shelter, the National Campaign for Homeless People Limited* https://england.shelter.org.uk/media/press_release/at_least_271000_people_are_homeless_in_england_today.
3. Wiens K, Bai L, Austin PC, *et al*. Characteristics of people with type I or type II diabetes with and without a history of homelessness: a population-based cohort study. *medRxiv* 2022.08.11.22278127 <https://doi.org/10.1101/2022.08.11.22278127>.
4. Wiens K, Bai L, Austin PC, *et al*. Long-term association between homelessness and mortality among patients with diabetes who use hospital services. *Lancet Diabetes Endocrinol* 2023;**11**:229–231. [https://doi.org/10.1016/S2213-8587\(22\)00358-8](https://doi.org/10.1016/S2213-8587(22)00358-8).
5. Berkowitz SA, Kalkhoran S, Edwards ST, Essien UR, Baggett TP. Unstable housing and diabetes-related emergency department visits and hospitalization: a nationally representative study of safety-net clinic patients. *Diabetes Care* 2018;**41**:933–9. <https://doi.org/10.2337/dc17-1812>.
6. DUKPC research highlights: Day 1. *Diabetes UK, The British Diabetic Association*, 2021. https://www.diabetes.org.uk/about_us/news/DUKPC-highlights-part-1.
7. The National Autistic Society. How Many People in the UK Have Autism? *The National Autistic Society*, 2013. <https://www.diabetes.org.uk/professionals/position-statements-reports/statistics>.
8. Scott J, Gavin J, Egan AM, *et al*. The prevalence of diabetes, pre-diabetes and the metabolic syndrome in an Irish regional homeless population. *QJM* 2013;**106**:547–53. <https://doi.org/10.1093/qjmed/hct063>.
9. Parliament. *Housing Act 1996*. The Stationery Office 1996;**2008**: 256.
10. Crisis. Types of homelessness. Crisis UK. Together we will end homelessness. <https://www.crisis.org.uk/ending-homelessness/homelessness-knowledge-hub/types-of-homelessness/>.
11. Life expectancy at birth and premature mortality rate - Office for National Statistics, 2021. <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/lifeexpectancyatbirthandselectedolderages>.
12. Butt A, John E. *Deaths of homeless people in England and Wales*. Office for National Statistics, 2019.
13. Office for National Statistics – NOMIS, OLM Statistics. Mortality Statistics – underlying cause sex and age. <http://www.nomisweb.co.uk/articles/1128.aspx>. *Nomis - Official Census and Labour Market Statistics, Office for National Statistics* 2022 (2019).
14. Booth GL, Hux JE. Relationship between avoidable hospitalizations for diabetes mellitus and income level. *Arch Intern Med* 2003;**163**: 101–6. <https://doi.org/10.1001/archinte.163.1.101>.
15. D'Souza MS, O'Mahony J, Achoba A. Exploring foot care conditions for people experiencing homelessness: a community participatory approach. *J Prim Care Community Health* 2022;**13**: 21501319211065247 <https://doi.org/10.1177/21501319211065247>.
16. Grewal EK, Campbell RB, Booth GL, *et al*. Using concept mapping

- to prioritize barriers to diabetes care and self-management for those who experience homelessness. *Int J Equity Health* 2021; **20**: 158. <https://doi.org/10.1186/s12939-021-01494-3>
17. Homelessness Case Level Information (H-CLIC). *Office for National Statistics*, 2023. <https://www.gov.uk/government/publications/dashboards-on-homelessness>
 18. Boobis S, Albanese, F. *The impact of COVID-19 on people facing homelessness*. Crisis.org.uk, 2020 https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiqq6KyjLv-AhVhoVwKHRM-BsgQFnoECBOQAQ&url=https%3A%2F%2Fwww.crisis.org.uk%2Fmedia%2F244285%2Fthe_impact_of_covid19_on_people_facing_homelessness_and_service_provision
 19. Thomas B. *Homelessness: a silent killer*, 2011. <https://www.crisis.org.uk/ending-homelessness/homelessness-knowledge-hub/health-and-wellbeing/homelessness-a-silent-killer-2011>
 20. *Homelessness and health: what's the connection?* 2019. <https://nhchc.org/>
 21. Cretch E. *Food insecurity & young homeless people*, 2022. <https://centrepoin.org.uk/what-we-do/policy-and-research/food-insecurity-report/>
 22. Crisis. New research reveals the scale of violence against rough sleepers. *Crisis* 2022. <https://www.crisis.org.uk/about-us/latest-news/new-research-reveals-the-scale-of-violence-against-rough-sleepers/>
 23. Heller L. *The Human Rights to Water and Sanitation*. King's College London, 2022. <https://doi.org/10.1017/9781108938679>.
 24. Kushel MB, Vittinghoff E, Haas JS. Factors associated with the health care utilization of homeless persons. *JAMA* 2001; **285**:200–6. <https://doi.org/10.1001/jama.285.2.200>
 25. Constance J, Lusher JM. Diabetes management interventions for homeless adults: a systematic review. *International Journal of Public Health* 2020; **65**: 1773–83. <https://doi.org/10.1007/s00038-020-01513-0>
 26. Davis S, Keep S, Edie A, Couzens S, Pereira K. A peer-led diabetes education program in a homeless community to improve diabetes knowledge and empowerment. *J Community Health Nurs* 2016; **33**: 71–80. <https://doi.org/10.1080/07370016.2016.1159435>
 27. Wilk T, Mora PF, Chaney S, Shaw K. Use of an insulin pen by homeless patients with diabetes mellitus. *J Am Acad Nurse Pract* 2002; **14**:372–80. <https://doi.org/10.1111/j.1745-7599.2002.tb00138.x>
 28. Marpadga S, Fernandez A, Leung J, et al. Challenges and successes with food resource referrals for food-insecure patients with diabetes. *Perm J* 2019; **23**:18–97. <https://doi.org/10.7812/TPP/18-097>
 29. Nelson LA, Greevy RA, Spieker A, et al. Effects of a tailored text messaging intervention among diverse adults with type 2 diabetes: evidence from the 15-month REACH randomized controlled trial. *Diabetes Care* 2021; **44**:26–34. <https://doi.org/10.2337/dc20-0961>
 30. Savage CL, Lindsell CJ, Gillespie GL, Lee RJ, Corbin A. Improving health status of homeless patients at a nurse-managed clinic in the Midwest USA. *Health Soc Care Community* 2008; **16**:469–75.
 31. Moczygamba LR, Thurman W, Tormey K, et al. GPS mobile health intervention among people experiencing homelessness: Pre-post study. *JMIR Mhealth Uhealth* 2021; **9**:e25553. <https://doi.org/10.2196/25553>
 32. Wewerinke D, al Shamma S, Wolf Boróka Fehér J, Balogi Lars Benjaminsen Sarah Johnsen with Suzanne Fitzpatrick José Ornelas A. *Housing First Europe final report supported by the European Union Programme for Employment and Social Security-PROGRESS (2007-2013)*, 2013.
 33. Lim S, Miller-Archie SA, Singh TP, et al. Supportive housing and its relationship with diabetes diagnosis and management among homeless persons in New York City. *Am J Epidemiol* 2019; **188**:1120–9. <https://doi.org/10.1093/aje/kwz057>
 34. Fitzpatrick-Lewis D, Gannan R, Krishnaratne S, et al. Effectiveness of interventions to improve the health and housing status of homeless people: a rapid systematic review. *BMC Public Health* 2011; **11**:1–14. <https://doi.org/10.1186/1471-2458-11-638>
 35. National Housing Federation. *Experiences of housing associations delivering Housing First Research into how housing associations use the Housing First model and recommendations for delivery*, 2020. https://www.housing.org.uk/globalassets/files/resource-files/housing-first-barriers-and-best-practice-v0.9_final.pdf
 36. Government of the United Kingdom, 2017. Government to lead national effort to end rough sleeping. <https://www.gov.uk/government/news/government-to-lead-national-effort-to-end-rough-sleeping>
 37. Housing First England. *The picture of Housing First in England 2020 Survey report 2. Housing First England Homeless Link. Homeless Link* 2020.
 38. CSJ. Close to Home: Delivering a national Housing First programme in England. *The Centre for Social Justice*, 2021.
 39. Pleace N, Quilgars D. *Improving health and social Integration through Housing First: a review*, 2013. www.feantsaresearch.org/
 40. Corinth K. The impact of permanent supportive housing on homeless populations. *J Hous Econ* 2017; **35**:69–84. <https://doi.org/10.1016/j.jhe.2017.01.006>
 41. Loubière S, Lemoine C, Boucekinge M, et al. Housing First for homeless people with severe mental illness: extended 4-year follow-up and analysis of recovery and housing stability from the randomized Un Chez Soi d'Abord trial. *Epidemiol Psychiatr Sci* 2002; **31**. <https://doi.org/10.1017/S2045796022000026>
 42. Peng Y, Hahn RA, Finnie RKC, et al. Permanent supportive housing with Housing First to reduce homelessness and promote health among homeless populations with disability: a community guide systematic review. *J Public Health Manage Pract* 2020; **26**:404–11. <https://doi.org/10.1097/PHH.0000000000001219>
 43. Wolitski RJ, Kidder DP, Pals SL, et al. Randomized trial of the effects of housing assistance on the health and risk behaviors of homeless and unstably housed people living with HIV. *AIDS Behav* 2010; **14**: 493–503. <https://doi.org/10.1007/s10461-009-9643-x>
 44. Schwarcz SK, Hsu LC, Vittinghoff E, et al. Impact of housing on the survival of persons with AIDS. *BMC Public Health* 2009; **9**:1–18. <https://doi.org/10.1186/1471-2548-9-220>
 45. Padgett DK, Gulcur L, Tsemberis S. Housing First services for people who are homeless with co-occurring serious mental illness and substance abuse. *Res Soc Work Pract* 2006; **16**:74–83. <https://doi.org/10.1177/1049731505282593>
 46. Rotheram-Borus MJ, Desmond K, Comulada WS, et al. Reducing risky sexual behavior and substance use among currently and formerly homeless adults living with HIV. *Am J Public Health* 2009; **99**:1100–7.
 47. Patterson M, Moniruzzaman A, Palepu A, et al. Housing First improves subjective quality of life among homeless adults with mental illness: 12-month findings from a randomized controlled trial in Vancouver, British Columbia. *Soc Psychiatry Psychiatr Epidemiol* 2013; **48**:1245–59. <https://doi.org/10.1007/s00127-013-0719-6>
 48. Mejia-Lancheros C, Lachaud J, To MJ, et al. The long-term effects of a Housing First intervention on primary care and non-primary care physician visits among homeless adults with mental illness: a 7-year RCT follow-up. *J Prim Care Community Health* 2021; **12**: 21501327211027102. <https://doi.org/10.1177/21501327211027102>
 49. Kirst M, Zenger S, Misir V, Hwang S, Stergiopoulos V. The impact of a Housing First randomized controlled trial on substance use problems among homeless individuals with mental illness. *Drug Alcohol Depend* 2015; **146**:24–9. <https://doi.org/10.1016/j.drugalcdep.2014.10.019>
 50. Milby JB, Schumacher JE, Wallace D, Freedman MJ, Vuchinich RE. To house or not to house: the effects of providing housing to homeless substance abusers in treatment. *Am J Public Health* 2005; **95**:1259–65. <https://doi.org/10.2105/AJPH.2004.039743>
 51. Kertesz SG, Mullins AN, Schumacher JE, et al. Long-term housing and work outcomes among treated cocaine-dependent homeless persons. *J Behavioral Health Services Research* 2007; **34**:17–33. <https://doi.org/10.1007/s11414-006-9041-3>
 52. Milby JB, Schumacher JE, McNamara C, et al. Initiating abstinence

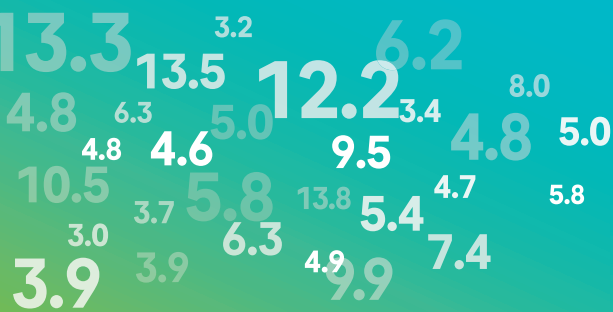
- in cocaine abusing dually diagnosed homeless persons. *Drug Alcohol Depend* 2000;**60**:55–67. [https://doi.org/10.1016/s0376-8716\(99\)00139-8](https://doi.org/10.1016/s0376-8716(99)00139-8)
53. Milby JB, Schumacher JE, Wallace D, *et al*. Day treatment with contingency management for cocaine abuse in homeless persons: 12-month follow-up. *J Consult Clin Psychol* 2003;**71**:1619–21. <https://doi.org/10.1037/0022-006x.71.3.619>
 54. Baxter AJ, Tweed EJ, Katikireddi SV, Thomson H. Effects of Housing First approaches on health and well-being of adults who are homeless or at risk of homelessness: systematic review and meta-analysis of randomised controlled trials. *J Epidemiol Community Health* 2019;**73**:379–87. <https://doi.org/10.1136/jech-2018-210981>
 55. DLUHC. September 2022. Department for Levelling Up, Housing and Communities Evaluation of the Housing First Pilots Third Process Report.
 56. Breatherton J, Pleave N. Housing First in England - an evaluation of nine services, 2015. <https://www.york.ac.uk/media/chp/documents/2015>
 57. Goering P, *et al*. *National Final Report Cross-Site At Home/Chez Soi Project*, 2014. <http://www.mentalhealthcommission.ca>
 58. Lemoine C, Loubiere S, Boucekine M, *et al*. Cost-effectiveness analysis of housing first intervention with an independent housing and team support for homeless people with severe mental illness: a Markov model informed by a randomized controlled trial. *Soc Sci Med* 2021;**272**:113692. <https://doi.org/10.j.socscimed.2021.113692>
 59. National Housing Federation. *Experiences of housing associations delivering Housing First research into how housing associations use the Housing First model and recommendations for delivery*, 2020. https://www.housing.org.uk/globalassets/files/resource-files/housing-first-barriers-and-best-practice-v0.9_final.pdf
 60. Wilson W, Loft P. Housing First: tackling homelessness for those with complex needs. Briefing Paper 37, 2021. House of Commons Library.
 61. Schick V, Witte L, Isbell S, *et al*. A community-academic collaboration to support chronic disease self-management among individuals living in permanent supportive housing. *Prog Community Health Partnersh* 2020; **14**: 89–99. <https://doi.org/10.1353/cpr2020.011>

ACCU-CHEK®

Turn numbers into better outcomes¹

The Accu-Chek Instant meter and mySugr® app help your patients better self-manage their diabetes, supporting personalised treatment decisions for better therapy outcomes.¹

By encouraging your patients to connect their Accu-Chek Instant meter to our mySugr app*, you could help them reduce estimated HbA1c (eHbA1c) and improve glycaemic control.²



Find out more
Diabetes.Roche.com/hcp-gb/RWD

The image used is a stock photo, not a real patient. | *The mySugr logbook is licensed for people with diabetes over the age of 16 years. The mySugr Bolus Calculator is licensed for people with diabetes over the age of 18 years. | References: 1. Debono F, Mayer H, and Kober J. Real-World Assessments of mySugr Mobile Health App. Diabetes Technol Ther. 2019; 2. Ide C, Mayor R, Ruch B. Real World Data Analysis shows a significant improvement on glycaemic management when using a blood glucose monitor connected with a mobile health application in UK users with type 2 diabetes. Diabetes UK Professional Conference 2023 poster session: 26-28 April, Liverpool, UK. | © 2023 Roche Diabetes Care Limited. All rights reserved. ACCU-CHEK, ACCU-CHEK INSTANT and MYSUGR are trademarks of Roche. All other trademarks or brand names are the property of their respective owners. Roche Diabetes Care Limited, Charles Avenue, Burgess Hill, West Sussex, RH15 9RY, UK. | Company Registration Number: 09055599. | Date of preparation: November 2023 | BGM2023-UK&I-727 | For healthcare professional use only in the UK and Ireland. Not for distribution.