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What barriers do administrators face whilst upgrading their data assemblage?

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ABSTRACT

Built for Zero (BFZ) is a data-driven methodology that some US homeless systems are using to allocate housing assistance. The 'by-name data' that BFZ needs is produced by actors within a 'data assemblage': a socio-technical system that people re/create to produce, analyse, and use data. Although BFZ is diffusing across the Global North, little research has examined the barriers that local administrators face whilst upgrading their systems' data assemblage with this methodology. This paper advances housing scholarship by using interview data from 28 US homeless systems to answer the question: what barriers do administrators face whilst upgrading their data assemblage with BFZ? I delineate four barriers that fray the network ties that local administrators need to produce by-name data: disinterest, fragmentation, noncompliance, and incapacity. My analysis shows how data assemblage theory can be used to understand homeless governance, delineates several factors that prevent or complicate data sharing within homeless systems, and identifies new directions for research on homeless datafication.

Introduction

Homeless service delivery in the USA has been increasingly 'datafied' over the past two decades (Willse, 2015). Datafication is 'the transformation of social life into online quantified data, thus allowing for real-time tracking and predictive analysis' (van Dijck, 2014). 'Continuum of Care' (CoC) is a performance-based grant that the US government uses to finance local homeless systems (US Department of Housing and Urban Development, 2023). A 'homeless system' is a local network of organisations that delivers homeless services *via* a negotiated set of rules. At the time of this study, federal authorities recognised 387 CoC jurisdictions.[1] Each CoC is represented by a Board that is composed of local stakeholders who collaborate across public, private, and non-profit sectors to govern homelessness. Federal authorities require CoCs to collect standardised data on people who access their

services (Willse, 2015). Residents of a jurisdiction get assessed, prioritised, and referred to homeless assistance through their CoC's coordinated entry system (see US Department of Housing and Urban Development, 2017). Through this process, caseworkers at 'participating agencies' produce a 'data double' of people seeking homeless assistance. A data double is a quantitative signifier of someone that gets produced for surveillance and/or resource allocation (Haggerty & Ericson, 2000). Data doubles are uploaded to a database – Homeless Management Information System (HMIS) – where they get aggregated within and across jurisdiction(s) for the purposes of performance evaluation and resource allocation (Willse, 2015).

The datafication of homelessness is an important yet under-explored topic in housing studies. Previous research has analysed the process, function, and/or impact of homeless datafication. Recent studies have examined how homeless service providers datafy people experiencing unsheltered homelessness (Clarke *et al.*, 2021; Grainger, 2022a). They identified struggles caseworkers faced whilst datafying a hidden population that gets forcefully moved on a daily basis. Housing scholars have also analysed the political economic function of homeless datafication (Baker *et al.*, 2020; Willse, 2015). That research showed policymakers view datafication as a way to make homeless systems more economically efficient. Lastly, researchers have analysed the impact of homeless datafication on various stakeholders. Past studies showed some forms of datafication bias resource allocations by undercounting subpopulations (Cloke *et al.*, 2001; Grainger, 2024), re/produce racial inequalities (Cronley, 2020; Kithulgoda *et al.*, 2024), and criminalise service recipients (Eubanks, 2018). Whilst those studies highlighted negative impacts, recent studies have shown administrators are using homeless data to make their system more equitable (Cronley *et al.*, 2024; Grainger & Gaede, 2024). Homeless data is therefore a resource that administrators can strategically use to generate costs and/or benefits for various stakeholders in their system.

Housing scholars have produced limited research on the system that administrators use to datafy homelessness (see Ecker *et al*., 2022). Mentioned above, caseworkers produce data doubles in HMIS of people who contact coordinated entry. CoC administrators use those data doubles to prioritise service recipients for federally funded programmes like Housing First (Grainger, 2022b). Past research has analysed bias in the assessment and prioritisation of service recipients (Cronley, 2020; Eubanks, 2018; Kithulgoda *et al.*, 2024; Osborne, 2019). The assessment tool and assessor that those studies analysed are nested in a *social* structure that shapes what kind of data gets produced and how that information is used. That social structure is currently under-theorised and its construction unexamined in housing studies literature. This knowledge gap impedes housing scholars from understanding the quality and comparability of homeless data that administrators produce. I advance previous research by using interview data that was collected from 28 homeless systems to analyse problems face administrators face whilst building the social apparatus of their data system.

The current study advances scholarship on homeless governance in two ways. First, it extends the research agenda on homeless datafication with a theoretical framework borrowed from critical data studies (see Kitchin & Lauriault, 2018). I use that framework to define the socio-technical system that administrators use to

produce homeless data and posit directions for future research. Next, I use interview data from 28 homeless systems to analyse things that impede efforts to build the social structure that administrators need to produce homeless data. Whilst previous studies have identified barriers that caseworkers face whilst counting homeless individuals (Clarke *et al.*, 2021; Cloke *et al.*, 2001; Grainger, 2022a), this paper analyses problems that administrators face as they create social ties and information flows that are needed to produce homeless data.

Homeless data assemblage

I use 'data assemblage' theory as the starting point of my analysis. A data assemblage is 'a complex socio-technical system, composed of many apparatuses and [(non-) human] elements that are thoroughly entwined, whose central concern is the production of a data' (Kitchin & Lauriault, 2018, p. 6). That definition implies data gets produced by interest-based actors within a socio-historical context that constrains and enables their actions. Kitchin & Lauriault (2018) insight directs attention to the way social context and processes shape the form, content, and usage of data. Critical data scholars assume modern society is hierarchically organised (Boyd & Crawford, 2012; Dalton & Thatcher, 2014). The use of data by institutional authorities to control subordinate groups makes it an object of social conflict. Data assemblage research analyses those conflicts by naming the entities and interests that control data production. Such information can help activists bend data production toward social justice. I extend that line of inquiry by analysing the way social context shapes social network ties that administrators need to produce homeless data. A social network is broadly defined here as the 'structure of relationships linking social actors [to one another]' (Marsden, 2000, p. 2727). The individuals and/or organisations in a social network are called a 'node' (Pescosolido, 2006). Network nodes use various technologies to share information with one another (i.e. information flow). I use those concepts (i.e. social network, node, and information flow) to define the social apparatus that CoC administrators create whilst upgrading their 'homeless data assemblage'.

A *homeless* data assemblage is a socio-technical system that datafies unhoused individuals. The US Government requires CoCs to build a data assemblage to monitor local homeless trends (Willse, 2015). This system has several components (see Figure 1). The network ties between actors connected in a social network is the foundation of a homeless data assemblage because data gets produced through their coordinated action. Technology lets actors produce a data double of unhoused people that is shared amongst CoC members. The type of homeless data that CoC members produce with these technologies is shaped by the ideology of federal policymakers (see Hays, 1985).[2] The Department of Housing and Urban Development (HUD) is the dominant actor in this data assemblage who reflects the logics and political interests of (un)elected officials. The ideology of HUD officials shapes the policies that participating agencies implement. HUD officials used a neoliberal ideology to create the 'universal data elements' – name, social security number, date of birth, race and ethnicity, gender, veteran status, disabling condition, project start date, project exit date, destination, relationship to head of household, enrolment CoC, housing move-in date, and prior living situation – that CoCs record in HMIS (Willse, 2015).
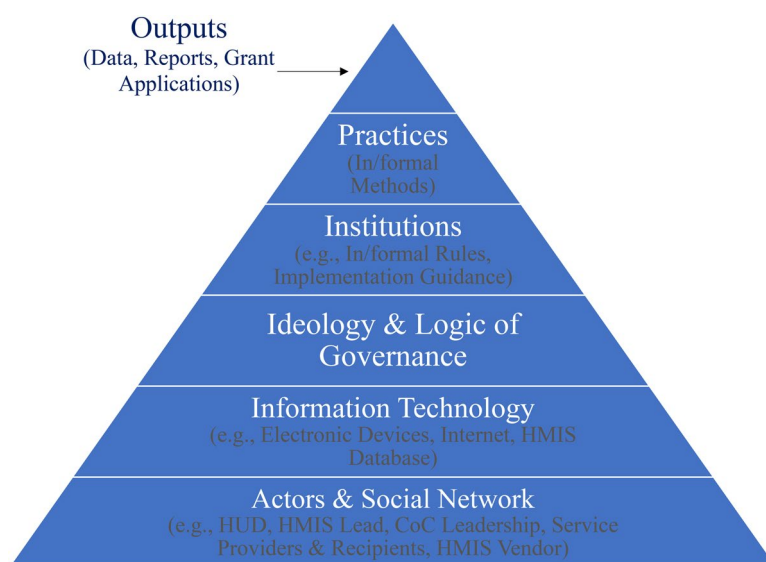
Figure 1. Components of a homeless data assemblage in the USA.

To this end, HUD regularly publishes guidance to help CoCs re/build their data assemblage. HUD Exchange (2017a) differentiated four components of data quality that CoCs should achieve: completeness, accuracy, timeliness, and consistency. Completeness is the degree to which agencies in a CoC jurisdiction produce HMIS data. Accuracy is the extent to which HMIS data correctly measures homelessness in a CoC jurisdiction. Timeliness is the degree to which HMIS data is promptly made available for use. Consistency is the extent to which HMIS data is standardised across participating agencies. HUD Exchange (2017b) tells CoC Leaders to create a 'Data Quality Management Program' (DQMP). A DQMP has four components: data quality plan, enforceable agreements, monitoring and reporting, and encouragements and enforcements. The data quality plan establishes data quality benchmarks and assigns obligations to CoC members for achieving those goals. Enforceable agreements specify data requirements for participating agencies and lists consequences for not meeting these expectations. Monitoring and reporting lets CoC administrators measure progress toward data quality benchmarks. Encouragements and enforcements are bespoke incentives that motivate agencies to produce quality data. HUD requires every CoC to submit data quality reports in their Annual Performance Report (APR) (HUD Exchange, 2017a). The measures HUD primarily uses to evaluate CoCs are length of time persons remain homeless, successful placement in and retention of housing, and returns to homelessness.

HUD officials view data assemblages as a way to make homeless systems more efficient. Federal authorities believe datafication can reduce tax expenditures on emergency services (Baker *et al.*, 2020). The homeless data assemblage that HUD officials designed thus prioritises people for housing assistance based on emergency service consumption (Willse, 2015). In the rush to save money, federal authorities prioritised efficiency over equity. Eubanks (2018) criticised the CoC data assemblage for lacking transparency, providing weak data protections to service recipients, and

deprioritising subgroups for housing assistance. The latter point re deprioritisation has been developed by subsequent research on racial equity. Recent studies showed a popular assessment tool (i.e. the VI-SPDAT) that CoC administrators have used to prioritise service recipients for housing assistance is racially biased (Cronley, 2020; Kithulgoda *et al.*, 2024). Whilst those studies showed homeless data can be used to harm vulnerable service recipients, newer research has indicated administrators are using homeless data to fix racial biases (Cronley *et al.*, 2024; Grainger & Gaede, 2024). Housing scholarship has therefore shown the morality of homeless data is dependent on the way institutional authorities use it. I however sidestep that normative debate to focus my analysis on the empirical dimensions of homeless data assemblages.

Built for Zero: upgrading homeless data assemblages

Some CoCs are using BFZ (i.e. BFZ communities) to upgrade their data assemblage. BFZ as a methodology that CoC administrators use to produce 'by-name data' (BND) with their homeless data assemblage.[3] Community Solutions is a non-profit agency from the USA that created BFZ in 2015 (Community Solutions, 2023). It defines homelessness as a 'dynamic' problem whose cause and solution varies across time and space (Community Solutions, 2018). To understand the fluidity of homeless populations, Community Solutions says CoCs need BND to monitor and facilitate 'flow': entries into and exits from coordinated entry (Grainger, 2022a). Table 1 shows how BND differs from other types of data that HUD requires grantees collect (Community Solutions, 2023). Unlike the point-in-time count, which an annual census of homelessness that every CoC grantee conducts in late-January, BND is updated at least monthly. This lets administrators contemporaneously track fluctuations in their system and expedite flow by making timely interventions (Evans & Baker, 2021). Although administrators generate BND from the HMIS database, it differs from HMIS data because it includes information from agencies that do not receive federal grants. By filling those data gaps, BND gives administrators better information to measure system performance, identify bottlenecks, brainstorm solutions, and lobby for funding (Community Solutions, 2018). BND is consequently *the* cornerstone of BFZ. Applying this methodology requires CoC administrators to 'upgrade' their data assemblage so it produces BND.

BND is created from a 'by-name list' (BNL). A BNL is a spreadsheet with six columns – newly identified, returned from housing, returned from inactive, actively

Table 1. The Characteristics of homeless data types.

Point-in-Time	HMIS	By-Name
• Cross-sectional	• Longitudinal	• Longitudinal
• Annually collected	• Regularly collected	• Regularly collected
• Depersonalised	• Personalised	• Personalised
	• Extended retention[a]	• Limited retention[b]
	• CoC members	• CoC members
		• Non-CoC members

[a]The U.S. Government requires CoCs keep service recipients on their HMIS list for seven years after their last contact with CES.
[b]BFZ communities remove 'inactive' clients from their BNL when they have been estranged from CES for a period of time determined by CoC administrators, usually 60–90 days.

homeless, housing placements, and moved to inactive – that CoC administrators use to monitor system flow, 'This allows each community to drill down into individual cases to understand what is truly driving increases or stagnancy in that particular system. The chief benefit of this kind of analysis is the ability to identify the highest leverage areas for improvement quickly and to avoid wasting time…' (Community Solutions, 2018, p. 14). The rows of a BNL record information about each service user that are filled in by caseworkers at participating agencies (i.e. network nodes) on a shared database. This gives administrators individualised data to make optimal programme referrals for each client and identify system-level impediments that prevent subgroups from getting/staying rehoused. This lets 'communities know who people are and what they need to secure and retain housing. It also gives communities a line of sight into the dynamics of their existing systems…' (Community Solutions, 2018, p. 10). Administrators use BNLs to make 'just-in-time' referrals that match clients to the kind of support they want and/or need (Grainger, 2022c).

Previous research has suggested BND production is complicated by several factors. Grainger (2022c) showed street outreach workers in one US county struggled to find unsheltered homeless individuals who were displaced by different social forces. Unless outreach workers form cross-sector partnerships to locate people on the street (Stambe *et al.*, 2024), displacement will prevent some people from accessing coordinated entry and getting a data double created in HMIS. Herring (2019) provided evidence that criminalisation is one factor that makes unsheltered people harder to find. By displacing unsheltered homeless persons, police officers make it hard for outreach workers to datafy them. Smith (2022) showed displacement by police officers causes homeless individuals to lose personal documents. Without those documents, someone's data double in HMIS may get deprioritised for housing assistance by CoC administrators. Cronley (2020) demonstrated assessment tools can bias a service user's data double. It showed Blacks got lower VI-SPDAT scores than Whites. This undermines the validity of BND and decisions that administrators make with it. Administrators therefore have to strategically navigate institutional constraints that can in/directly bias their BND.

Although BFZ has gained attention from federal policymakers (Built for Zero, 2021) and influential philanthropists (MacArthur Foundation, 2021), little academic research has analysed how CoCs upgrade their data assemblage with it. Grainger (2022a) presented an ethnographic analysis of a CoC that used BFZ principles to make referrals to programmes like Housing First. It showed administrators in an under-resourced homeless system confronted allocation dilemmas and thus made referrals that harmed some clients. Grainger (2024) extended that research with an analysis of programme referrals that were conducted by several BFZ communities during COVID-19. It provided evidence that implementation problems observed in Grainger's (2022a) case study are widespread, at least in 2022. Although these studies identified issues that BFZ communities have faced with programme referrals, they neglected the way CoC administrators build the social network that their homeless data assemblage relies on.

Because homeless datafication is directed rather than automated (Kitchin, 2014), human beings must locate and datafy a hidden and transient population (Clarke *et al.*, 2021; Grainger, 2022a). This assumes service providers in a CoC jurisdiction *will*

produce BND. Past research has shown service providers are often averse to datafication because it reduces time for case management (Grainger, 2022a). Furthermore, service providers that are funded with private grants are unobligated to produce homeless data for CoC grantees. The refusal of a large service provider to produce and share homeless data will undermine the completeness of the BND that administrators produce. This highlights the salience of social networks to BND production and the work that administrators do to develop those relationships over time. Despite the problems that CoC administrators confront whilst building that social apparatus, researchers have not yet examined how administrators create the social networks and information flows that BFZ requires. As a result, housing scholars can neither evaluate recent changes in homeless governance nor explain variation in the governing capacity of different homeless systems. This paper advances previous studies by answering the question: what barriers do administrators face whilst upgrading their data assemblage?

Data & methods

To answer this question, I conducted an interview-based study in 2022. My inspiration for this study came from my previous yearlong ethnography of coordinated entry. That project familiarised me with problems local administrators faced whilst using BFZ principles to allocate housing assistance. I designed the current study to understand the transferability of my ethnographic research to other CoCs.

At the time of this study, Community Solutions had recruited 105 out of 387 CoCs (27.2%) into its BFZ campaign. I purposefully sampled coordinated entry directors from 74 BFZ communities. A coordinated entry director is responsible for managing allocations through their homeless system. Based on my previous fieldwork, I recruited coordinated entry directors because they played a significant role in building the social network required to produce BND. Contacts were offered a £20 Amazon gift card, but many refused due to legal restrictions. Although some contacts immediately responded to initial email invites, I sent follow-up emails to others and some never replied. This strategy recruited participants from 28 BFZ communities (26.7%). Some directors invited colleagues from their CoC like HMIS Analysts who could speak on interview topics.[4] Thirty-five people contributed to this study. Table 2 describes the demographic characteristics of participants. I used negative case analysis to enhance the rigour of my study (see Padgett, 2016). In this regard, I used maximum variation sampling to recruit respondents from different regions and places (urban and rural). This helped me account for variation across political, economic, and social contexts.

I got approval from the University of Wisconsin-Madison's Institutional Review Board to interview participants for this study. Interviews were conducted over Zoom in spring 2022 with an audio recording device. I used a semi-structured interview guide that broadly asked the following questions that grew out of my previous fieldwork: What problems have you confronted whilst implementing BFZ? What kind of things do you need to implement BFZ more effectively? Interviews ranged 30–90 min, but most lasted approximately one-hour. Audio recordings were sent to a private transcriptionist. Returned transcripts were pseudonymised so the name and location of each respondent was disguised.

Table 2. Demographic characteristics of study participants.

		Frequency	Percent
Race	Black	3	8.57
	Hispanic	2	5.71
	Native	2	5.71
	White	26	74.3
	N/A	2	5.71
Gender	Female	24	68.5
	Male	9	25.7
	N/A	2	5.71
Age	(18–35)	13	37.1
	(36–55)	15	42.9
	(56–99)	1	2.90
	N/A	6	17.1
Education	High School	2	5.70
	Associates	1	2.90
	Bachelorette	12	34.3
	Post-graduate	15	42.9
	N/A	5	14.2
Years of experience	(0–5)	4	11.4
	(6–10)	14	40.0
	(11–15)	3	8.6
	(16–20)	6	17.1
	N/A	5	14.3
Years in role	(0–5	21	60.0
	(6–10)	6	17.1
	(11–20)	2	5.71
	N/A	6	17.1
Total		35	100%

I used Braun & Clarke (2006) processual framework to thematically analyse the transcripts in NVivo. The data were deductively analysed to answer the paper's research questions. I open coded relevant portions of interview transcripts to identify emergent themes. Open codes were grouped into superordinate ones based on commonalities. Subthemes were identified to highlight variation within each super-ordinate code. This let me identify latent themes between semantically unrelated data. I then defined each theme, selected exemplary quotes from each code, and used that data to write-up this report. Neither collaborative coding nor member checks were conducted due to resource constraints.

Findings

Table 2 lists four constraints that hindered respondents from upgrading the social apparatus of their homeless data assemblage: disinterest, fragmentation, noncompliance, and incapacity. Each constraint frayed the social network that respondents needed to upgrade their homeless data assemblage. Whereas disinterest and fragmentation reduced the number of nodes in the network, noncompliance and incapacity blocked information flows between network nodes (Table 3).

Disinterest

The first barrier participants faced was disinterest amongst service providers in BND. Refusal of disinterested nodes to join the CoC's data assemblage reduced the completeness of BND. Respondents identified several things that discouraged service

Table 3. Four barriers that impeded built for zero upgrades.

	Disinterest	Fragmentation	Noncompliance	Incapacity
Definition	Lack of motivation to produce BND for CoC administrators.	Differences within a homeless system that stymie BND production.	Un/intentional errors by participating agencies that undermine BND quality.	Capital deficiencies that prevent BND from getting produced.
Level of Analysis	• Individual • Organisational	• System	• Individual • Organisational	• Individual • Organisational • System
Primary Data Quality Impact(s)	• Completeness	• Completeness • Accuracy	• Accuracy • Consistency • Timeliness	• Completeness • Accuracy • Timeliness • Consistency
Mechanisms	• Uncertainty • Privacy • Autonomy	• Funding • Division of labour • Politics	• Violations • Inconsistency • Delays	• Staff turnover • Training requirements • Resource gaps

providers from joining their homeless data assemblage. The primary cause of disinterest was uncertainty about the benefits of BND to their agency. That concern partly reflected the time and effort that caseworkers would have devote to BND production:

> I think other agencies look at it as, '…It's another database we're going to have to deal with or just another way to do what we need to do that's going to make our job harder'. [Casey]

Redirecting time from casework to BND production would limit direct assistance to clients when CoC leaders did not finance new staff for data collection. Doing so would burden caseworkers with additional responsibilities, potentially cause staff to burnout from added stress, and facilitate job turnover within the agency. Clients would ultimately be disadvantaged because staff would have less time to deliver personal assistance. Some respondents disagreed with this view, arguing it stemmed from a misunderstanding of how BND would benefit clients:

> We have to change the culture around data collection. Most of the people in our CoC have a social work background…I don't understand why they don't teach them that in school the extent that we need the data to be consistently collected…This drives the funding that comes into our community…. [Celeste]

Celeste identified resource attainment as *the* reason caseworkers should care about and produce BND. Readers might agree that caseworkers should comply with data requests to get resources. But resource deficits were cited by several respondents as the reason some agencies questioned the value of BND:

> I think providers need to buy-in…It's definitely a message from providers, 'What's the point? They're still not housing…Why are we having all of these conversations around coordinated entry improvements…When there is still nowhere to refer people to? [Alex]

With inadequate housing assistance for service recipients, caseworkers understandably viewed BND as a pointless administrative burden. This highlights a problem with BFZ reasoning (Community Solutions, 2018). If CoC leaders need BND to lobby for housing resources, then they need caseworkers to produce it. That requires consent from caseworkers to prioritise BND production over the immediate needs

of their clients. This was a legitimate concern for caseworkers who reasonably doubted grantors would finance additional housing assistance.

Respondents also said privacy concerns made service providers disinterested in BND. Recall Eubanks (2018) problematised data sharing for criminalising service recipients. Participants voiced privacy concerns beyond criminalisation. One respondent said local service providers shielded themselves from accountability by denying CoC administrators access to data:

> It's a vulnerability to put all your notes into a system that other people can access…Some agencies were called out for things they put in HMIS. So, it became, 'Why open ourselves up for that and use it? [Kathy]

A service provider could defend their organisation against criticism by rejecting data requests from CoC administrators. This might be important to agencies that either mistrusted government or other service providers in their jurisdiction. Another set of privacy concerns pertained to client confidentiality. Some participants said service providers in their community cited federal statute to refuse data requests:

> There's some agencies that won't share their notes with coordinated entry…They're like, 'Oh, HIPAA'. But we all have to talk about multiple things [to] coordinate for housing… And when we have case conferencing, we usually don't have representatives from each of their teams…It's one staff that will read their notes…That delays coordination. [Elizabeth]

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) requires healthcare providers to proactively 'ensure the confidentiality, integrity, and availability of all [electronic protected health information] they create, receive, maintain or transmit' (US Department of Health and Human Services, 2022). Because the HMIS data double includes health information, it is understandable that service providers worried about the legal repercussions of producing BND, even though homeless service providers are exempt from HIPAA (US Department of Housing and Urban Development, 2020). Some agencies nonetheless refused data requests about vulnerable subpopulations:

> Our HMIS system is generally open so that somebody from one agency can see the activity [of] another programme…We had a youth provider…They enter into HMIS, but they didn't want to share it with other providers… [Dawn]

Privacy concerns were justified. One participant said her CoC experienced a data breach that raised concerns for staff at an emergency shelter. Because that agency served a large portion of the local homeless population, its refusal to share data significantly reduced the completeness of the BND her data assemblage produced. This example shows how trust is essential to the production of BND. A homeless system whose members mistrust one another will struggle to produce BND and vice versa.

Lastly, respondents said concerns about organisational autonomy discouraged some providers from producing BND. One participant described a shelter provider that worried the CoC would dictate service delivery:

> One of our local shelters…There's just a big misconception where they think that HMIS participation means that [coordinated entry] tells them who can be allowed in their shelter…which isn't true… [Laura]

Local service providers might view data sharing as a slippery slope that gradually ceded control to CoC administrators. Losing control over service delivery could force agencies to work with difficult-to-serve clients. An agency's staff that lacked the will or resources to help those clients might avoid data sharing agreements to maintain control over service delivery. Concerns about organisational autonomy sometimes reflected philosophical differences about homeless service delivery:

> The largest provider of emergency shelter in our community is the [emergency shelter], which is a religious organisation…They're philosophically against Housing First [and] harm reduction…And the county and so they would rather do things their way… [Alex]

Dependency on a grantor in most cases will limit organisational autonomy by making an agency accountable to external priorities. Grainger (2022a), for example, showed some coordinated entry directors have used financial leverage to make providers accept people with complex needs. This can strain agencies who lack resources to serve that subpopulation. Some of them may consequently refuse data requests to preserve autonomy. Refusing to share data would decrease the completeness of BND.

In short, upgrading a homeless data assemblage with BFZ required buy-in from service providers. Without their participation, the social network of a homeless data assemblage lacked enough nodes to produce complete BND. The impact of nodal truncation on BND completeness would vary by organisational size and consumer group. A large organisation that refused to generate BND would undermine completeness more than a small one and vice versa. An agency that primarily served one subpopulation (i.e. youth, LGBT, or women) could reduce the completeness of BND, regardless of its size. Participants identified several concerns (i.e. pay-off, privacy, and autonomy) that disinterested some providers in their community from producing BND. Upgrading their data assemblage meant administrators had to motivate and sustain participation from local service providers. This task was complicated by fragmentation, noncompliance, and incapacity.

Fragmentation

Respondents described several ways fragmentation truncated nodes from their homeless data assemblage. BND production involves multiple stakeholders who jointly select goals, divide labour, choose strategies, and pool resources whilst operating their homeless data assemblage. This sometimes creates tensions regarding who does what, when, how, and why. Despite the implementation guidance from federal authorities and Community Solutions, participants said their system was fragmented in ways that made it hard to upgrade their data assemblage with BFZ.

Fragmentation stemmed from three factors: funding, divided labour, and local politics. Respondents said funding fragmented their homeless system. Recall federal authorities require CoC grantees to produce HMIS data. Although many service providers in their community were obligated to produce HMIS data because they

received CoC funding, some declined it to retain organisational autonomy. This let them refuse data requests from CoC administrators:

Interviewer: What do you think stops them from sharing data?

Laura: Everything's a competition between the homeless providers here…'Who can serve the most people?' …It doesn't help them to bring in more funding…It's just not in the best interest of them.

Interviewer: How did this competitive atmosphere get created?

Laura: …It's reinforced through the City and our reports. 'How many people did you have? …Why aren't you helping this many people?'…[Service providers] don't want to accept [CoC] funding because they know there's all this pressure going to be put to them…

Lacking financial leverage, participants had to convince the administrators of those agencies that it was worth it for them to produce BND. Recruiting those stakeholders was an uphill battle because, aside from resource constraints, they were sometimes overwhelmed by data requirements from other funding agencies. Adding another data obligation was an unreasonable ask for some:

The challenges when you work with multiple agencies, they all have their own separate databases and spreadsheet requirements…Whenever we come in with coordinated entry…'We'd love to add this extra stuff', it's like, 'Well, I'm already putting the information over here'. [Kristy]

Regardless of the cause, divergent funding sources was said to impede efforts to produce BND. This undermined the completeness of BND that was available to participants:

I know the agencies that get [federal] money are going to have significantly more information. They're going to have to be in HMIS…Whereas some of the other case managers, if they're not getting the money we're getting, we can't guarantee that they're having the same kind of statistics… [Aiden]

And sometimes fostered coordination problems that undermined data quality:

We had a lot of people doing…coordinated entry…Some are contracted and so they were paid by the County. Others were not…And so managing the work and making sure it's quality and maintaining the validity of our policies…was really challenging. [Myra]

Diversified funding varied data requirements for agencies in each homeless system. For several reasons, some agencies that were financed by private grantors refused to help respondents upgrade their homeless data assemblage with BFZ. This rendered the BND that participants produced incomplete or inaccurate. The salience of that data gap varied by the number and type of homeless individuals that a non-participating organisation served. Because respondents lacked financial leverage to force those agencies to produce BND, they had to creatively persuade them to co-produce it. Sometimes this worked whilst at others it failed.

The division of labour within a CoC was another source of fragmentation. All CoC members play a role in coordinated entry. A subset of agencies provide 'access points' where people enter the homeless system. Recall caseworkers at an access point assess the 'vulnerability' of individuals seeking help. Decentralised service delivery sometimes hindered the coordination that was needed to produce BND:

> If you're an individual experiencing homelessness in [my community] and you Google what to do, there's not going to be an easy answer…You have to meet the right person on the street or be a good advocate for yourself…211 can't tell them, 'Do this to get into coordinated entry…' Our 211 is run by contractors in [another state]…They don't necessarily know everything that's going on here…We were hoping to get a little bit of information so that we can share that with people to follow-up…And they weren't willing to ask the questions… [Amber]

Information gaps like this could prevent access point caseworkers from reaching contacts, conducting assessments, and updating HMIS. This limited the completeness of BND. Issues persisted in some cases even when data was entered into HMIS. Accuracy occasionally suffered because of decentralisation:

> There's a ton of duplication because you have so many people open to multiple services…So, the by-name list pulls anybody that's open to any of other homeless services… It takes a long time to un-duplicate it… [Laura]

Duplicate data forced respondents to clean large datasets. Although I cannot comment on the validity of these methods, flawed methodologies could wrongly remove people from the BNL. The previous example analysed how quantitative data is produced, but participants also said divided labour impeded the production of qualitative data:

> With case conferencing, it's sometimes difficult to get all the partners at the table… Sometimes there might be a few clients we don't have any updates on because the people who are working with them weren't there at that meeting. [Charles]

Caseworkers develop a qualitative understanding of clients whilst delivering services. This information is a necessary supplement to quantitative assessments (see Grainger & Gaede, 2024). Respondents notified caseworkers when a client could be referred to a housing programme. Caseworkers were expected to attend a case conference where their clients' referral got decided. Because CoCs lacked the housing inventory to always make optimal referrals (Grainger, 2024), caseworker attendance was vital to clients getting an appropriate one. The division of labour in some CoCs prevented this from happening because scheduling conflicts prevented some frontline staff from attending case conferences.

Lastly, respondents said political fragmentation undermined their BFZ upgrade. A CoC may encompass several municipal governments that finance homeless service delivery and/or housing assistance in their jurisdiction. Some participants said this discouraged BND production because elected officials prioritised resources for their own constituents:

> The biggest [issue] that comes up is geographic areas…Providers that serve in those geographic areas…aren't as interested in a comprehensive by-name list…It has a lot to do with politics…The scope that the city councils worry about is their city or

their district in the county…When one of those jurisdictions is putting in money to help fund the project…they want that project to be specifically for those people… [Joel]

Joel's experience is unsurprising, given US race relations. Large US counties are often racially segregated (Frey, 2018). Some municipalities were created to stop the redistribution of resources from White to non-White communities (Lichter *et al.*, 2015). Small US towns have shirked regional approaches to welfare provision in many metropolitan areas. Central cities have consequently absorbed responsibility for poverty management. Although I cannot specify the reasons, this may explain the political fragmentation that Joel described. Regardless of the cause, political fragmentation reduced the completeness of BND if it discouraged municipal funding for data collection by a CoC.

Noncompliance

Participants sometimes struggled with noncompliance by participating agencies, even when those organisations were contractually obligated to do so. This diminished the accuracy, timeliness, and/or consistency of BND by blocking information flows between network nodes. Noncompliance took several forms. This subsection first discusses how some caseworkers violated HMIS protocols. It will then look at how caseworkers inconsistently entered data even whilst following HMIS protocols. The subsection will end by analysing the significance of delayed entries.

Recall federal authorities require participating agencies to produce standardised HMIS data. CoC members are obligated to follow formal rules about data collection and entry. Some participants said caseworkers habitually violated these protocols. One respondent thought this reflected a professional bias against data governance amongst social workers:

You have people like [us]…who love a spreadsheet, and we see it as the wave of the future…Then, you have people like my boss…She comes from a social service background. And it's the data-driven verses the people-driven. And they [will just be like], 'Well, I just didn't get that finished'. That's not a big deal until you have to go into HMIS and pop up thirty-five errors. [Aiden]

Protocol violations like this reduced the consistency and timeliness of BND because participants had to clean the BNL. This could take a longtime if multiple agencies violated data protocols:

Some of the things that they were spending time on were unnecessary…Instead of putting things in the fields that were structured, like an address field…They would just put everything in the case notes…We can't run reports on case notes… [Celeste]

Violations of data protocol were sometimes done by caseworkers to get clients prioritised for housing assistance. Despite their good intentions, caseworkers who did this eroded the accuracy and timeliness of BND if administrators had to correct multiple errors. It was therefore imperative that CoC boards enforce their data policy. Some participating agencies were unresponsive to enforcement measures and CoC Boards inconsistently sanctioned noncompliance.

Another type of noncompliance was inconsistent data entries. Unlike policy violations, inconsistent entries were unintentional mistakes by participating agencies who earnestly tried to follow HMIS protocols. Some participants attributed this to workflow conflicts. Caseworkers datafied clients in HMIS during an assessment whilst comforting them through a traumatic experience. Because caseworkers came from a 'social work background' and were thus 'more person- than data-centred' [Celeste], respondents thought they prioritised care over datafication and that this could facilitate unintentional errors:

> The biggest challenge is end-user error: making sure that we follow the workflows [and] get every question answered…With humans, things are a little more organic… We like to just kind of hear the client…And you're able to capture a lot of information you can then plug into the data fields…If you don't use HMIS that often, you can tend to forget details… [Dana]

Beyond reporting errors, inconsistent data entries made it hard for participating agencies to collaboratively produce BND. For example, inconsistent data entry by caseworkers at a stationary access point (e.g. emergency shelter) can slow down coordinated entry by wasting resources at a mobile access point (e.g. street outreach):

> We had a hard time getting [emergency shelters] to do entries and exits that were consistent…If they aren't using an adequate workflow that has client (A) staying at the shelter for 30 days straight, you have this person open for 30 days, but they're telling the street outreach that they left the shelter 15 days ago…It causes an issue because now they're open with street outreach, but they're living at the shelter, or vice versa… [Patience]

A sluggish coordinated entry system increased the time it took to datafy service recipients. In addition to quantitative metrics, participants also described inconsistent case notes. HMIS has an open field where case notes can be entered about each client. Some respondents wanted caseworkers to standardise case notes so they could quickly retrieve information:

> The way our current HMIS system is set up, it's kind of hard to pull data…If someone has a disability, but it's not specific…'Do they need a really high level of care?' So, noting that 'needs higher level of care' then…If you don't always write it the exact same way every time, it's not going to capture it…We have a list of standardised abbreviations that we'll try to use to capture things…If you misspell something, it's not always accurate. [Laura]

Inconsistent entries could thus undermine the retrieval and analysis of BND. Participants confronted more inconsistencies when an organisation joined their data assemblage or HUD updated its HMIS guidance because the CoC administrators had to re/train staff. Alternatively, inconsistencies spiked when an external shock like COVID-19 increased demand on participating agencies. During those moments, homeless data assemblages were harder to create, maintain, and/or upgrade because participating agencies were overstretched.

The third form of noncompliance was delayed entries. Respondents said caseworkers were sometimes slow to enter data into HMIS. This hindered BND production by excluding information about new people who entered or left the system and therefore reduced its timeliness:

> We've had a problem with implementing real-time data collection…We would have a lot of providers that would do paper intakes and enter the data after several days… Anytime you're putting distance between when you're collecting the information and when you're entering [it] leads to user error… [Alex]

Without timely BND, administrators might not yield the benefits from BFZ that Community Solutions promised because selected interventions would be based on obsolete information. For example, vulnerability is fluid during an episode of homelessness and an assessment score can thus quickly become outdated. The systematic delay of entries can thus misrepresent the distribution of vulnerability in a homeless population and bias prioritisation for housing assistance:

> Grace: A lot of programmes do a VI-SPDAT as part of their intake…Sometimes it'll sit in a pile, waiting to be entered into our HMIS system…
>
> Interviewer: Why do you think that that's a problem?
>
> Andrew: Because data ages quickly.
>
> Grace: Yeah.

In extreme cases, respondents said some caseworkers never entered assessment scores into HMIS:

> There were people who didn't have HMIS access that were doing assessments on paper… they never got entered or they'd get entered three months later or people were being assessed multiple times… [Amy]

Homeless service providers sometimes served particular subpopulations (i.e. youth, LGBT, gender, complex needs, neighbourhoods, and/or municipalities). If an organisation systematically delayed data entry, then its client group would be misrepresented in HMIS. This could undermine the completeness and accuracy of that system's BND whilst preventing that subpopulation from getting rehoused. Where CoC jurisdictions are highly segregated, entry delays could racially bias homeless system flows and/or grant allocations.

Incapacity

The incapacity of homeless systems stopped some participants from upgrading their data assemblage with BFZ. Respondents described several forms of incapacity that hindered BFZ implementation. Most said their homeless system lacked enough staff to produce BND. Solving this problem was complicated by staff turnover, training requirements, and resource gaps. The incapacity of participating agencies consequently disrupted information flows that administrators needed to produce BND.

To illustrate, coordinated entry access points were the primary site of staff shortage. Recall access points are where caseworkers assess and datafy service recipients. HUD affords each CoC discretion to decide who can be as an access point. Most respondents said their CoC adopted a 'No Wrong Door' access point model. This

meant people could enter the homeless system through emergency shelters, social service hotline (i.e. 211), and/or street outreach teams. Many respondents said shelter providers in their jurisdiction lacked enough caseworkers to adequately assess people:

> …We have a really large shelter that serves a lot of folk and they have limited case management staff. So, their capacity is limited to do assessments…That's one of the big barriers that we're working through… [Jim]

This sometimes prevented staff from entering HMIS data in a timely fashion:

> The main thing is provider capacity…We hear a lot from our non-profit providers, 'We just don't have the time to do all this data entry', which is completely relevant. I'd say that's the biggest thing. [Alex]

Delayed data entry by emergency shelter staff prevented administrators from accurately knowing how many people were experiencing sheltered homelessness in their community. To allay their backlog, shelter staff referred some clients to social service hotline (i.e. 211) where an operator conducted their assessment. Some respondents said their 211 provider also suffered chronic staff shortages that hindered data collection:

> On the family side, we offer phone-based coordinated entry…We don't always have enough staff to handle the volume of calls…It can be a few days or longer before we're actually able to connect… [Jack]

A shortfall like this in hotline staff occasionally generated backlogs:

> I think the thing that we would most like to address with the phone hotline is being able to answer the phone quickly. But if you're on the phone with someone and you're in the middle of a coordinated entry, you're not going to be able to stop and answer the phone…And then you get backlogged. [Dana]

The hotline backlog could be relieved if street outreach workers were able to conduct face-to-face assessments with callers. This strategy was impossible if outreach teams were under-staffed or unwilling to collect HMIS data:

> When it comes to street outreach, it's definitely a gap…I think there are some that are just like, 'No, we're not doing that'.…The overarching reason probably is just the extra work. People are underpaid and overworked as it is. [Marie]

Most respondents attributed staff shortages to COVID-19. According to them, the pandemic put unprecedented stress on under-resourced homeless systems that every participant struggled to deal with:

> …The non-profit sector in general, in homeless services, especially, is wiped by the pandemic…Chronically understaffed, and the increased needs of navigating an infectious disease, I think it's really hit our capacity quite seriously. [Jack]

This coupled with low-pay and long-hours created staff burnout during and after COVID-19. The US Government flooded homeless systems with funding for housing assistance during the pandemic. Although participants welcomed the influx of funding, they lamented the lack of administrative resources to allocate those funds:

> We've seen a larger investment in housing resources this year…Having those providers scale-up and being able to hire case managers, and clinical staff, has been extremely challenging…Part of the delay in how we've been able to utilise all of our resources… have been…we don't have any case managers… [Kristy]

This quote indicated a poorly staffed access point cannot adequately assess people. If caseworkers cannot assess and upload information to HMIS in a timely manner, then they cannot produce BND. COVID-19 either created or exacerbated this problem, depending on the CoC. Unprecedented demand for emergency housing services shocked every US homeless system. Access point providers consequently had to quickly onboard new caseworkers to process applications during a public health crisis. This made it even harder for service providers to generate BND.

Several participants linked these shortages to staff turnover. Some attributed turnover to the 'natural' cycle of entry-level jobs, 'I think the biggest challenge is staff turnover…I think part of it is natural…The case management level is an entry-level position…' [Ariel]. High turnover made it difficult to keep HMIS-trained staff:

> Turnover is pretty high in this profession…Sometimes you get somebody spending all that time getting trained…It's like, 'Okay, we're in a good place'. And they leave…A new person comes in and we've got to start all over again. [Jamal]

As a result, participants had to constantly train new hires on HMIS protocols. Rapid turnover thus fostered some of the noncompliance that was discussed in the previous section. Most respondents however attributed staff turnover to COVID-19:

> The pandemic has really worn people out…A lot of them had to cut back on capacity… Everyone's just stretched thin on resources…A lot of people have just felt done… [Tonya]

A few participants thought decentralised work motivated frontline staff to seek alternative employment whilst others thought caseworkers were lured to the private sector by higher wages. Regardless of the cause, respondents said COVID-related turnover depleted human capital that their system needed to produce BND:

> We think just a lot of it was kind of things going on with COVID…A lot of it has just been turnover…You'd meet a new person. You work with them for a couple of months…And all of a sudden, you find out they just quit, or they got sick… [Laura]

The foregoing paragraph showed access points had to quickly hire new staff to accommodate surging demand during the pandemic. That effort was complicated by staff turnover. Long hours, illness, and job burnout motivated resignations. This made is hard for CoC administrators to produce BND at a time when they needed it most.

Growing the capacity of homeless systems to produce BND was complicated by several factors. The primary barrier that respondents discussed was HMIS training requirements. I previously showed frequent turnover forced participants to constantly train new caseworkers on HMIS protocols. This was difficult because new

caseworkers often lacked data skills. Some thought this in part reflected the professional bias of caseworkers against data governance:

> Folks who are entering data into that system are often folks working out in the field… They're really good at working with humans and typically do not love sitting in front of a computer entering data. [Suzanne]

Whilst others argued the HMIS training curriculum was untailored to the organisation of their homeless system:

> The training isn't individualised to each type of project, which contributes to a lot of data errors…It doesn't really show people, 'If you're entering for a shelter or motel vouchers or for PATH outreach, how to do that' There's a lot of errors and then people call us to fix it. [Laura]

Participants discussed some ideas for increasing their systems' capacity. Some thought increasing wages would foster retention:

> …We'd love to be able to provide better pay for our case managers, so that we keep them longer, because there's a ton of staff turnover in the work and the programmes that we do. [Myra]

Reducing turnover could help administrators retain trained staff. That would facilitate BND production and enhance system efficiency. Other respondents were incredulous that grantors would fund administrative expenditures to maintain staff:

> Hope: If you can't afford to hire somebody to process that billing, how do you get paid for providing somebody rental assistance? To me, that's not an administrative cost. That should be tied into the programme function…

> Interviewer: Why do you think administrative costs are so difficult to get funded?

> Hope: Because they're seen as we give you enough money as it is…We needed funders to comprehend what case management service truly is, because funders were on the mind-set of money needs to go for services, money doesn't need to go to staff. Case management is a vital service.

Fixing incapacities was thus harder than it sounds. Participants had to train new caseworkers in HMIS. This was difficult because new hires often lacked data skills that were needed to use HMIS and/or the CoC provided inadequate HMIS training for each access point. The hesitancy of grantors to fund administrative staff was said to prevent some respondents from retaining caseworkers both during and after the pandemic. This undermined all four components of BND quality by blocking information flow between network nodes.

Discussion & conclusion

This paper answered the question: what barriers do managerial staff face whilst upgrading their systems' data assemblage with BFZ? It used interview data from 28 BFZ communities to identify four barriers that local administrators confronted: disinterest, fragmentation, noncompliance, and incapacity. Each barrier constrained the social network that administrators needed to produce BND. The first two constraints (i.e. disinterest and

fragmentation) limited the size and structure of the social network in a homeless data assemblage. I showed system fragmentation let disinterested agencies refuse data requests from CoC administrators. This biased BND by reducing the number of network nodes that generated data in a BFZ community. The impact of nonparticipation on BND quality varied by the amount and type of clients that the agency served. The other two constraints (i.e. noncompliance and incapacity) affected the flow of information between the network nodes of a homeless data assemblage. I showed participating agencies un/intentionally violated data protocols, but that resource deficits rather than incompetence or corruption were often to blame.[5] The salience of social networks to BND production meant variation in the aforementioned constraints created context-specific biases that were baked into homeless counts that BFZ communities produced.

My analysis made two contributions to housing scholarship. First, it demonstrated the usefulness of data assemblage theory for understanding digitised homeless governance. Kitchin & Lauriault (2018) interrogated the belief that data gives an objective account or mirror image of reality. Data are instead produced by situated actors who constitute and manage a data assemblage. I used that insight to analyse problems that CoC administrators face whilst upgrading their homeless data assemblage with BFZ. BND is an essential ingredient of BFZ whose social foundation local administrators struggled to create. I identified four constraints that complicated administrative efforts to build the social apparatus of their homeless data assemblage. Data assemblage theory helped me problematise the social dimensions of homeless data assemblages; specify ideologies, technologies, relationships, and strategies that local administrators used to produce BND; and develop/answer research questions about the construction of homeless data assemblages. By applying this framework to homeless datafication, the paper connects the topic to a larger research agenda in critical data studies that readers can use to develop future research.

The paper also gave new insight to the barriers of BFZ implementation. Built for Zero has influenced HUD (Built for Zero, 2021), secured a $100 million grant for Community Solutions (MacArthur Foundation, 2021), and diffused throughout the British Commonwealth and to parts of Western Europe (Community Solutions, 2024). Despite its growing international influence, housing scholars have published very little research on BFZ implementation. Previous studies have analysed BFZ's logic of governance (Evans & Baker, 2021), data collection (Grainger, 2022a), macro-level impacts (Batko *et al.*, 2021), and programme referrals (Grainger, 2022a, 2024). None of those studies analysed how BFZ communities develop the network ties that BND production demands. This paper advanced previous research on BFZ by identifying four barriers to its implementation. I problematised the relationship between organisations in BFZ communities and showed the willingness of local stakeholders to produce BND cannot be assumed. That insight can help housing scholars identify leverage points in homeless data assemblages that need to be adjusted so administrators can produce BND.

Here, I note a few limitations that reduced the rigour of this study (see Padgett, 2016). The first shortcoming is the reliance on interviews with coordinated entry directors. This is a weakness because HMIS administrators play a central role in BND production. Sampling more HMIS administrators would have strengthened the

study's empirical claims. I did not realise this until the end of data collection, but study participants nonetheless worked closely with HMIS data and were able to answer my questions. The second shortcoming is that I independently coded interview transcripts because resource constraints prevented me from hiring a research assistant. I compensated for that weakness by triangulating interviewee responses and sign-posting in-text the degree of consensus in the findings section. The third shortcoming stems from my inability to conduct member checks. This paper was written two years after data collection when I had lost contact with participants. I compensated for this limitation by using negative case analysis to challenge and modify the data analysis.

Housing scholars can advance this study in several ways. Whilst this paper ana-lysed barriers, it neglected enablers of homeless data assemblage. The study conse-quently overlooked opportunities that administrators used to build the social apparatus of their data assemblage. Future research can address this shortcoming by identifying key resources administrators need to upgrade homeless data assem-blages. Housing scholars can also advance this study by analysing strategies admin-istrators use to navigate constraints and exploit opportunities during BFZ implementation. That research will identify mechanisms of homeless data assemblage in different contexts and help housing scholars evaluate homeless counts that are reported by BFZ communities. Lastly, future research is needed to understand the perspective of other key stakeholders in homeless data assemblages. This study provided evidence of administrative perspectives of service providers, CoC boards, and elected officials. It therefore gave a partial account of barriers to BND produc-tion. Future research ought to analyse the way these stakeholders evaluate the dis/advantages of BND.

Notes

1. I use the acronym "CoC" when referring to a grantee jurisdiction.
2. Ideology refers to a theory about the way society is and should be organised.
3. Logic of governance is the reasoning administrators use to address social problems like homelessness.
4. The number of colleagues that contacts invited to the interview varied from one to three. I used the same interview protocol to facilitate all discussions, but applied focus group strategies during those conversations to get input from each participant.
5. Both noncompliance and incapacity were relevant to HMIS data and BND because they involve agencies that are statutorily required to produce data for CoC administrators. Some forms of fragmentation were relevant to HMIS data and BND whilst disinterest was only relevant to BND.

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Notes on contributor

Garrett L. Grainger is a Research Associate at Manchester Metropolitan University and a Research Fellow of Social Inclusion at Wrexham University who specialises in social policy, homeless governance, and digital sociology.

Data availability statement

Masked data is available upon request.

References

Baker, T., Evans, J. & Hennigan, B. (2020). Investable poverty: Social investment states and the geographies of poverty management, *Progress in Human Geography*, 44(3), pp. 534–554.

Batko, S., Solari, C. D. & DuBois, N. (2021). *The Value of Ending Veteran and Chronic Homelessness in Four Communities: A Framework Community-wide Costs and Benefits* (Washington, DC: The Urban Institute).

Boyd, D. & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon, *Information, Communication & Society*, 15(5), pp. 662–679.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology, *Qualitative Research in Psychology*, 3(2), pp. 77–101.

Built for Zero (2021) HUD Secretary Marcia L. Fudge remarks at Built for Zero learning session – November 2, 2021. Available at https://www.youtube.com/watch?v=wUg1BU4yS1Q&t=485s (accessed 20 March 2022).

Clarke, A., Parsell, C. & Lata, L. N. (2021). Surveilling the marginalised: How manual, embodied and territorialised surveillance persists in the age of 'Dataveillance', *The Sociological Review*, 69(2), pp. 396–413.

Cloke, P., Milbourne, P. & Widdowfield, R. (2001). Making the homeless count? Enumerating rough sleepers and the distortion of homelessness, *Policy & Politics*, 29(3), pp. 259–279.

Community Solutions (2018). Getting to proof points: Key learning from the first three years of the Built for Zero Initiative. Available at https://community.solutions/new-report-reflections-from-the-first-three-years-of-built-for-zero/(accessed 1 December 2021).

Community Solutions (2023). Built for Zero: A movement to measurably and equitably end homelessness. Available at https://community.solutions/built-for-zero/(accessed 5 November 2023).

Community Solutions (2024) International Partner Initiatives: Ending homelessness at scale. Available at https://community.solutions/international-partner-initiatives/ (accessed 25 July 2024).

Cronley, C. (2020). Invisible intersectionality in measuring vulnerability among individuals experiencing homelessness: Critically appraising the VI-SPDAT, *Journal of Social Distress and Homelessness*, 30, pp. 1–11.

Cronley, C., Tiderington, E., Aykanian, A. & Huslage, M. (2024). Voices from the field: Continua of care representatives discuss strategies and opportunities for promoting equity in homelessness services in the United States, *Journal of Social Distress and Homelessness*, pp. 1–14.

Dalton, C. & Thatcher, J. (2014). What does a critical data studies look like, and why do we care? Seven points for a critical approach to 'big data'. *Society and Space*. Available at https://www.societyandspace.org/articles/what-does-a-critical-data-studies-look-like-and-why-do-we-care (accessed 6 November 2023).

Ecker, J., Brown, M., Aubry, T., Pridham, K. F. & Hwang, S. W. (2022). Coordinated access and coordinated entry system processes in the housing and homelessness sector: A critical commentary on current practices, *Housing Policy Debate*, 32(6), pp. 876–895.

Eubanks, V. (2018). *Automating inequality: How high-tech tools profile, police, and punish the poor* (New York: St. Martin's Press).

Evans, J. & Baker, T. (2021). Breaking through the epistemic impasse: Ending homelessness with the invention of 'functional zero' in the Anglo-American world, *Futures*, 129, pp. 102730.

Frey, W. H. (2018) Black-White segregation edges downward since 2000, census shows. Available at https://www.brookings.edu/articles/black-white-segregation-edges-downward-since-2000-census-shows/ (accessed 7 November 2023).

Grainger, G. L. (2022a) What tradeoffs are made on the path to functional zero chronic homelessness?, *Housing Studies*, 39(7), pp. 1702–1723.

Grainger, G. L. (2022b) Yielding returns on homeless policy through the micro-economisation of Housing First recipients, *Sociological Inquiry*, 92(S1), pp. 967–993.

Grainger, G. L. (2022c) Seeing like a shadow state: An ethnography of homeless street outreach in the USA, *Urban Geography*, 44(7), pp. 1412–1432.

Grainger, G. L. (2024). Draining a flooded bathtub: A qualitative analysis of built for zero implementation during COVID-19, *Housing and Society*, 51(1), pp. 50–79.

Grainger, G. L. & Gaede, E. (2024). Making BIPOC lives matter: A qualitative analysis of managerial resistance to racial exclusions in US homeless systems, *Housing, Theory and Society*, 41(1), pp. 89–109.

Haggerty, K. D. & Ericson, R. V. (2000). The surveillant assemblage, *The British Journal of Sociology*, 51(4), pp. 605–622.

Hays, R. A. (1985). *The federal government and urban housing: Ideology and change in public policy* (Albany: State University of New York Press).

Herring, C. (2019). Complaint-oriented policing: Regulating homelessness in public space, *American Sociological Review*, 84(5), pp. 769–800.

HUD Exchange (2017a) CoC data quality. Available at https://files.hudexchange.info/resources/documents/coc-data-quality-brief.pdf (accessed 6 November 2023).

HUD Exchange (2017b) Data quality management program. Available at https://files.hudexchange.info/resources/documents/HMIS-Data-Quality-Management-Program.pdf (accessed 6 November 2023).

Kitchin, R. (2014). The real-time city? Big data and smart urbanism, *GeoJournal*, 79(1), pp. 1–14.

Kitchin, R. & Lauriault, T. (2018). Towards critical data studies: Charting and unpacking data assemblages and their work, in: J. Thatcher, J. Eckert, & A. Shears (Eds.) *Thinking big data in geography: New regimes, new research*, pp. 3–20. Lincoln: University of Nebraska Press).

Kithulgoda, C. I., Vaithianathan, R. & Parsell, C. (2024). Racial and gender bias in self-reported needs when using a homelessness triaging tool, *Housing Studies*, 39(8), pp. 1951–1973.

Lichter, D. T., Parisi, D. & Taquino, M. C. (2015). Toward a new macro-segregation? Decomposing segregation within and between metropolitan cities and suburbs, *American Sociological Review*, 80(4), pp. 843–873.

MacArthur Foundation (2021). Community Solutions awarded $100 million to end homelessness. Available at https://www.macfound.org/press/article/community-solutions-awarded-$100-million-to-end-homelessness (accessed 20 March 2022).

Marsden, P. V. (2000). Social networks, in: E. F. Borgatta & R. J. V. Montgomery (Eds.) *Encyclopaedia of sociology*, pp. 2727–35 (New York: Macmillan).

Osborne, M. (2019). Who gets "Housing First"? Determining eligibility in an era of housing first homelessness, *Journal of Contemporary Ethnography*, 48(3), pp. 402–428.

Padgett, D. K. (2016). *Qualitative methods in social work research* (New York: Sage Publications).

Pescosolido, B. A. (2006). The sociology of social networks, in: C. D. Bryant & D. L. Peck (Eds.) *The handbook of 21st century sociology*, pp. 208–217 (New York: Sage Publications).

Smith, C. (2022). *Homelessness and housing advocacy: The role of red-tape warriors* (London: Routledge).

Stambe, R., Kuskoff, E., Parsell, C., Plage, S., Ablaza, C. & Perales, F. (2024). Seeing, sharing and supporting: Assertive outreach as a partial solution to rough sleeping, *The British Journal of Social Work*, 54(2), pp. 723–740.

US Department of Health and Human Services (2022) Summary of the HIPAA Security Rule. Available at https://www.hhs.gov/hipaa/for-professionals/security/laws-regulations/index.html (accessed 24 July 2024).

US Department of Housing and Urban Development (2017). *Coordinated entry core elements* (Washington, DC: U.S. Department of Housing and Urban Development).

US Department of Housing and Urban Development (2020) Homelessness and Health Data Sharing Toolkit. Available at https://www.hudexchange.info/resource/6145/homelessness-and-health-data-sharing-toolkit/ (accessed 24 July 2024).

US Department of Housing and Urban Development (2023) Continuum of Care (CoC) Program eligibility requirements. Available at https://www.hudexchange.info/programs/coc/coc-program-eligibility-requirements/ (accessed 5 November 2023).

van Dijck, J. (2014). Datafication, dataism and dataveillance: Big data between scientific paradigm and ideology, *Surveillance & Society*, 12(2), pp. 197–208.

Willse, C. (2015). *The value of homelessness: Managing surplus life in the United States* (Minneapolis: University of Minnesota Press).