

Describing Trajectories of Homeless Service Use in Hawai'i Using Latent Class Growth Analysis

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Highlights

- Administrative data were used to explore diverse service patterns among those new to a homeless system.
- The findings indicated that most individuals in the sample (85%) had very low levels of service use.
- A small number of individuals (about 5%) demonstrated problematic patterns of service use.
- Several related risk factors were identified, along with suggested programmatic solutions.
- The importance of considering the sociocultural context of the homeless system was also highlighted.

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Abstract The State of Hawai'i, like many other areas across the United States, has large numbers of individuals and families experiencing homelessness, many of whom seek support through statewide shelters and services. This study explored the diversity of ways in which individuals and families moved through Hawai'i's homeless service system. Using administrative data, a cohort of new service users was tracked across time to trace the developmental trajectories of their homeless service use. The sample consisted of adults who had entered the service system for the first time in the fiscal year (FY) of 2010 ($N = 4655$). These individuals were then tracked through the end of FY 2014, as they used emergency shelter, transitional shelter, and outreach services. A latent class growth analysis was conducted and identified four distinct patterns of service use: low service use ($n = 3966$, 85.2%); typical transitional shelter use ($n = 452$, 9.7%); atypical transitional use ($n = 127$, 2.7%), and potential chronic service use ($n = 110$, 2.4%). Multinomial logistic regression models were then used to determine if select demographic, family, background experience (e.g., education, employment), or health variables were associated with class membership. The distinct profiles for class membership are discussed.

Keywords Homelessness · Hawai'i · Latent class growth analysis · Homeless policy

Introduction

For many developed countries, homelessness has arisen in modern times as a prominent and difficult problem to address (Quigley & Raphael, 2001). It has become a major public health and humanitarian concern and across the nation it has proven to be a fairly intractable issue, defying simple programmatic and policy solutions (Culhane, Park & Metraux, 2011). It is, therefore, important that policy decisions related to homelessness be guided by empirical data.

Systems change analysts often argue that true change requires a complex understanding of the ways different parts of a system react and interact in dynamic and often non-linear ways (Foster-Fishman, Nowell & Yang, 2007). This study represents one attempt at exploring a systemic understanding of homeless services by better characterizing the diverse ways in which individuals move through the homeless service system over time. It also situates this systemic exploration within the very particular sociocultural context of Hawai'i, thus emphasizing the importance of understanding both the systemic and sociocultural context of homelessness.

The Heterogeneity in Homelessness

With a growing number of differing types of homeless services available, one approach to more effectively

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tailoring and targeting programs to specific needs is to better understand the complexity and diversity of characteristics and needs among those experiencing homelessness. Studies exploring this kind of heterogeneity are important as implementing a one-size-fits-all approach to homelessness is unlikely to be effective (Lennon, McAllister, Kuang & Herman, 2005; Yuan, Vo & Gleason, 2014). Luke (2005), in his oft cited methodological critique, argued that community psychologists often rely too heavily on individual-level analytical approaches. His main goal in leveling this critique was to advocate for the broader use of statistical methods that are able to highlight the salient contextual features that impact the social issues we seek to understand. One group of techniques that can be used to explore these kinds of contextualized understandings and that “emphasize diversity rather than central tendency” (Rapkin & Luke, 1993, p. 247) is cluster analysis and related techniques, such as latent class and latent class growth analysis (LCGA). These methods sort individuals into subtypes based on certain shared characteristics, resulting in a more nuanced understanding of the group of interest.

Over the years a number of different studies have used cluster analysis, latent class analysis, or related clustering techniques to describe different categories or subtypes of homeless populations. Several studies have attempted to group homeless individuals according to their background experiences (Muñoz, Panadero, Santos & Quiroga, 2005), mental health symptoms (Bonin, Fournier & Blais, 2009; Mowbray, Bybee & Cohen, 1993), complicating problems (such as criminal history, transiency, etc.; e.g., Solarz & Bogat, 1990), and other individual characteristics or features (e.g., Aubry, Klodawsky & Coulombe, 2012; Tsai, Kasproff & Rosenheck, 2013). Altogether this line of research has been useful in demonstrating: (1) a high amount of heterogeneity in the homeless population; (2) that a better understanding of this heterogeneity can expose policy and programmatic issues that can be productively explored to better target services and prevention strategies; and (3) that contrary to many stereotypes, large portions of homeless individuals tend to present with few complicating problems beyond economic hardship.

Heterogeneous Service Patterns

A similar line of research has attempted to classify homeless individuals according to their patterns of service usage rather than according to individual-level characteristics. This set of studies has used longitudinal data to classify homeless service users according to how they use services over time. This approach can be helpful in understanding how to better target services so as to both prevent homelessness and move individuals quickly

and effectively out of homelessness. The most well-known of these studies was conducted by Kuhn and Culhane (1998), who derived a three-category typology and validated it using administrative shelter data from the New York City and Philadelphia shelter systems. They used cluster analysis to group individuals in emergency shelter services according to their aggregate number of days spent in the shelter (duration) and aggregate number of shelter stays (frequency) over a 2- to 3- year period.

The largest of Kuhn and Culhane’s (1998) sub-types, the transitional group, made up approximately 80% of those using shelter services, tended to stay for a short time, and had few episodes of shelter entry (1 or 2). This group tended to be younger, was less likely to have complicating problems (such as substance abuse, health, mental health issues, etc.), and had higher proportions of Caucasian/White service users. The second sub-type, the episodic group, made up approximately 10% of shelter users in both locations. This group was characterized by a large number of shelter stays of varying durations; it was on average younger and had high rates of complicating issues such as mental health and substance abuse problems. Finally, the chronic use group comprised approximately 10% of the shelter users who used the highest number of available shelter days. This group had a small to moderate number of homeless shelter stays of extended duration and tended to be older, with higher proportions of minority clients and those with substance abuse and mental health issues.

Later, Culhane, Metraux, Park, Schretzman and Valente (2007) expanded research related to this three-class typology with administrative shelter data from four localities (New York City, Philadelphia, Columbus, OH, and the State of Massachusetts) to determine if they could distinguish a similar typology of service usage among families. They did indeed again find three clusters of shelter usage patterns across all four of their sample locations: transitional (72–80%, depending on sample site), episodic (2.1–8%), and chronic (17.9–21.5%). However, unlike the previous findings, homeless families that fell into the “chronic” usage class seemed to have the fewest complications (such as disability, unemployment, etc.) and lowest social service usage rates. Among families, it was the episodically homeless group that had the highest rates of social service usage, foster care involvement, and disability, followed by the transitional group. Culhane et al. (2007) proposed that the relatively few complicating problems experienced by the longer staying family group was due at least in part to the high rates of transitional shelter use among this group. Transitional shelters often allow longer stays than the typical emergency shelter, tend to serve more families than individuals (e.g., see Yuan et al., 2014), and typically follow a longer program model. Thus, the families who were enrolled in and “stuck with”

transitional shelter programs tended to have long shelter stays, but were not necessarily expected to have higher rates of barriers or “problems.”

Kuhn and Culhane’s (1998) original typology of homelessness has been widely cited and used in the past decade and a half. Their terminology of “chronic homelessness” is currently used in federal housing policy to distinguish a group of persistently homeless individuals with health, substance abuse, or mental health problems. It is worth noting, however, that the current federal definition of “chronic homelessness” collapses Kuhn and Culhane’s (1998) episodic and chronic groups into one category of persistent homelessness (Kertesz et al., 2005). While McAllister, Kuang and Lennon (2010) have acknowledged the influence that the Kuhn and Culhane (1998) classification system has had on national homeless research and policy, they have also leveled some notable critiques of the study and have stressed that current research should seek to refine and improve upon this initial classification. First, these authors critiqued the lack of homogeneity in the episodic category of service use. As the goal of clustering and latent class approaches is to group individuals into separate, but homogeneous, categories, it is problematic to have a high degree of heterogeneity in one of the classes. Their own exploration of the original Kuhn and Culhane (1998) data did indeed call into question the episodic category, replacing it with two new, more homogeneous categories (McAllister et al., 2010).

Perhaps their most important criticism was that the Kuhn and Culhane’s (1998) typology grouped individuals based on their frequency and duration of shelter use as aggregated over time. McAllister et al. (2010) have argued that this approach loses valuable information about the patterning of shelter stays. For example, one individual may have had intermittent stays in a shelter that tended to increase over time, perhaps indicating that he was sinking deeper into homelessness, while a different individual could have had a longer initial stay with shorter “relapses” as she eventually established more stable housing. These two profiles could conceivably produce the same aggregated frequency and duration of shelter stays, but arguably represent two very different experiences of homelessness. Therefore, McAllister et al. (2010) proposed that if service usage data are to be used to explore homeless subtypes, it would be more informative to use a time-patterned rather than a time-aggregated approach. LCGA represents one promising method for exploring a time-patterned understanding of movement through homeless services (Jung & Wickrama, 2008).

Contextualizing Homelessness: Homelessness in Hawai‘i

In addition to being an issue of national concern, homelessness has also been a notable problem in the State of

Hawai‘i. Hawai‘i consists of a collection of neighboring islands. In 2015, it had an estimated 1,431,603 total residents living in 532,455 housing units, spread across seven populated islands (U.S. Census Bureau, 2015). These islands are divided into four major counties: The City and County of Honolulu (O‘ahu Island; population 998,714), Hawai‘i County (Hawai‘i Island; population 196,428), Maui County (Maui, Moloka‘i, and Lanai Islands; population 164,726), and Kaua‘i County (Kaua‘i and Ni‘ihau Islands; population 71,735; U.S. Census Bureau, 2015). The majority of individuals (about 70%) live in the City and County of Honolulu, which represents the largest metropolitan area. The remaining three counties have large swaths of rural areas, interspersed with small towns and cities.

In the fiscal year (FY) of 2015, the homeless services system in the state served 10,014 households, consisting of 14,954 individuals (Yuan, Vo, Gleason & Azuma, 2016), spread across all four counties (City and County of Honolulu = 10,257; Maui County = 2206; Hawai‘i County = 1829; and Kaua‘i County = 662). There are four major types of homeless programs in the state: rapid rehousing programs, permanent supportive housing programs, shelter programs, and outreach programs (Yuan et al., 2016). The rapid rehousing programs, which began to be implemented in FY 2012, are intended to provide short-term cash assistance and services to quickly rehouse individuals and families who have lost their housing. The goal of the rapid rehousing strategy is to circumvent prolonged homeless stays by getting individuals and families quickly back into housing. Permanent supportive housing programs are more intensive programs that provide ongoing service and financial support to help house and keep housed those who are unlikely to be able to maintain housing on their own. Often these programs target those with disabilities, mental health, or substance abuse issues. Two different Housing First programs are among the newer permanent supportive housing programs in the state (Yuan et al., 2016). Both the rapid rehousing and permanent supportive housing programs tended to be newer to the state and serve fewer clients (e.g., rapid rehousing programs served 6.6% of service users in FY 2015) than the shelter and outreach programs.

Shelter programs were accessed by 59.1% of all service users in FY 2015 and generally fall into two categories: emergency and transitional. Both shelter types provide a safe place to sleep at night, often accompanied by a range of other services. The target population, eligibility requirements, and service participation expectations for shelter-type programs can range widely between service organizations. Generally, emergency shelters, which provided services for 56.0% of all shelter users in FY 2015, allow for shorter stays than transitional shelter services and have

fewer requirements. Transitional shelters, also known as transitional housing, are designed to provide more intensive support for individuals and families, with service stays lasting up to 2 years. These programs, which served 56.9% of all shelter users in FY 2015, often require participation in more intensive services than do emergency shelter programs. Finally, outreach services target unsheltered individuals to offer service referrals and other support, providing services to 53.7% of homeless service users in FY 2015. Many service users (19.4% in the FY 2015) have participated in more than one of these service types (Yuan et al., 2016).

In examining the overall movement of individuals into and out of the service system, it seems clear that despite the fact that many do exit the system in any given year (8407 or 58.9% in the FY 2014), the cycle of high levels of service use continues due to the large numbers of both new individuals (5717 in FY 2015) entering and past users (3362 in FY 2015) re-entering the system over the course of the year (Yuan et al., 2016). This makes it difficult to argue that current policies and practices are reducing homelessness in the state.

At the national level, much of the relevant research currently available has been aimed at generalizing the mechanisms of homelessness. While this approach has produced some useful insights into the problem, there is also much to be gained from contextualized research that generates knowledge about how homelessness differs across locations. There are a number of historical, systemic, political, and cultural differences in Hawai'i that likely shape different patterns of homelessness than what is generally seen in other U.S. areas. For instance, in much of the mainland U.S. literature on homelessness, the social category of race is salient in that often African Americans have been shown to be disproportionately vulnerable to becoming homeless (Shelton, Mackie, van den Bree, Taylor & Evans, 2012; Shinn et al., 1998) and to experiencing more severe or entrenched homelessness (Kuhn & Culhane, 1998). This trend is markedly different in Hawai'i, where only 5.1% of FY 2014 homeless shelter users were African American (Yuan & Vo, 2015). In fact, Okamura (2008) maintains that race is not the most salient social category in Hawai'i. Instead, he points to culture and ethnicity as important socially distinguishing features, where privileged groups include those of Caucasian, Japanese American, and Chinese American descent; groups that experience disproportionate disadvantage include those of Native Hawaiian, Filipino, and Samoan descent, among others (Okamura, 2008).

For example, there is some evidence that members from Compact of Free Association (COFA) states also experience elevated levels of discrimination in the local context of Hawai'i. Talmy (2010), recently documented

overt (from students) and subtle (from adults) acts of racism directed at COFA National students in a Hawai'i public school ESL classroom. The COFA is an agreement the U.S. government has with certain nations in the Pacific region of Micronesia including The Federated States of Micronesia, the Marshall Islands, and Palau. This agreement allows the U.S. military to maintain a presence in the area in exchange for the ability of residents of these nations to travel to and work in the U.S. freely and without a visa (Talmy, 2010). Because of a history of U.S. dominance in these islands and the resulting "economic and political dependency," many COFA Nationals now come to Hawai'i seeking economic opportunity not currently available to them at home (Talmy, 2010). However, the high cost of living in the islands often presents unexpected challenges to newcomers. While individuals with a COFA National citizen status do qualify for some types of government assistance, most do not qualify for many parts of the social safety net available to U.S. Citizens, which can result in elevated vulnerability for members of this group.

Exploring how homelessness differs in this unique sociocultural context can add to our understanding of how privilege and disadvantage may operate across groups and contexts. A better understanding of service usage patterns in the Hawai'i service system, which is comprised of services based largely on national policy and research findings, is a first step in exploring how effective this range of policies and services are at addressing the issue in the unique sociocultural environment of Hawai'i. Therefore, this study sought to determine if individuals experiencing homelessness in Hawai'i can be classified into distinct subgroups based on their service use histories over a 3-year period. Various demographic, family, background, and health status factors were also explored in association with group membership in order to understand context-specific factors that may impact homeless service use trajectories.

Methods

The present study is situated as part of a larger mixed methods project aimed at exploring the diversity of homeless experiences in Hawai'i (for full discussion see 1st Gleason, 2016). The quantitative portion of that study presented here consisted of using an LCGA of statewide administrative homeless service usage data to explore heterogeneous patterns of service usage among a sample of individuals entering the homeless service system for the first time in the FY 2010. The analysis grouped these individuals according to how they used three different types of services across a 3-year time span (entry to

month 36): emergency shelter, transitional shelter, and outreach services. Emergency shelter services are designed to provide short-term (usually <1 year) shelter and vary in the level of programmatic requirements (classes, fees, sobriety, etc.) they expect from clients. Transitional shelters often tend to have longer service models (up to 2 years), higher levels of programmatic requirements, and more private living options. Outreach services are designed to reach those living in unsheltered spaces in order to provide service referrals and material aid (e.g., food, hygiene supplies). The option of including rapid rehousing services and permanent supportive housing services in the analyses was explored as well, but because these are newer and smaller programs, few individuals in the sample had used these service types.

Data Source

The administrative data used in this study were obtained from the Hawai'i State Homeless Management Information System (HMIS). This is a large database that includes intake, encounter, and exit records for the large majority of homeless service programs in the state. Information for all individuals enrolled in emergency shelter and/or outreach services (both gateway services) in the FY 2010 (July 1, 2009–June 30, 2010) was provided for this study in a de-identified form. All data were collected in accordance with APA ethical guidelines and under the approval the University of Hawai'i at Mānoa Internal Review Board. Service use data were available from FY 2010 to FY 2014, resulting in 4–5 years of service usage data for each individual. Because many of service users had little to no service use in years 4 and 5, only the first 3 years of service data were included in the LCGA.

Sample

The Hawai'i HMIS database included service records dating as far back as June 30, 2004, with the most reliable recordkeeping process beginning in the FY 2007. The sample for the present study consisted of all those over the age of 18 who had no HMIS service entry record prior to FY 2010 (i.e., new service users; $N = 4655$). The demographic characteristics of the sample are shown on the far right of Table 1. The average age of the sample was 38.40 years old ($SD = 13.05$). There were more males ($n = 2792$; 60%) than females ($n = 1862$; 40.0%). The largest ethnic group in the sample ($n = 1689$; 36.3%) was Caucasian/White. Those who identified as Native Hawaiian represented the second largest ethnic group ($n = 1160$; 24.9%), followed by Micronesians ($n = 422$; 9.1%). Most of the individuals in the sample ($n = 3782$; 81.2%) were U.S. Citizens. There was also a large

proportion of individuals with a citizen status of COFA National ($n = 583$; 12.5%). Because the overall goal of the analyses was to explore system-wide movement of individuals into, out of, and between homeless services, the sample included adults from both single person and family households, with an average group size of 1.77 ($SD = 1.42$). The decision to include individuals from both household types in the same sample was made because there appeared to be some fluidity in family status, thus, creating ambiguity between these groups. Additionally, in many (though certainly not all) of the organizations implementing these programs, families and individuals are served side-by-side.

Variables

Using a sample of individuals who had entered the HMIS system for the first time in the FY 2010, allowed them to be tracked beginning from their date of first entry into services. That entry date served as time point 1, and for every 60-day time period thereafter the number of days spent in emergency and/or transitional shelter was tabulated, along with the number of times each individual received outreach services during that period. This tabulation process resulted in three sets of 60-day longitudinal variables for each individual, indicating the number of days spent using emergency shelter, transitional shelter, and outreach services during each interval. These three sets of longitudinal variables served as the basis for the LCGA.

Select demographic and background variables were explored in terms of their association with different service usage patterns. Demographic variables included gender, age, primary ethnicity/race, citizen status, and lifetime residence in the state. Data related to family composition included average group size and household composition (single, two-parent, etc.). Relevant personal history variables included a history of involvement with the criminal justice system, veteran and domestic violence status, and educational and employment status at entry to services. Health-related variables included history of mental health issues, substance abuse, and physical disability.

As is the case with many large administrative databases, missing and incomplete data were a concern for this dataset. To maximize the usefulness of the available information, most variables underwent additional processing before being included in the analysis. For some of the demographic variables, including gender, race, and citizenship status, low frequency categories (e.g., transgender female to male) were combined with similar categories (e.g., male) to create groups large enough for meaningful analysis. Additionally, where the same variable was collected across multiple intake time points but was not

Table 1 Distribution of demographic, family composition, background, and health variables

	Class 1 (low use) <i>n</i> = 3966 (85.2%)	Class 2 (typical transitional) <i>n</i> = 452 (9.7%)	Class 3 (atypical transitional) <i>n</i> = 127 (2.7%)	Class 4 (potential chronic) <i>n</i> = 110 (2.4%)	Total sample <i>N</i> = 4655
Demographic characteristics					
Female (%)	1538 (38.8)	231 (51.1)	64 (50.4)	29 (26.4)	1862 (40.0)
Mean age	38.44 (13.04)	36.71 (12.89)	37.61 (12.45)	44.60 (11.74)	38.40 (13.05)
Identifies as Hispanic (%)	451 (11.4)	59 (13.1)	10 (7.9)	10 (9.1)	530 (11.4)
Primary ethnicity (%)					
Caucasian/White	1559 (39.3)	67 (14.8)	16 (12.6)	47 (42.7)	1689 (36.3)
Native Hawaiian	977 (24.6)	134 (29.6)	28 (22.0)	21 (19.1)	1160 (24.9)
Micronesian	291 (7.3)	88 (19.5)	28 (22.0)	15 (13.6)	422 (9.1)
Filipino	246 (6.2)	33 (7.3)	5 (3.9)	7 (6.4)	291 (6.3)
African American/Black	222 (5.6)	17 (3.8)	6 (4.7)	5 (4.5)	250 (5.4)
Other Pacific Islander	186 (4.7)	26 (5.8)	5 (3.9)	2 (1.8)	219 (4.7)
Asian	169 (4.3)	21 (4.6)	3 (2.4)	4 (3.6)	197 (4.2)
Marshallese	104 (2.6)	57 (12.6)	30 (23.6)	1 (0.1)	192 (4.1)
Portuguese	91 (2.3)	8 (1.8)	4 (3.1)	4 (3.6)	107 (2.3)
Native American	98 (2.5)	1 (0.2)	2 (1.6)	3 (2.7)	104 (2.2)
COFA status	368 (9.3)	142 (31.4)	57 (44.9)	16 (14.5)	583 (12.5)
Lifetime resident of HI	1424 (35.9)	221 (48.9)	48 (37.8)	40 (36.4)	1733 (37.2)
Household composition					
Mean average group size	1.60 (1.26)	3.07 (1.94)	2.71 (1.61)	1.45 (1.11)	1.77 (1.42)
Household composition (%)					
Ever entered as single person	2239 (56.5)	131 (29.0)	43 (33.9)	91 (82.7)	2504 (81.5)
Ever entered as couple	219 (5.5)	19 (4.2)	6 (4.7)	10 (9.1)	254 (5.5)
Ever entered as single parent household	680 (17.1)	107 (23.7)	34 (26.8)	23 (20.9)	844 (18.1)
Ever entered as two parent household	403 (10.2)	147 (32.5)	59 (46.5)	13 (11.8)	622 (13.4)
Ever entered as intergenerational family	11 (0.3)	8 (1.8)	8 (6.3)	1 (0.9)	28 (0.6)
Background experiences (%)					
History of veteran status	419 (10.6)	44 (9.7)	13 (10.2)	15 (13.6)	491 (11)
Any criminal justice history	749 (18.9)	82 (18.1)	20 (15.7)	28 (25.5)	879 (19)
History of domestic violence	624 (15.7)	73 (16.2)	28 (22.0)	18 (16.4)	743 (16.0)
No than high school diploma or GED	827 (20.9)	113 (25.0)	49 (38.6)	26 (23.6)	1015 (21.8)
Employed at entry	556 (14.0)	166 (36.7)	31 (24.4)	13 (11.8)	766 (16.5)
Health related variables (%)					
Physical disability	718 (18.1)	86 (19.0)	36 (28.3)	40 (36.4)	880 (18.9)
Mental illness	1090 (27.5)	92 (20.4)	33 (26.0)	42 (38.2)	1257 (27.0)
Substance abuse issues	875 (22.1)	109 (24.1)	31 (24.4)	36 (32.7)	1051 (22.6)

COFA, Compact of Free Association.

expected to vary much across time (e.g., veteran status), all available information was pooled across multiple intakes to create a composite variable. For example, if an individual ever endorsed having a veteran status at any intake, then they were considered a veteran for the purposes of this study. The lifetime resident of the state, household composition, criminal justice background, veteran status, history of domestic violence, and physical disability, mental health, and substance abuse status variables used in this study represent information pooled across all 4–5 years of available data. Following the recommendations of Schafer and Graham (2002), the full-information maximum likelihood approach was used to address the remaining issues related to missing data.

Data Analysis

All analyses used Mplus (Version 7) software, (Muthén & Muthén, Los Angeles, CA, USA). Three sets of eighteen 60-day time points were used to fit a model that included three growth curves (for emergency shelter, transitional shelter, and outreach service use), tracking service users from entry through month 36. A series of latent class growth models were fit, starting with the assessment of a single class model and working successively up to a six class model. Geiser (2012) described several factors that should be considered in choosing the optimum number of classes for an LCGA model, including the Bayesian Information Criterion (BIC), mean class assignment

probabilities, entropy, and the size of the classes, each of which was considered in the present study. After deciding on the number of classes for the LCGA model, individuals were assigned to their most likely class, class proportions were determined, and a series of four multinomial logistic regressions were run to explore whether select demographic, family composition, background experience, or health related variables were associated with class membership.

Results

The majority of individuals in the sample ($n = 3397$; 73.0%) had used outreach services at least once. Over a third of the sample ($n = 1821$; 39.1%) had used at least 1 day of emergency shelter services; and a smaller number ($n = 1821$; 27.1%) had used at least 1 day of transitional shelter services. Most of the outreach ($n = 2370$; 68.8%) and emergency shelter ($n = 1095$; 60.1%) service users belonged to single person households (those with an average group size of 1.0). By contrast, only 27.8% of transitional shelter users in the sample had an average group size of 1.0. Transitional shelters tend to target families, with many transitional shelter programs in the state exclusively serving families with children. However, as these numbers indicate, some transitional shelter services do enroll single persons as well. Given that single-person and family populations were both represented in all three service types, they were analyzed as a single sample for the LCGA model. In this way, the present study has explored the movement of all service users throughout the service system.

The optimal number of classes for the LCGA model was determined by examining resulting fit statistics and entropy levels for growth curves with one to six classes. Based on these results, the four-class model was selected. This model had a lower BIC value (BIC = 1559935.296) than the one class (BIC = 1682921.788), two class (BIC = 1616333.646) and three class (BIC = 1584988.846) solutions, and had a strong entropy value (0.996) as well as class assignment probabilities (.977–.999). The five and six class models were not selected due to potential convergence issues and the fact that they added classes that were very small (1–3%) portions of the sample. The four-class solution resulted in two classes that were characterized by typical or non-problematic service usage (Classes 1 and 2) and two classes that displayed higher, more problematic levels of service use (Classes 3 and 4). The emergency shelter, transitional shelter, and outreach service use growth curves for each class are shown in Fig. 1.

Class 1 (*Low Service Use*) was the largest subgroup identified by the model ($n = 3966$; 85.2%). The service

trajectory of this group consisted of patterns of low level use across all three service types (Fig. 1a–c). Table 1 shows the distribution of demographic characteristics and background variables among all four classes and the sample as whole. Compared to the other groups, the Low Service Use class most closely resembled characteristics of the overall sample. Therefore, this class was used as the reference group for the multinomial logistic regression models. The results of these four regression models are shown in Table 2, which lists the odds ratios for each covariate, indicating the odds of following the class 2–4 trajectories versus the low service use (Class 1) trajectory after controlling for the other variables in the model.

The second largest group ($n = 452$; 9.7%), Class 2 followed a service pattern typical of most transitional shelter users, with initially high levels of transitional shelter use that drop-off steadily to near zero by the end of the 36-month period (Fig. 1d–f). As transitional shelters tend to follow a longer service model than emergency shelters, high levels of use in the first 1–2 years of the homeless trajectory is to be expected for those enrolled in this service type. Therefore, the service trajectory seen in Class 2 was labeled “Typical Transitional Shelter Use” and was determined to be an unproblematic pattern of service use.

Like the Typical Transitional Shelter Use class, Class 3 ($n = 127$; 2.7%) had notably high levels of transitional shelter use (Fig. 1h). This group differed in that it started out with lower levels of transitional use that increased towards the end of the study period. In fact, Class 3 was the only group that had a growth curve with a positive slope, indicating that its members were increasingly likely to use transitional services over time. Additionally, compared to the Typical Transitional Shelter Use class, this group also had higher levels of emergency shelter (Fig. 1g) and outreach service use (Fig. 1i). Because Class 3 was distinguished primarily by high transitional shelter use, but showed patterns of service use outside what is expected for the typical transitional shelter user, this group was labeled “Atypical Transitional Shelter Use.”

Class 4 ($n = 110$; or 2.4%) was distinguishable by its high levels of both emergency shelter (Fig. 1j) and outreach service (Fig. 1l) use. Along with the Atypical Transitional Service Use group, Class 4 represented a problematic and prolonged service use trajectory. The pattern of high and fluctuating emergency shelter and outreach service use seen in Class 4 is similar to what one might expect from stereotypical “chronic” homelessness. However, since the sample used in this study represented newcomers to the HMIS database, this class likely represents those who are vulnerable to becoming chronically homeless during their stay in the system. Thus, Class 4 was labeled “Potential Chronic Service Use.”

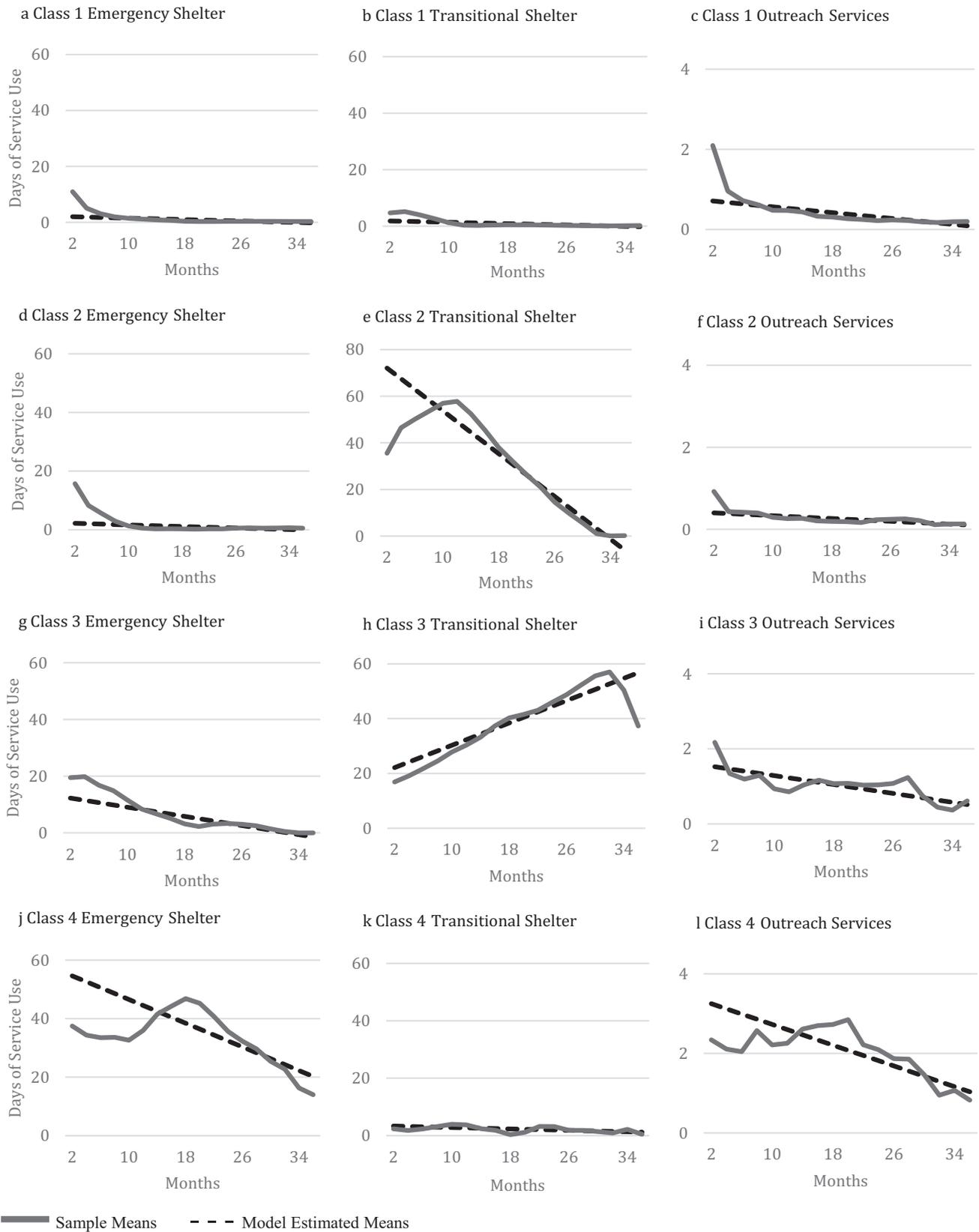


Fig. 1 Emergency shelter, transitional shelter, and outreach service growth curves for classes 1–4. Class 1 = low service use (85.2%); Class 2 = typical transitional shelter use (9.7%); Class 3 = atypical transitional shelter use (2.7%); Class 4 = potential chronic service use (2.4%)

Table 2 Odds ratios and associated 95% confidence intervals from the four multinomial logistic regression models^a

	Class 2 (typical transitional)	Class 3 (atypical transitional)	Class 4 (potential chronic)
Model 1: Demographic characteristics^b			
Female	1.256 (1.025–1.541)	1.213 (0.842–1.747)	0.606 (0.397–0.924)
Higher age	1.042 (0.962–1.129)	1.130 (0.982–1.301)	1.430 (1.264–1.619)
Identifies as Hispanic	1.522 (1.112–2.084)	1.070 (0.551–2.078)	0.944 (0.479–1.861)
Primary ethnicity			
Caucasian/White	Reference	Reference	Reference
Native Hawaiian	1.819 (1.288–2.571)	1.704 (0.925–3.140)	0.755 (0.422–1.351)
Micronesian	3.644 (1.770–7.501)	4.137 (1.423–12.030)	0.658 (0.199–2.176)
Filipino	1.905 (1.200–3.024)	1.298 (0.488–3.453)	0.890 (0.383–2.070)
African American/Black	1.994 (1.142–3.483)	2.903 (1.106–7.616)	0.781 (0.307–1.987)
Other Pacific Islander	2.601 (1.575–4.296)	2.181 (0.795–5.982)	0.426 (0.102–1.782)
Asian	2.149 (1.260–3.660)	1.213 (0.341–4.320)	0.620 (0.219–1.754)
Marshallese	6.788 (3.301–13.958)	12.880 (4.211–39.399)	0.129 (0.014–1.222)
Portuguese	1.131 (0.520–2.455)	2.576 (0.853–7.778)	1.283 (0.415–3.970)
Native American	0.239 (0.034–1.702)	2.071 (0.472–9.095)	1.040 (0.310–3.485)
COFA status	2.590 (1.328–5.048)	3.007 (1.152–7.852)	4.111 (1.283–13.167)
Lifetime resident of HI	2.397 (1.771–3.245)	2.287 (1.416–3.692)	1.342 (0.819–2.197)
Model 2: Household composition			
Larger average group size	1.498 (1.412–1.589)	1.278 (1.154–1.416)	0.848 (0.670–1.073)
Household composition			
Ever entered as couple	1.014 (0.620–1.660)	0.998 (0.415–2.399)	1.522 (0.748–3.098)
Ever entered as single parent household	1.791 (1.370–2.342)	2.088 (1.347–3.238)	1.120 (0.682–1.840)
Ever entered as two parent household	2.804 (2.146–3.664)	6.054 (3.886–9.433)	1.157 (0.621–2.156)
Ever entered as intergenerational family	3.238 (1.304–8.044)	12.949 (4.823–34.746)	3.159 (0.334–29.924)
Model 3: Background experiences			
History of veteran status	0.941 (0.676–1.309)	1.080 (0.602–1.937)	1.191 (0.675–2.099)
Any criminal justice history	0.927 (0.718–1.197)	0.672 (0.418–1.081)	1.279 (0.821–1.993)
History of domestic violence	1.055 (0.804–1.384)	1.531 (0.985–2.380)	0.891 (0.533–1.491)
Less than high school diploma or GED	1.216 (0.963–1.536)	2.506 (1.717–3.658)	1.060 (0.671–1.673)
Employed at entry	3.259 (2.624–4.047)	2.009 (1.311–3.079)	0.739 (0.420–1.301)
Model 4: Health related variables			
Physical disability	1.160 (0.892–1.508)	1.869 (1.199–2.913)	2.229 (1.424–3.491)
Mental illness	0.557 (0.443–0.717)	0.669 (0.429–1.044)	1.024 (0.657–1.595)
Substance abuse issues	1.212 (0.959–1.533)	1.076 (0.709–1.633)	1.358 (0.882–2.090)

COFA, Compact of Free Association.

Bold if significant at .05 level.

^aThe low service use trajectory (class 1) was used as the reference group.^bThe sample size for this model was slightly smaller than for the other models ($N = 4630$ vs. 4655). Because the race variables had a small amount of missing data, in order to reduce the complexity of the model, some ($n = 25$) individuals were excluded from the analysis for this model so as to simplify the missing data estimation.

Model 1: Demographic Characteristics

Table 2 presents the results of the four multinomial logistic regression models used to explore factors related to group membership. Model 1 included gender, age, ethnicity, citizen status, and lifetime residence in Hawai'i as predictors of class membership. Gender was significantly associated with membership in the Typical Transitional (greater odds for females) and Potential Chronic (greater odds for males) service use groups. Age was only significantly associated with membership in the Potential Chronic group, with higher age predicting increased risk for membership in this class versus the Low Service Use class. Compared to Caucasian/White service users, those identifying as Hispanic, Native Hawaiian, Micronesian, Filipino, African American/Black, Other Pacific Islander, Asian, and Marshallese were at significantly increased risk of

following the Typical Transitional trajectory versus the Low Service Use trajectory; Micronesian, African American/Black, and Marshallese service users were at increased risk of following the Atypical Transitional Trajectory. Ethnicity did not significantly predict Potential Chronic Use group membership. After controlling for ethnicity, having a COFA National status predicted significantly increased odds of membership in all three other classes versus the Low Service Use class. Finally, being a lifetime resident of the state significantly predicted membership in both transitional shelter groups (Typical and Atypical) compared to the Low Service Use group.

Model 2: Household Composition

Average group size and household composition were also examined in relation to group membership. Because

family size can change across time as individuals combine, separate, and have children, the size of the group entering services with each individual was calculated for every service entry record and then averaged across all entries. The majority of the sample ($n = 3053$; 66%) had an average group size of exactly 1.0, indicating a single person household. Another 13% ($n = 606$) had an average group size of between 1.1 and 2.0, indicating some variability in having entered services alone or with a second individual. The remaining service users ($n = 996$; 21.4%) had an average group size of between 2.0 and 10.0. A larger average group size was significantly associated with membership in both the Typical and Atypical Transitional Shelter Use groups versus the Low Service Use group.

Because of a high degree of missing data for the available household composition variable, a new set of variables was calculated to determine if each individual had ever entered as a single person (81.5%), couple (5.5%), single parent (18.1%), two parent (13.4%), or intergenerational (0.6%) household at any point in the study time period. Having ever entered services as a single parent, two parent, or intergenerational household significantly predicted membership in both transitional shelter use classes (Typical and Atypical) versus the Low Use class. However, the magnitude of the odds associated with ever entering as a two parent or intergenerational household indicated a particularly high risk of following the more problematic Atypical Shelter Use trajectory for these families.

Model 3: Background Experiences

Model 3 examined whether the background experiences of veteran status, criminal justice involvement, domestic violence victimization, having less than a high school education at entry, or being employed at entry were predictive of group membership. Having employment at entry to services significantly predicted membership in both transitional shelter use groups. Having less than a high school education was significantly associated with membership in the Atypical Transitional Shelter Use group. No significant associations were found between veteran status, criminal justice history, or domestic violence history and group membership.

Model 4: Health Related Variables

Model 4 examined whether having a physical disability, mental illness, or substance abuse issue was associated with group membership. Having a physical disability was significantly associated with membership in the two problematic and prolonged service use groups: the Atypical

Transitional and the Potential Chronic Use groups. Having a mental illness was associated with lower odds of being in the Typical Transitional Shelter Use group compared to the Low Service Use group, but was not significantly associated with either of the problematic use groups. Similarly, having substance abuse issues was not significantly associated with following either problematic service use trajectory versus the Low Service Use trajectory.

Discussion

We used LCGA and a series of multinomial logistic regressions to better understand the factors associated with differing trajectories of homeless service usage in the unique context of Hawai'i. Overall these results indicated that individuals from a wide variety of backgrounds enter the service system, use low levels of services, and exit fairly quickly. Because the Low Service Use group represented such a large majority of the sample, it is fair to say that most families (e.g., 80.6% of those ever entering in single parent households; 65.0% for two-parent households) and single persons (e.g., 89.4% of those ever entering as single person households) use homeless services only briefly.

However, there were also a number of individuals and families who spent longer periods of time in services (Classes 2–4). Two of these groups, the Typical and Atypical Transitional Shelter users, tended to consist mainly of families, predominantly of Local or Pacific Islander origin. The designation of “Local” is used by many in the islands to represent those who are not indigenous to Hawai'i (i.e., not Native Hawaiian) but who see themselves as being from Hawai'i. For example, many former plantation workers from Japan, China, the Philippines, South Korea, and other countries settled in the islands several generations ago and their descendants consider themselves “Local.” In the complicated multicultural setting of Hawai'i, this term is nuanced and not necessarily used in the same way by all groups. However, the designation of “Local” usually does not include Caucasian/White individuals (see Okamura, 2008 or Talmy, 2010, for a more detailed discussion of “Local”). Two-parent and intergenerational households, COFA Nationals, those with physical disabilities, and those without a high school diploma were over-represented in the more complicated and prolonged of the two transitional shelter groups: the Atypical Transitional Shelter Use class. The third prolonged service use trajectory, Potential Chronic Use, tended to have higher proportions of older men and single person households, as well as those with physical disabilities and White/Caucasian service users than the two transitional use classes.

These results suggest that in the unique sociocultural context of Hawai'i, COFA Nationals, those with physical disabilities, larger families, and those with less than a high school education may be at increased risk for more prolonged or repeated episodes of homelessness. We propose that several of these risk factors, but particularly COFA National status, point to structural inequality in the housing and employment markets in Hawai'i. In studies involving mainland homeless populations, Shinn et al. (1998) and Shelton et al. (2012) raised similar concerns regarding structural racism towards African Americans. Indeed, Talmy (2010) has described racist and marginalizing acts towards COFA Nationals in a Hawai'i public school, and several participants from the qualitative portion of the present study discussed suspicions that landlords in Hawai'i may discriminate against COFA groups (Gleason, 2016). Thus, while the mechanisms of disadvantage may be similar across locations, it is important to consider the nuanced impacts of vulnerability, power, and inequality across settings.

The patterns of service use described in the present study expand upon, but are roughly compatible with previous attempts to classify homeless service use. For example, the Low Service Use trajectory defined in the present study aligns with the classic Kuhn and Culhane (1998) "transitional" service use category, which composed about 80% of their sample of single person households in emergency shelters and was generally a group with few complicating problems. Similarly, the Typical Transitional Shelter Use trajectory aligns with the "chronic" pattern of family service usage found in Culhane et al. (2007). Those authors noted that the 17.9–21.5% of families that exhibited a "chronic" pattern of service use in their sample did not tend to have a high rate of complicating problems and interpreted the high rate of extended shelter use among these families as a product of the transitional shelter model rather than as problematic extended stays. The existence of a fairly unproblematic group consisting mainly of families with prolonged transitional shelter use holds up in the present study.

Compared to the original Kuhn and Culhane (1998) study, the present study found that proportionally fewer individuals followed the two more prolonged and problematic service use trajectories, with 2.7% of the sample in the Atypical Transitional Shelter Use class and another 2.4% of the sample in the Potential Chronic Service Use class, versus the previous chronic (10%) and episodic (10%) findings. Additionally, the present study includes no distinction between "episodic" and "chronic" service use. Given that the heterogeneity of the "episodic" category in the Kuhn and Culhane (1998) typology has been since criticized (McAllister et al., 2010) and that the label "chronic" is currently applied to both categories in federal

definitions (Kertesz et al., 2005), episodic service use was not thought to be a particularly useful categorization for the present findings. The present study, instead, found a distinction between the problematic service use that included transitional shelter stays and that which did not, thus roughly separating problematic patterns among families (Atypical Transitional Shelter Use) from those seen in single individuals (Potential Chronic Use). The smaller proportion of services users with problematic trajectories in the present study (~5% vs. ~20%) can be partially explained by the use of a cohort rather than cross-sectional sample. Kuhn and Culhane's (1998) sample consisted of all single individuals enrolled in shelter services at a given time point, regardless of their date of shelter entry. Link et al. (1994) have noted that cross-sectional samples are prone to over-representing chronic service use and under-representing those who have brief homeless stays. By contrast, the present study followed only new service users, beginning at their first entry date, thus eliminating service users with previous service records and avoiding the pitfall of over-representing those with longer stays.

While the two problematic use groups in the present study sample were fairly small, together they represent 5.3% of adults entering the HMIS system for the first time in FY 2010. It is important to note that this number does not include any children that might be following these trajectories along with their parents. The number of Atypical Transitional Shelter service users especially would likely increase if children were included. If approximately 5% of every cohort of new adult service users (and their children) go on to follow prolonged and problematic service patterns, the size of the chronic homeless population would increase steadily over time unless there was a coinciding similar rate of exit each year. Additionally, even when the number of individuals following these patterns is low, prolonged and high-use trajectories can be extremely costly for the service system, not to mention the physical and emotional toll it takes on the families and individuals involved.

Implications

The overall goal of the present study was to explore systemic patterns of service use in order to better inform program and policy decisions. The four service use trajectories and the profiles described above could be used to guide the targeting of appropriate services to the array of differing groups in the homeless service system. Because of their relatively low levels of complicating problems, the Low Service Use and Typical Transitional Shelter Use groups may be best targeted with homeless prevention and rapid rehousing strategies, which provide

short-term support to keep individuals housed or to quickly rehouse them. In describing a service strategy that attempts to intervene and prevent the negative outcomes of prolonged homelessness before they can occur, Culhane et al. (2011) recommend that homeless prevention and rapid rehousing services target those who are not likely to need extended levels of support. While the Typical Transitional Shelter Use group may on the surface seem to require higher levels of support given their prolonged transitional shelter use, Culhane et al. (2011) question this premise and suggest that longer shelter stays have not been convincingly shown to improve outcomes. Indeed, the relatively low levels of complicating issues with which this group presented in the present study suggests that they may be just as successful if they bypassed the prolonged transitional shelter stay altogether.

Conversely, because of their potential vulnerability to prolonged service use, the Atypical Transitional Shelter group may be more effectively served by admitting them into transitional shelters earlier in their service trajectories. Their current service patterns suggest that many may be using emergency shelter and/or outreach services for several months before entering transitional shelters. There are a number of possible explanations for this lag, but in their analysis of service referrals for veteran homeless individuals, Tsai et al. (2013) suggested that service providers might tend to identify higher-functioning individuals as more “ready” for services. While this observation did not pertain specifically to this population or to transitional services, it is quite possible that those with certain complicating issues (e.g., intergenerational families, COFA Nationals, those with disabilities or low levels of education) are being seen as less ready for the highly structured settings of transitional shelters. However, making these settings more accessible and appealing to these individuals and families could give them the supportive environment they need to stabilize their income and find housing. Additionally, Shinn, Samuels, Fischer, Thompkins and Fowler’s (2015) recent findings suggest another promising approach for at-risk families. These authors tested a Critical Time Intervention model, which has shown some success in homeless adults with mental illness, for use with families headed by a mother with mental health or substance abuse issues. This type of service model provides intensive case support during the transition from shelter to housing and seems likely to improve outcomes for those families who showed atypical transitional shelter use in the present study.

Finally, many research studies have explored the effectiveness of Housing First approaches for targeting chronically homeless populations (e.g., Nelson et al., 2013; Tsemberis, Gulcur & Nakae, 2004). As the effectiveness of Housing First programs has been consistently established, it is likely that the Potential Chronic Service Use

group would benefit from this approach and/or other long-term supportive housing services (Culhane et al., 2011). In fact, two such programs are currently underway in Honolulu and are targeting chronically homeless populations (Yuan et al., 2014). Future studies will no doubt show how these new approaches are impacting the service trajectories of those vulnerable to chronic homelessness.

Limitations

The present study has a number of limitations that are important to recognize. First, the data presented here are limited to those homeless individuals who have accessed at least one of the services in the State of Hawai‘i that enters its service activities into the HMIS database. As such, it does not include homeless individuals who accessed alternative types of services (e.g., less formal church-run shelters or soup kitchens, etc.) or who choose for whatever reason not to access services at all. Additionally, though the analyses were able to track HMIS service use, they were not able to track service users outside of that system. Some in the sample could have accessed services outside of the HMIS, artificially deflating their rates of service use in the present study. Not being able to track the service users outside of the HMIS system also resulted in an inability to determine the fate of those who had left the system. Therefore, “leaving” (or failing to show up in) HMIS services cannot be considered an unambiguous indication of having left homelessness. Despite this, we do believe that the approach taken here can be practical as a heuristic guide in that most of those who used high amounts of HMIS services were indeed experiencing more prolonged and complicated homeless journeys and most of those who left and did not reenter services were likely headed to more stable housing situations.

Unlike many previous approaches to understanding homeless service use, the present study included adults from both single person and family households. The intent in doing this was to map movement throughout the whole homeless service system in the State of Hawai‘i, thus creating a better understanding of patterns into, out of, and between services. However, in doing so, important nuances of service use within each household type may have been lost. Other studies have highlighted important specialized concerns, risk factors, and vulnerabilities faced by families experiencing homelessness (e.g., Culhane et al., 2007; Shah et al., 2016; Shinn et al., 2015) versus single individuals experiencing homelessness. For example, Culhane, Metraux, Byrne, Stino and Bainbridge (2013) have presented an interesting argument indicating that the cohort of individuals born between 1954 and 1961 in the U.S. has consistently been the most vulnerable to single person homelessness across time (1990–2010 in their

study). By contrast, family heads of household experiencing homelessness showed no such cohort effects, with those 21–23 years old remaining the most vulnerable across time. Indeed, Shah et al. (2016) have found that among those aging out of foster care, young adult parents were more vulnerable to episodes of homelessness than their non-parent peers. That some of these nuances and concerns are blurred in the present study does represent a major limitation to the interpretation of these results. Additional analyses are needed to better explore the different patterns of service use between families with children and other household types.

Another limitation is related to the availability and quality of the variables used to compare the four service classes. Many of the variables underwent extensive processing, such as combining information across time, to creatively solve issues of missing data. This approach is vulnerable to introducing error (e.g., false positives) to the dataset. Additionally, there are certainly many other important factors that influence homeless trajectories, such as level of income, that were simply not available with high enough quality for use in the present analyses.

Conclusion

We have approached the present study in a way that has built on and added to current understandings of homeless trajectories in a number of ways. Following McAllister et al.'s (2010) recommendation to expand homeless service usage typologies to include a time-patterned rather than a time-aggregated approach, we have employed an LCGA model to track individuals over the course of several years and across multiple services and grouped them accordingly. This has allowed for a more nuanced view of movement within the local homeless service system. Since the goal of any homeless service is to move individuals as effectively and efficiently as possible out of the service system and into permanent housing, understanding differing service patterns can aid stakeholders in identifying groups at risk for prolonged and problematic service use.

Additionally, in exploring these patterns in the unique setting of Hawai'i, we were able to highlight the importance of considering not only movement through the system, but also the sociocultural context in which that system exists. Indeed, while structural inequality likely influences patterns of homelessness across the nation, the present study suggests that it can operate in markedly different ways depending on the local setting. Thus, the vulnerabilities and needs of differing homeless populations may be highly specific and local context should be considered when exploring systemic understandings of homelessness.

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