Homelessness in Northern Arizona:

Homelessness, Substance Use, and its Cost to the Community Behavioral Healthcare System

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Executive Summary

Homelessness is an ever-present condition in Northern Arizona. The measurement of homelessness is complicated by multiple data sources that are incomplete or not relevant to the needs of a Medicaid health plan. As reliable and valid data is difficult to match to analytical needs, our ability to draw meaningful conclusions, and make data-driven decisions has been limited. In summary, we know that housing people is a significant need in the community, and we need more reliable ways to define how to address it. This study confirms that the homeless population is more likely to experience substance use and incur a greater financial cost to the behavioral healthcare system. In addition, we found that homelessness is likely to occur out of proportion to regional population density. Finally, we evaluated the implementation of Oxford House in Northern Arizona, and suggested opportunities for future housing programs.

Introduction

Homelessness in Northern Arizona may be measured in different ways. The Narbha Institute (TNI) and Northern Arizona University (NAU) conducted a sophisticated assessment of well-being in Arizona in 2017 (NAU, 2017), and 2021 (SHER, 2021). Homelessness was identified as both cause and effect for negative health outcomes. More than 30% of households in the Northern Region experience Housing Stress. In addition, the assessment also noted that homelessness is underrepresented. The lack of stable housing is also a barrier to individuals accessing social services, securing insurance, or finding gainful employment (NAU, 2017).

Lack of current, reliable data has been identified as a barrier to making data-driven decisions in matters of public Health (SHER, 2021). Research conducted by the Southwest Health Equity Research Collaborative (SHER) has revealed that Housing is identified as the most unevenly distributed community resource. Concurrently research participants indicated that their respective organizations have a commitment to addressing social determinants of health (SDOH).

The Narbha Institute and Blue Cross Blue Shield of Arizona (BCBSAZ) Health Choice have endeavored to create housing opportunities throughout Northern Arizona. This study will focus on the implementation of Oxford House in Northern Arizona as a function of the Substance Abuse Block Grant (SABG) and the State Opioid Response Grant (SOR). This study will observe Oxford House from two main viewpoints. We will assess if the location of the established homes is proportional matched to regional housing needs for people experiencing homelessness and substance use disorders.

This study will utilize a matched sample of Health Choice (HC) AHCCCS Complete Care (ACC) members residing in the 5 counties of the Northern Region (Apache, Coconino, Mohave, Navajo, and Yavapai). We will compare a sample of members who have identified themselves as “Homeless” with a random sample who identify as Not-Homeless. The study will analyze key measurements, such as

prevalence of substance use disorder (SUD), geographical density of homelessness, and compare impact to the behavioral healthcare system as a function of total cost.

Oxford House

Oxford House, Inc. (OHI) is a housing program for people recovering for alcohol and substance use disorders. It provides a comfortable independent living environment infused with recovery behaviors and activities. OHI is exceptional because it is a fully democratic, self-run living environment. Every house member shares financial and social responsibilities for the home. Oxford House is a sober living environment and substance use is not allowed. Health Choice was the first health plan in Arizona to contract with Oxford House, establishing its first homes in Arizona 2019 (Oxford House, 2020). Today there are 81 Oxford Houses in Arizona, with 27 of those being in the Northern Region.

Method

Hypotheses

H1: SUD will be more prevalent among the Homeless Population than Not-Homeless

H2: Homeless Population will have a higher cost to system

H3: Homeless SUD Population will have highest cost to system

H4: OHI implementation is congruent with the observed gender needs of the sample

H5: OHI homes have been established in communities with the is the greatest amount of homelessness

H6: OHI homes are established in the communities with the greatest amount of substance use disorders

Data Collection

Available data concerning homelessness is not specific to the needs of Northern Arizona. The AZ Department of Housing produces a Point in Time count each year that is available to the public (DOH, 2022). However, this report aggregates all areas of the state not in Pima or Maricopa counties as "Balance of State" including the Northern Region.

To establish a reliable and valid data set, this study selected distinct HC ACC Northern Region members who identified their primary address as "Homeless" during the duration of the HC ACC Contract years 2018-2021 (10-1-2017 to 09-30-2021). The study then selected a random control sample of distinct HC ACC Northern Region members who did not identify their primary address as "Homeless" for the same period.

Oxford House Housing Activity and Member Outcomes are sourced from monthly "Housing Activity Reports" from SABG and SOR contract deliverables from 2019-2022, and from the Oxford House Profile Series (2020), which was gathered in August 2020. BCBSAZ Health Choice contracts and financial reporting was also evaluated.

Data Validation and Cleaning

The samples for “Homeless” and “Not-Homeless” were assessed for errors and normality.

The Homeless group was found to have 5 outliers beyond 3 standard deviations of the mean. These were giving a non-representative skew to the data and were excluded from the analysis. With the outliers removed, the data is still skewed positive, but it is expected that medical costs would follow the Pareto Principle whereby a small percentage of the population is responsible for the greatest amount of cost. There are 64 “NULL” values that will be excluded from the analysis SUD because they did not encounter any claims during the period.

The Not-Homeless group was found to have 7 outliers beyond 3 standard deviations (s) of the mean. These were giving a non-representative skew to the data and were excluded from the analysis. With the outliers removed, the data is still skewed positive, but it is within normal limits of variance being less that 6 standard deviations of the mean.

Oxford House Housing Activity reports were aggregated into a single file from the contract required deliverables, and then validated against the originals to correct any inconsistencies.

Results

Descriptive Statistics

There was a total sample size of *n*=476 BCBSAZ Health Choice ACC members. The Housing Status distribution was Homeless = 238 (50%) and Not-Homeless = 238 (50%). The Homeless group was identified as Health Choice members who identified their primary address as “Homeless” between October 1, 2017, and September 30, 2021. The Not-Homeless group was randomly selected from Health Choice members who did not identify “Homeless” as their primary address. The gender distribution was Male = 261 (55%) and Female = 215 (45%). The Substance Use Disorder status (SUDs) distribution was *SUD Dx* = 64 (13%) and *No-SUD Dx* = 348 (73%). In measuring SUDs and related cost, there were 64 cases that were excluded because there were no behavioral health claims for the member.

Hypothesis Testing

H1: Substance Use Disorders will be more prevalent among the Homeless population than the Not-Homeless population

This test evaluated if substance use disorders are more prevalent amongst Homeless Health Choice members than Not-Homeless. The sample included 412 individuals and found that 44 (10.68%) were Homeless SUD, and 20 (4.85%) were Not-Homeless SUD (see Table 1). An Upper Tail Z-test for different proportions was conducted and found that there are significantly more Homeless individuals with SUD than Not-Homeless ($z = 4.67$, $p < .001$). This confirms our hypothesis that the Homeless group is more likely to suffer from Substance Use Disorders.

Table 1

Sample Housing Status by Substance Use Disorder Status

Housing Status	SUD Dx	No SUD Dx	Total
Homeless	44 (10.68%)	130 (31.55%)	174 (42.23%)
Not-Homeless	20(4.85%)	218 (52.91%)	238 (57.76%)
Totals (*n* = 412)	64 (15.53%)	348 (84.46%)	

Source: GlobalMebers.dbo.ClientAddress, Claims.dbo.SHCAVos
64 NULL values removed because there were no claims

H2: Homeless population will have a higher cost to system

This test assessed overall cost in dollars for Housing status and SUD status. The sample included 412 individuals and found that 174 (42.23%) were Homeless, and 238 (57.76%) were Not-Homeless. The average Total Cost for Homeless (*M*=$4,486, *S*=$8,263) was significantly higher than the Total Cost of the control Not-Homeless (*M*=$1,782, *S*=$3,550). See Table 2 for more details. The Z-test for means confirmed our hypothesis that Homeless HC members incur a higher Total Cost of behavioral health services than their Not-Homeless counterparts ($Z = 9.924$, $p < .001$).

Table 2

Total Cost to System by Housing Status and SUD Status

Housing Status	SUD Dx	No SUD Dx	Total
Homeless	$8,329 (50.05%)*	$3,175 (19.26%)	$11,504 (69.31%)
Not-Homeless	$3,327 (20.18%)	$1,652 (10.02%)	$4,979 (30.20%)
Totals (*n* = 412)	$11,656 (70.23%)	$4,827 (29.28%)	$16, 483 (100%)

*$p < .001$
Source: GlobalMebers.dbo.ClientAddress, Claims.dbo.SHCAVos
64 NULL values removed because there were no claims

H3: Homeless SUD population will have highest cost to system of all

In order to test our hypothesis that HC members with SUD who also identify as "Homeless" have the highest cost of all to the system, we first confirmed that the SUD group in general costs more than Non-SUD. A Z-test for the means confirmed ($Z = 8.057$, $p < .001$) that members receiving treatment for SUD incurred a significantly higher Total Cost (*M*=$6,853, *S*=$10,900) than those without an SUD (*M*=$2,218, *S*=$4,493). See Table 2 for more details. Having now concluded that members who identified as Homeless incur more cost than Not-Homeless, and that members receiving SUD treatment incur more cost than those without SUD, it is reasonable to believe that a Homeless member with an SUD would incur the highest cost of all. We conducted a Chi-Squared test and confirmed our hypothesis that Homeless members with SUD incur the greatest cost of all in our study ($\chi^2(3, n = 412) = 1974.03$, $p < .001$).

H4: OHI implementation is congruent with the observed gender needs of the sample

This study revealed a sample gender distribution of: Male = 261 (55%) and Female = 215 (45%) (see Table 3). With the highest number being Homeless Men. We conducted a Chi-Squared test to determine if there was a significant difference among the average costs of the groups. We confirmed that Homeless Men incur significantly more average Total Cost than the other groups ($\chi^2(3, n = 412) = 117.56, p < .001$). See Table 4 for complete details of Gender and Total Cost.

Table 3

Homelessness Sample Description by Gender

Housing Status	**Male**	**Female**	**Total**
Homeless	152 (32%)	86 (18%)	238 (50%)
Not-Homeless	109 (23%)	129 (27%)	238 (50%)
Totals (*n* = 476)	261 (55%)	215 (45%)	

Source: GlobalMebers.dbo.ClientAddress

Table

Average Total Cost by Gender and Housing Status

Housing Status	**Male**	**Female**	**Total**
Homeless	$7,164 (36.88%) *	$6,661 (34.29%)	$13,825 (71.17%)
Not-Homeless	$3,381 (17.41%)	$2,219 (11.42%)	$5,599 (28.82%)
Totals (*n* = 412)	$10,545 (54.29%)	$8,880 (45.71%)	$19,425 (100%)

*$p < .001$
Source: GlobalMebers.dbo.ClientAddress, Claims.dbo.SHCAVos
64 NULL values removed because there were no claims

H5: OHI homes have been established in communities with the is the greatest amount of homelessness

Oxford House has established 27 homes in Northern Arizona since 2019. This accounts for 249 total beds. Our analysis of Oxford House Housing Activity Reports measured that the gender distribution of Oxford House was (Male Houses = 19 (70.37%), Female Houses = 8 (29.63%). The category Female includes houses for the Women and Women with Children groups. See Table 5 for more details. Given that the proportion of Homeless Male to Female is 36.88%:34.29%, we concluded that the current establishment of Oxford *Houses* disproportionately favored men. The number of Oxford House *Beds* demonstrated a similar result (Male Beds = 176 (70.68%), Female Beds = 73 (29.32%). We were unable to confirm our hypothesis that OHI has established itself proportionally to the distribution of Homeless men and women in the community.

Table 5

Oxford House Implementation: House and Bed Count

Gender	Houses	Beds
Female	8 (29.63%)	73 (29.23%)
Male	19 (70.37%)	176 (70.68%
Totals	27	249

Our analysis of individuals who identified their primary address as "Homeless" revealed the geographical distribution by County defined in Table 6. We also evaluated the geographical distribution of Oxford House beds. The distribution of OHI beds and Homeless Health Choice members was then considered in the context of the overall regional distribution of the population. We used a Chi-Squared test to confirm that Homeless rates per County vary significantly from the overall distribution of the Regional Population ($\chi^2(4, n = 238) = 55.117, p < .001$). Namely Coconino and Mohave counties experience a disproportionately high concentration of Homeless HC members, while Yavapai County experiences a disproportionately low concentration of Homeless members. The distribution of Oxford House Beds is patently disproportionate. Regardless, we conducted a Chi test on OHI beds, confirming our observation ($\chi(4, n = 249) = 54, p < .001$). Oxford House implementation is particularly over-represented in Yavapai County (62.65%). We were again unable to confirm our hypothesis that Oxford House has established beds in the communities that need them most.

Table 6

Homelessness Geographical Distribution by OHI Implementation

County	Homeless (%)	SUD (%)	% of Regional Population	OHI Beds (%)
APACHE	2 (0.84%)	17 (4.13%)	66,021 (8.60%)	0
COCONINO	57 (23.95%)*	71 (17.23%)	145,101 (18.91)	55 (22.09%)
MOHAVE	99 (41.60%)*	182 (44.17%)	213,267 (18.91%)	28 (11.24%)
NAVAJO	34 (14.29%)	62 (15.05%)	106,717 (13.91%)	0
YAVAPAI	46 (19.33)*	80 (19.42%)	236,209 (30.78%)	156 (62.65%)
Totals (n = 412)	238	412	767,315	249

Source: GlobalMebers.dbo.ClientAddress, Claims.dbo.SHCAVos, OHI_HousingActivity, US Census Bureau (2020)

64 NULL values removed because there were no claims

H6: OHI homes are established in the communities with the greatest concentration of Health Choice members with Substance Use Disorders

Our previous hypotheses outlines geographical distributions of population (see Table 6). We also evaluated the geographical distribution of Oxford House beds. We used a Chi-Squared test to confirm that the prevalence of SUD by County varies significantly from the overall distribution of the Regional Population ($\chi^2(4, n = 412) = 179.00, p < .001$). We observed that Coconino and Mohave Counties have a

disproportionately high concentration of HC members with SUD, while Yavapai County experiences a disproportionately low concentration of members with SUD. Our previous analysis revealed that OHI houses and beds were established disproportionately to the community needs for homelessness. The same holds true for proportionality to substance use disorders (See Table 7). Therefore, we were unable to confirm our hypothesis that Oxford House has established beds in the communities that need them most.

Table 7
Homelessness Geographical Distribution by OHI Implementation

County	SUD (%)	% of Regional Population	OHI Beds (%)
APACHE	17 (4.13%)	66,021 (8.60%)	0
COCONINO	71 (17.23%)	145,101 (18.91)	55 (22.09%)
MOHAVE	182 (44.17%)	213,267 (18.91%)	28 (11.24%)
NAVAJO	62 (15.05%)	106,717 (13.91%)	0
YAVAPAI	80 (19.42%)	236,209 (30.78%)	156 (62.65%)
Totals (*n* = 412)	412	767,315	249

Source: GlobalMebers.dbo.ClientAddress, Claims.dbo.SHCAVos,
OHI_HousingActivity,
US Census Bureau (2020)
64 NULL values removed because there were no claims

Discussion

Objectives

This study set out to demonstrate three primary objectives. First was to establish a methodology to extract a clinically relevant sample of health plan members that could be observed for their experiences of homelessness and substance use disorders. The second objective was to observe any differences between the Homeless sample, and a randomly selected sample of Not-Homeless individuals. The final objective was to observe the establishment of an innovative program, like Oxford House, in the context of regional housing and behavioral health needs.

Hypothesis Testing

We were able to achieve our first goal of establishing reliable sample data by identifying members who identified their primary address as “Homeless” through AHCCCS enrollment data. Subsequently, we extracted a matched random sample of “Not-Homeless” from the remaining population of Health Choice members to use as a control group. The data were assessed for errors and normality, ultimately producing a sample of 476 individuals who were used for the study.

Next, we used the sample data for hypothesis testing. Our hypotheses were based on literature review and primary knowledge of the field. We confirmed that substance use disorders are more prevalent among the Homeless population than the Not-homeless. We also confirmed that the Homeless population incurs a significantly higher cost to the behavioral healthcare system in Northern

Arizona. Finally, it was confirmed that members of the Homeless group who ***also*** had a substance use disorder incurred the highest behavioral health cost of all.

We then turned our attention to the establishment of an innovative housing program, Oxford House, Inc. Oxford House was first introduced to Northern Arizona in 2019, and has since established 27 homes in the north, accounting for 249 beds. Our analysis revealed that there were inconsistencies in the regional development of Oxford Houses. A significant majority of homes were established in Yavapai county. However, analyses for SUD and homelessness both reveal a greater need in Mohave and Coconino counties. It should be noted that Mohave and Coconino counties both have established Oxford Houses in lower proportion.

Conclusions

Our research confirmed our prior beliefs that homelessness exists disproportionately in certain communities around Northern Arizona, namely Coconino and Mohave Counties. It also confirmed that substance use disorders manifest disproportionately, with a significantly greater prevalence in Mohave County. However, we found that the establishment of Oxford Houses did not match with these community needs. Yavapai county had a significantly greater number of Oxford Houses established, accounting for 63% of the total project. We asked ourselves, “Why?”

There are several reasons why the implementation happened the way that it did. Yavapai has a closer geographical proximity to Maricopa County, including the state capital, Phoenix. Oxford House was also implemented by Central and Southern Arizona health plans, and it would be sensible to balance the distance between them. Secondly, a great deal of pressure was applied by the state Medicaid agency for health plans to establish contracts with Oxford House begin establishment. Thus the location with first availability was favored, in this case being Yavapai County. Lastly, and key to the purpose of this study, *we did not have the data*. Without the ability to make data driven decisions, the health plan is unable to direct the focus of innovative partners like Oxford House.

In summary, Oxford House was an exceptional partner to BCBSAZ Health Choice, working together to establish nearly 250 new beds for people in recovery. Through our partnership we were able to bring a great new resource to the Northern Region. With more readily available data-driven insights, health plans could give our partners better direction to meet the needs of the community in proportion to homelessness and substance use disorders.

References

Southwest Health Equity Research Collaborative Community Engagement Core. (2021). *A Regional Health Equity Survey Report: Building Research Capacity to Address Health Equity In Northern Arizona*. Northern Arizona Universtiy, Center for Health Equity Research. https://nau.edu/wp-content/uploads/sites/79/RHES_county-report_FINAL.pdf

Arizona Department of Housing. (May 2, 2022). *2022 Point-in-time Count AZ-500 Arizona Balance of State CoC.* https://housing.az.gov/2022-point-time-count-az-500-arizona-balance-state-coc

Northern Arizona University. (September 6, 2017). *Advancing Wellbeing in Northern Arizona:A Regional Health Equity Assessment*. Northern Arizona University Center for Health Equity Research.

https://nau.edu/wp-content/uploads/sites/160/2018/09/Wellbeing-in-Arizona_Final-9_22_17.pdf

Oxford House Inc. (2020). *Oxford House Profile Series - 2020: Arizona Network of Oxford Houses.* Oxford House, Inc.

U.S. Census Bureau (2020). 2020 Population and Housing State Data. Retrieved on October 12, 2022, from https://www.census.gov/library/visualizations/interactive/2020-population-and-housing-state-data.html.