

## Introduction

Integrated behavioral health or primary care behavioral health is “care that results from a practice team of primary care and behavioral health clinicians, working together with patients and families, using a systematic and cost-effective approach to provide patient-centered care for a defined population. This care may address mental health and substance abuse [sic] conditions, health behaviors (including their contribution to chronic medical illnesses), life stressors and crises, stress-related physical symptoms, and ineffective patterns of health care utilization.”<sup>1</sup>

Determining whether a primary care setting employs an integrated behavioral health (IBH) approach can involve staff interviews, surveys, or detailed data on referrals and collaborations. While these measures may be available in some electronic health records (EHRs) or health information exchanges, they are not currently accessible to researchers and other stakeholders for the vast majority of practices. As a potential solution, we create a proxy for the availability of integrated behavioral health by using a workforce co-location methodology to explore the geospatial distribution of primary care practices and behavioral health providers. We explore the distribution of these practices relative to primary care and mental health care Health Professional Shortage Areas (HPSAs), Medically Underserved Areas/Populations (MUA/Ps), and urban/rural designation. In this brief, we outline the above, as well as an innovative methodology, the IBH potential score, which explores the distribution of likely-integrated behavioral health locations.

## Methods

### Data

We used data from the November 2021 Cumulative National Plan and Provider Enumeration System (NPPES)<sup>2</sup> to identify the primary care and mental health workforce. Table 1 lists the taxonomy codes included in the analysis. We combined these data with supplemental information from the American Medical Association (AMA) Masterfile<sup>3</sup> and the Centers for Medicare and Medicaid Services (CMS) Medicare Fee-for-Service Provider Utilization and Payment Data Physician and Other Supplier Public Use File<sup>4</sup> to refine and filter the final list of primary care and mental health providers.

*Table 1. Taxonomy Codes for Primary Care and Mental Health Providers*

Provider Type	Provider Name	Taxonomy
Primary Care	Addiction Medicine (Psychiatry & Neurology) Physician	2084A0401X
	Family Medicine Physician	207Q00000X
	General Practice Physician	208D00000X
	Geriatric Medicine (Family Medicine) Physician	207QG0300X
	Internal Medicine Physician	207R00000X
	Pediatrics Physician	208000000X

*Table 1, cont. Taxonomy Codes for Primary Care and Mental Health Providers*

Provider Type	Provider Name	Taxonomy
Mental Health Practitioner	Addiction (Substance Use Disorder) Counselor	101YA0400X
	Clinical Psychologist	103TC0700X
	Clinical Social Worker	1041C0700X
	Marriage & Family Therapist	106H00000X
	Mental Health Counselor	101YM0800X
	Psychiatric/Mental Health Nurse Practitioner	363LP0808X
	Psychologist	103T00000X

The initial NPPES provider extract resulted in 1,230,254 primary care and mental health providers. Next, we removed records with deactivated National Provider Identifier (NPI) codes and those without reliable address information. We then merged the remaining records, when possible, with the AMA Masterfile, using individual NPI codes, and identified office-based practices offering direct patient care. We then linked these records to CMS payment data and eliminated direct patient care hospitalists, defined as providers with 90 percent or more billable activity in hospitals. We screened for deceased providers using an AMA indicator but found no records. Finally, we used an AMA Masterfile birthdate data to classify providers as retired, and removed these records.<sup>5</sup> These record elimination techniques resulted in 314,733 primary care physicians and 748,257 mental health clinicians, totaling 1,062,990 health care providers, as summarized in Appendix A. We geocoded the resulting records' address data and appended latitude and longitude values using ESRI ArcMap 10.8.1.

Next, using a method suggested by Miller, we truncated latitude and longitude values to five significant digits to determine co-located primary care and mental health providers.<sup>6</sup> Five decimal digits of latitude (or longitude) is accurate to within 1.11 meters, suggesting that providers sharing latitude and longitude values at this level of precision are located in the same practice office. We totaled primary care and mental health providers at each unique combination of latitude and longitude values and identified individual practices with co-location of one or more primary care physician and one or more mental health provider. This method resulted in a total of 23,079 proximity-derived co-located practices. These 23,079 practice locations include 118,510 primary care providers and 139,281 mental health clinicians, with 20.2% of all primary care practices (n=114,220) having co-located mental health services, and 37.77% of all primary care physicians (118,510/314,170) being co-located in a practice with a mental health clinician.

Finally, we use spatial joins to link derived practice locations with geospatial information on health care shortage areas<sup>7,8</sup> (Primary Care and Mental Health Care Health Professional Shortage Areas [HPSAs]), Medically Underserved Areas/Populations (MUA/Ps), and rurality status (rural-urban commuting area [RUCA]).<sup>9</sup>

### Measures

**IBH Score.** We previously developed an *integrated behavior health potential score*, requiring only the number of primary care physicians and behavioral health clinicians within each practice location. This IBH Potential Score is a combination of the probable – meaning the likelihood of collaboration, and the possible – referring to available collaborations within a practice.<sup>10</sup>

**Analysis.** We calculated descriptive IBH Potential Score statistics, including count, average, and one-way analysis of variance (ANOVA) for each geography type (HPSAs, MUA/Ps, rurality), and by four levels of RUCA (metro areas, micro areas, small cities, and rural areas).

### Results

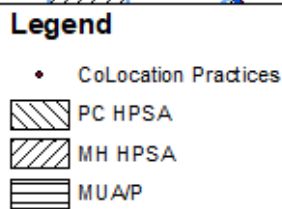
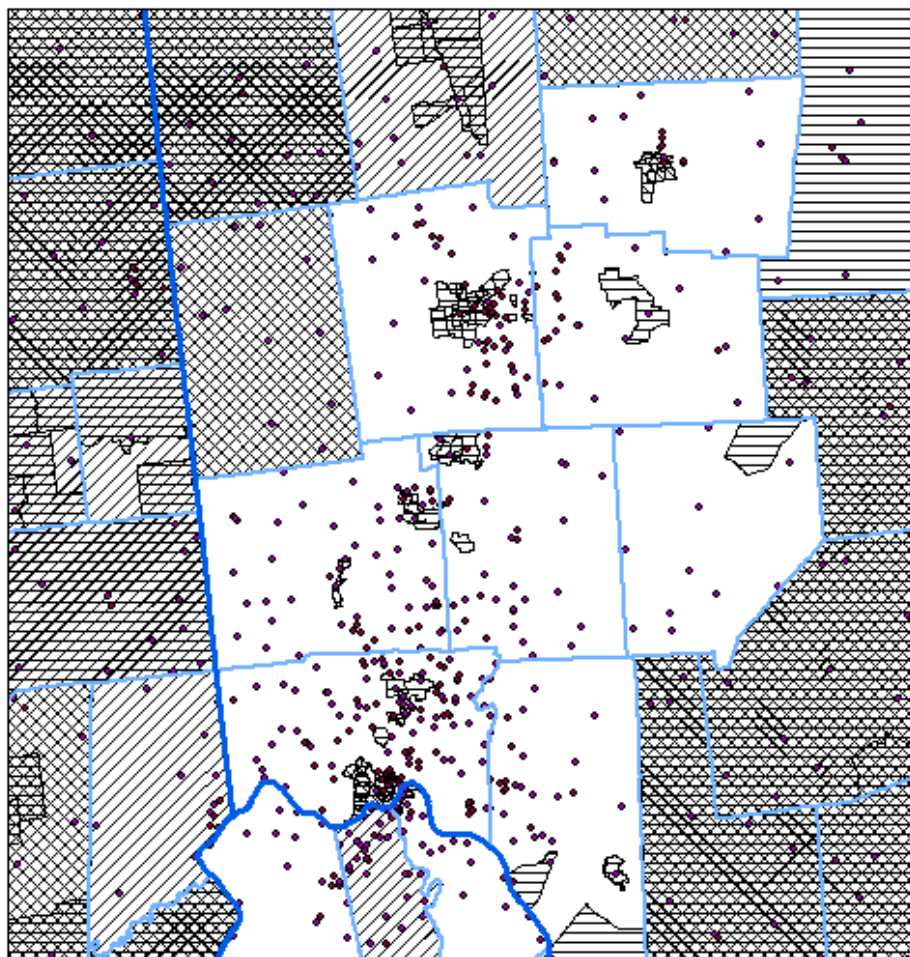
Table 3 summarizes the geographic distribution of co-located care facilities by HPSA and MUA/P. Forty percent of co-located practices are located within a primary care HPSA, while just over 52% of co-located facilities are found within a mental health care HPSA. Only 32% of facilities with primary and behavioral health practitioners are in a medically underserved area (MUA/P). Simple one-way ANOVA of the IBH Potential Score, the measure described above, shows no significant variation across any shortage areas or medically underserved areas.

*Table 2. IBH Potential*

	N	%	Mean IBH Score
<b>Primary Care HPSAs</b>			
In HPSA	9,223	40.0	0.0616
Not in HPSA	13,856	60.0	0.0608
<b>Mental Health Care HPSAs</b>			
In HPSA	12,092	52.4	0.0609
Not in HPSA	10,987	47.6	0.0608
<b>MUA/P</b>			
In Medically Underserved Area/Population	6,930	32.2	0.0607
Not in Medically Underserved Area/Population	15,656	67.8	0.0608
<b>Rural-Urban Commuting Area (RUCA)</b>			
Metro	20,292	88.0	0.0609
Micro	1,577	6.8	0.0604
Small City	816	3.5	0.0598
Rural	378	1.6	0.0604

Figure 1 displays the distribution of co-located IBH practices in southwest Ohio relative to HPSAs and MUA/Ps. We selected southwest Ohio for this example because it allows us to examine rural, small city, suburban, and metro areas on a single map. The map shows that IBH practices are concentrated in metro areas, with limited representation in small city and rural areas. In fact, only about 5% of IBH practices are in small city or rural areas, indicating a potential lack of IBH access in these areas. While the majority of IBH practices are in more urban areas, the majority of practices are not located in HPSAs or MUA/Ps, consistent with the results shown in Table 2.

Figure 1. Southwest Ohio, including Cincinnati and Dayton Ohio Metro Areas



### Limitations

There are several potential limitations to this analysis. First, it is possible there are several false positive co-locations, meaning locations that are determined to have co-located providers but merely reflect common office space or office space in a single multi-storied building. It is also possible that addresses associated with a provider's NPPES record reflect a business center or billing location, rather than an actual care location. Finally, co-location does not imply integrated behavioral health. It is possible that providers share office space but do not engage in the level of collaboration required to meet the definition of integrated behavioral health.

### Discussion

Not surprisingly, primary care and behavioral health clinicians are predominantly co-located in urbanized areas, though not necessarily in health care shortage areas within those urbanized areas. Further, while the lack of IBH practices in small city and rural areas is consistent with general health care service availability and population patterns, these data suggest even less availability of IBH practices in these areas. Despite this, more than 5 in 10 IBH practices are located within mental health care HPSAs, suggesting an opportunity for IBH to increase capacity in these areas.

### Authors and Acknowledgements

#### *Authors*

Mark Carrozza, MA, Michael Topmiller, PhD, Jessica McCann, MA, Jene Grandmont, MA, Morgan Walker, MS, and Jennifer Rankin, PhD

#### *Suggested Citation*

Carrozza M, Topmiller M, McCann J, Grandmont J, Walker M, Rankin J. Co-Location of Primary Care and Behavioral Health Clinicians. HealthLandscape. June 17, 2022. <https://healthlandscape.org/geospatial-analysis/>

#### *Funding*

This work was conducted under a cooperative subcontract with the National Center for Integrated Behavioral Health, Mayo Clinic, <https://www.mayo.edu/research/centers-programs/national-center-for-integrated-behavioral-health/overview>. The activities described in this report were funded by the U.S. Department of Health and Human Services, Health Resources and Services Administration under cooperative agreement number UH1HP33881. The contents are those of the authors and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS or the U.S. Government.

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**Appendix A. Record Selection**

Provider Name and Taxonomy	Entity Type 1 and PC/MH Taxonomy codes	Remove Deactivated NPI Codes and Unable to Geocode	Direct Patient Care per AMA, Where Available	Office-based Practices, per AMA, Where Available	Remove Hospitalists, per CMS Payment File	Remove AMA Deceased (NO CHANGE)	Remove Retired (Age per AMA)	Final Universe
<b>PRIMARY CARE</b>								
Addiction Medicine (Psychiatry & Neurology) Physician, 2084A0401X	881	874	725	611	585	585	563	563
Family Medicine Physician, 207Q00000X	176,763	175,883	153,455	142,089	137,713	137,713	130,953	130,953
General Practice Physician, 208D00000X	23,539	19,581	15,640	14,746	14,609	14,609	13,889	13,889
Geriatric Medicine (Family Medicine) Physician, 207QG0300X	2,586	2,521	2,097	1,912	1,858	1,858	1,760	1,760
Internal Medicine Physician, 207R00000X	189,231	187,651	154,179	132,072	115,859	115,859	110,122	110,122
Pediatrics Physician, 208000000X	84,151	83,222	68,218	60,399	60,230	60,230	57,446	57,446

Provider Name and Taxonomy	Entity Type 1 and PC/MH Taxonomy codes	Remove Deactivated NPI Codes and Unable to Geocode	Direct Patient Care per AMA, Where Available	Office-based Practices, per AMA, Where Available	Remove Hospitalists, per CMS Payment File	Remove AMA Deceased (NO CHANGE)	Remove Retired (Age per AMA)	Final Universe
<b>MENTAL HEALTH</b>								
Addiction (Substance Use Disorder) Counselor, 101YA0400X	91,700	91,553	91,534	91,533	91,532	91,532	91,526	91,526
Clinical Psychologist, 103TC0700X	65,616	64,066	64,057	64,056	64,053	64,053	64,052	64,052
Clinical Social Worker, 1041C0700X	224,275	223,180	223,177	223,177	223,170	223,170	223,170	223,170
Marriage & Family Therapist, 106H00000X	70,225	70,186	70,182	70,182	70,182	70,182	70,182	70,182
Mental Health Counselor, 101YM0800X	232,384	232,241	232,170	232,158	232,143	232,143	232,132	232,132
Psychiatric/Mental Health Nurse Practitioner, 363LP0808X	20,044	20,043	20,042	20,042	19,338	19,338	19,338	19,338
Psychologist, 103T00000X	48,859	47,927	47,876	47,866	47,864	47,864	47,857	47,857

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