

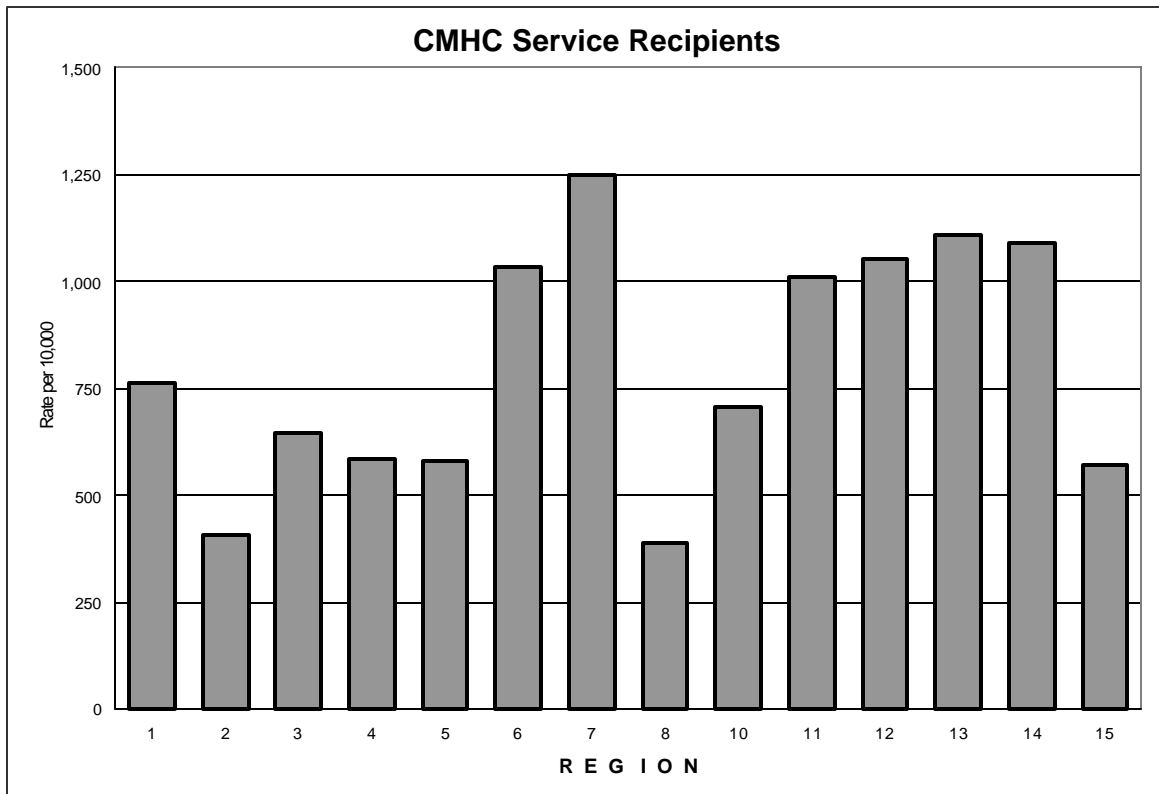
Unduplicated Inpatient Behavioral Health Utilization Rates for

General Hospitals

General Population and CMHC Service Recipients

Kentucky FY 2002

By Age, Gender, And Region



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January 11, 2004

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Introduction and Overview

This report provides an overview of the rate at which individuals who received community mental health services in Kentucky during FY2002 also receive inpatient behavioral health care services (mental health and substance abuse) from one of Kentucky's 105 general hospitals during that same year. For purposes of comparison, the rates at which members of the general population receive inpatient behavioral health services from general hospitals are provided as well.

These indicators of service system performance are provided for the state as a whole, and for each of the state's 14 community mental health service areas. Within each geographical region, general hospital utilization rates are provided for the population as a whole and for people in each of 14 age/gender categories.

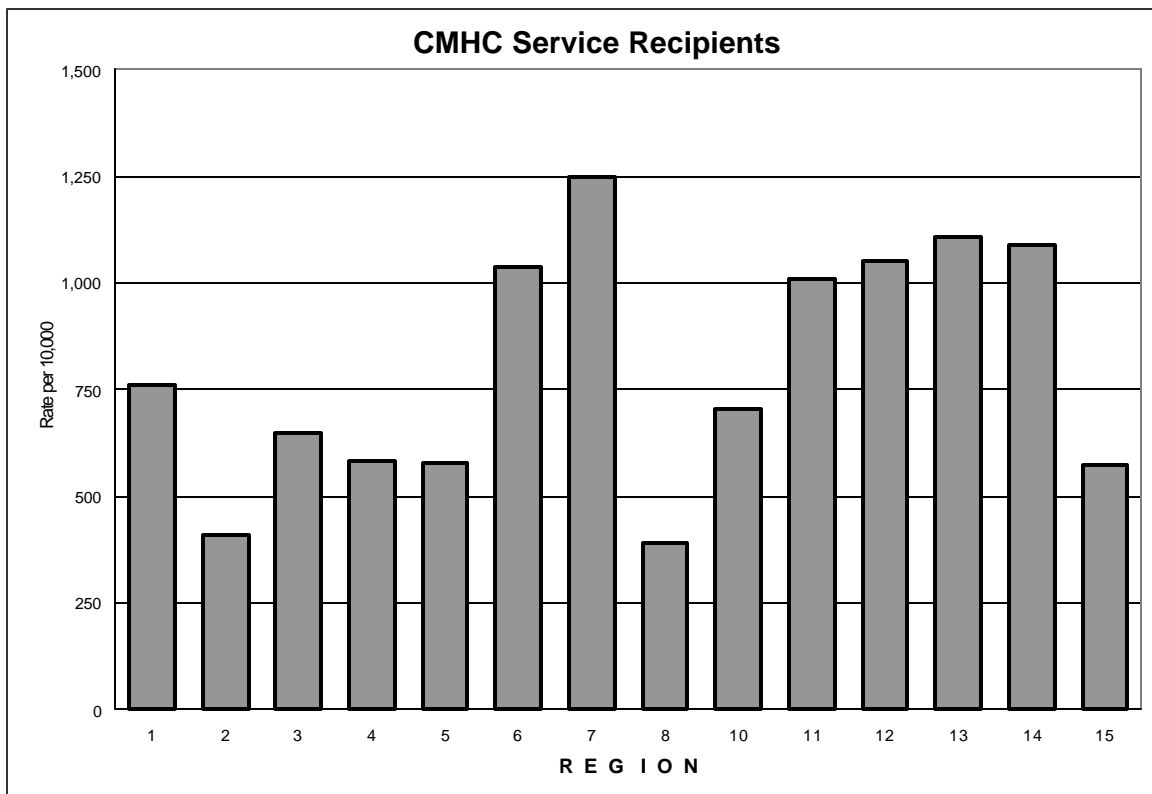
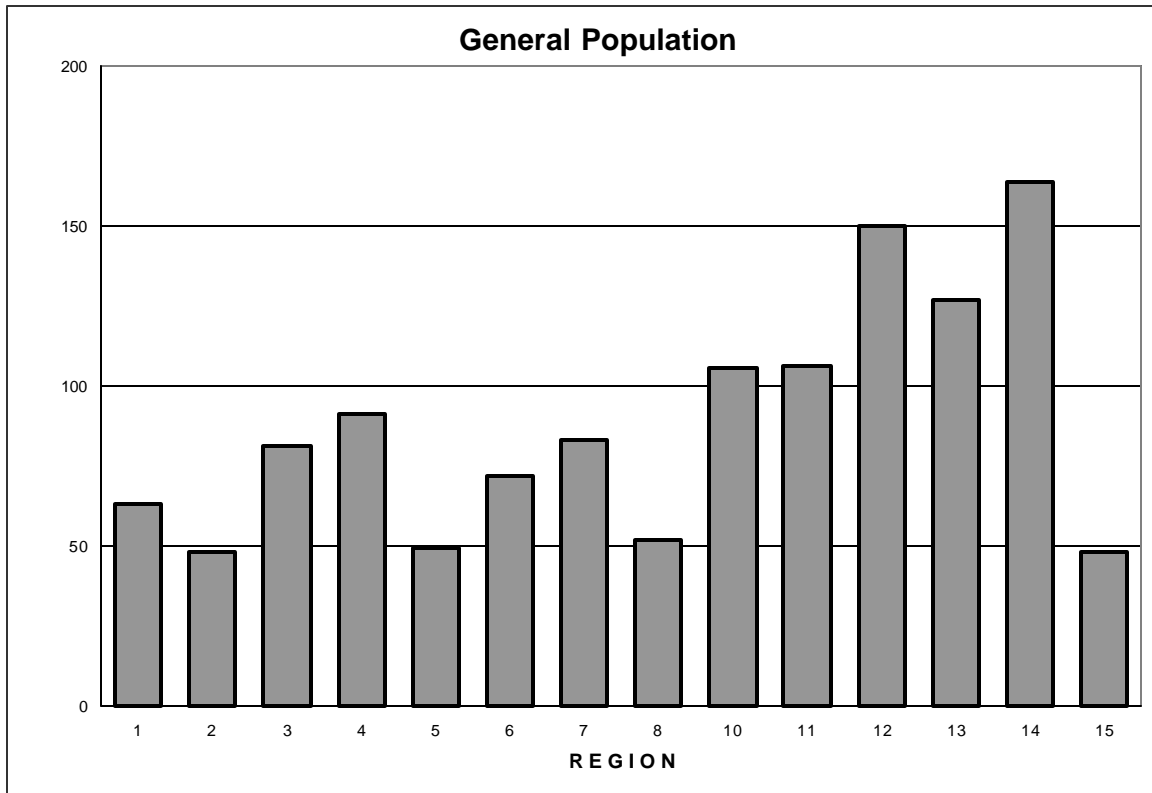
The rate at which community mental health service recipients are hospitalized for behavioral health care can be interpreted from at least three perspectives. Most commonly, hospitalization rates for community mental health service recipients are used to measure treatment outcomes. The data used to support this interpretation focuses on hospitalization after receipt of community based services. The rate at which individuals discharged from inpatient care are admitted to community mental health programs is a powerful measure of access to care in the community for individuals in a high need population. The data used to support this interpretation focuses on receipt of community based services after hospitalization. Finally, hospitalization rates can be interpreted as an indication of practice patterns, the types of treatment provided to individuals with mental and psychiatric disorders, within a geographical region. The data used to support this interpretation focuses on rates of hospitalization during the same period as community based services. The current study is best characterized as a study practice patterns.

Findings indicate that more than 8% of all adults who received community mental health services during FY2002 (815 per 10,000 service recipients) were hospitalized for behavioral health care in a general hospital during that year. There were, however, substantial differences in the use of inpatient behavioral health care in Kentucky's 14 community mental health service areas and among demographic groups. Rates of hospitalization for behavioral health care in general hospitals varied from 389 per 10,000 CMHC service recipients in Region 8 to 1,248 per 10,000 CMHC service recipients in Region 7.

Overall, recipients of CMHC services were 10.2 times as likely as members of the general population to be hospitalized for behavioral health care. This relative rate of hospitalization in Region 7 (15.1) was more than twice the relative rate in Region 4 (6.4).

CMHC service recipients in the 18-34 and 50-64 age groups had the lowest hospitalization rates (756 and 757 per 10,000 clients respectively) and individuals in the 65+ age group had the highest hospitalization rate (925 per 10,000). The general hospitalization rates for male and female CMHC service recipients were not significantly different.

Unduplicated General Hospitals Behavioral Health Utilization Rates Kentucky FY 2002



Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

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**Rates of Hospitalization for Behavioral Health Care in General Hospitals
General Population and CMHC Service Recipients
Kentucky FY 2002**

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	3,046,951	24,429 ±56	80 ±0.2	122,409 ±302	9,979 ±151	815 ±13	10.2 ±0.2
Region 1	157,510	988 ±8	63 ±0.5	6,168 ±50	469 ±21	761 ±34	12.1 ±0.5
Region 2	154,361	741 ±6	48 ±0.4	7,329 ±57	300 ±20	409 ±27	8.5 ±0.6
Region 3	155,001	1,256 ±10	81 ±0.6	6,402 ±52	415 ±27	648 ±42	8.0 ±0.5
Region 4	193,083	1,754 ±13	91 ±0.7	12,438 ±102	726 ±41	584 ±34	6.4 ±0.4
Region 5	177,804	876 ±7	49 ±0.4	5,412 ±43	313 ±20	579 ±37	11.8 ±0.7
Region 6	654,224	4,668 ±32	71 ±0.5	21,253 ±175	2,203 ±89	1,037 ±43	14.5 ±0.6
Region 7	286,137	2,370 ±18	83 ±0.6	5,041 ±41	629 ±39	1,248 ±79	15.1 ±1
Region 8	41,452	215 ±2	52 ±0.5	2,964 ±24	115 ±5	389 ±18	7.5 ±0.4
Region 10	162,796	1,718 ±13	106 ±0.8	9,856 ±81	696 ±37	706 ±38	6.7 ±0.4
Region 11	121,476	1,287 ±10	106 ±0.9	8,463 ±68	855 ±23	1,010 ±29	9.5 ±0.3
Region 12	91,201	1,367 ±11	150 ±1.2	5,957 ±48	626 ±26	1,051 ±45	7.0 ±0.3
Region 13	177,872	2,248 ±18	126 ±1	8,727 ±71	967 ±44	1,108 ±51	8.8 ±0.4
Region 14	147,152	2,409 ±18	164 ±1.2	7,354 ±59	800 ±43	1,089 ±59	6.6 ±0.4
Region 15	526,882	2,532 ±18	48 ±0.3	15,045 ±126	862 ±59	573 ±40	11.9 ±0.8

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

**Rates of Hospitalization for Behavioral Health Care in General Hospitals
General Population and CMHC Service Recipients
Kentucky FY 2002**

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	3,046,951	24,429 ±56	80 ±0.2	122,409 ±302	9,979 ±151	815 ±13	10.2 ±0.2
Male	1,464,021	11,966 ±40	82 ±0.3	59,823 ±213	4,835 ±108	808 ±18	9.9 ±0.2
Female	1,582,930	12,463 ±40	79 ±0.3	62,586 ±215	5,143 ±106	822 ±17	10.4 ±0.2
Age 18-34							
Total	969,966	8,471 ±35	87 ±0.4	50,901 ±211	3,848 ±97	756 ±19	8.7 ±0.2
Male	489,409	4,504 ±26	92 ±0.5	26,568 ±152	2,044 ±71	769 ±27	8.4 ±0.3
Female	480,557	3,967 ±23	83 ±0.5	24,334 ±145	1,803 ±66	741 ±27	9.0 ±0.3
Age 35-49							
Total	936,641	8,846 ±38	94 ±0.4	44,773 ±196	3,987 ±103	890 ±23	9.4 ±0.2
Male	462,480	4,420 ±27	96 ±0.6	22,143 ±137	1,901 ±74	858 ±34	9.0 ±0.4
Female	474,161	4,426 ±27	93 ±0.6	22,630 ±140	2,086 ±72	922 ±32	9.9 ±0.3
Age 50-64							
Total	635,551	3,963 ±19	62 ±0.3	19,509 ±89	1,476 ±49	757 ±25	12.1 ±0.4
Male	308,151	1,896 ±13	62 ±0.4	8,583 ±56	656 ±33	765 ±38	12.4 ±0.6
Female	327,400	2,067 ±14	63 ±0.4	10,926 ±69	820 ±36	750 ±34	11.9 ±0.5
Age 65+							
Total	504,793	3,150 ±13	62 ±0.3	7,226 ±30	668 ±25	925 ±34	14.8 ±0.6
Male	203,981	1,146 ±7	56 ±0.3	2,529 ±14	234 ±11	925 ±46	16.5 ±0.8
Female	300,812	2,003 ±11	67 ±0.4	4,696 ±26	434 ±22	924 ±47	13.9 ±0.7

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 1, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	157,510	988 ±8	63 ±0.5	6,168 ±50	469 ±21	761 ±34	12.1 ±0.5
Male	74,603	455 ±5	61 ±0.7	3,313 ±39	204 ±15	616 ±46	10.1 ±0.8
Female	82,907	532 ±6	64 ±0.7	2,855 ±32	265 ±14	930 ±50	14.5 ±0.8
Age 18-34							
Total	44,957	325 ±4	72 ±1	2,638 ±36	150 ±14	570 ±53	7.9 ±0.7
Male	22,517	167 ±3	74 ±1.4	1,562 ±29	71 ±11	456 ±70	6.2 ±1
Female	22,440	158 ±3	71 ±1.4	1,076 ±20	79 ±8	736 ±80	10.4 ±1.1
Age 35-49							
Total	44,750	375 ±5	84 ±1.2	2,358 ±33	205 ±14	871 ±60	10.4 ±0.7
Male	22,019	161 ±3	73 ±1.5	1,203 ±24	80 ±10	667 ±80	9.1 ±1.1
Female	22,731	215 ±4	94 ±1.9	1,155 ±23	125 ±10	1,083 ±90	11.5 ±1
Age 50-64							
Total	34,888	149 ±3	43 ±0.7	913 ±14	67 ±6	736 ±64	17.3 ±1.5
Male	16,852	75 ±2	44 ±1	447 ±10	37 ±4	823 ±91	18.6 ±2.1
Female	18,036	74 ±2	41 ±1	466 ±10	30 ±4	652 ±91	15.9 ±2.3
Age 65+							
Total	32,915	139 ±2	42 ±0.6	260 ±3	47 ±3	1,790 ±104	42.4 ±2.5
Male	13,215	53 ±1	40 ±0.8	102 ±2	16 ±2	1,549 ±154	38.4 ±3.9
Female	19,700	86 ±2	43 ±0.8	158 ±3	31 ±2	1,947 ±139	44.8 ±3.3

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 2, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	154,361	741 ±6	48 ±0.4	7,329 ±57	300 ±20	409 ±27	8.5 ±0.6
Male	76,551	357 ±4	47 ±0.5	3,702 ±43	139 ±14	374 ±39	8.0 ±0.8
Female	77,810	384 ±4	49 ±0.5	3,627 ±38	161 ±13	445 ±37	9.0 ±0.8
Age 18-34							
Total	52,077	280 ±4	54 ±0.7	3,106 ±41	113 ±14	364 ±46	6.8 ±0.9
Male	28,662	147 ±3	51 ±1	1,732 ±32	54 ±11	312 ±65	6.1 ±1.3
Female	23,415	133 ±3	57 ±1.1	1,373 ±25	59 ±9	430 ±65	7.6 ±1.2
Age 35-49							
Total	42,760	253 ±4	59 ±0.9	2,543 ±36	127 ±12	498 ±48	8.4 ±0.8
Male	21,404	125 ±3	58 ±1.2	1,270 ±25	59 ±9	465 ±68	8.0 ±1.2
Female	21,356	128 ±3	60 ±1.3	1,273 ±25	68 ±9	532 ±68	8.9 ±1.1
Age 50-64							
Total	31,692	110 ±2	35 ±0.6	1,080 ±16	35 ±6	326 ±53	9.4 ±1.5
Male	15,289	47 ±1	31 ±0.7	453 ±9	15 ±3	323 ±62	10.4 ±2
Female	16,403	63 ±1	38 ±0.9	626 ±13	21 ±5	327 ±80	8.6 ±2.1
Age 65+							
Total	27,832	99 ±1	35 ±0.5	601 ±6	25 ±3	414 ±45	11.7 ±1.3
Male	11,196	38 ±1	34 ±0.7	247 ±4	11 ±1	441 ±44	12.9 ±1.3
Female	16,636	60 ±1	36 ±0.7	355 ±5	14 ±2	396 ±71	10.9 ±2

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 3, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	155,001	1,256 ±10	81 ±0.6	6,402 ±52	415 ±27	648 ±42	8.0 ±0.5
Male	73,891	619 ±7	84 ±0.9	2,915 ±34	190 ±19	650 ±65	7.8 ±0.8
Female	81,110	637 ±7	79 ±0.9	3,487 ±40	226 ±19	647 ±55	8.2 ±0.7
Age 18-34							
Total	45,493	389 ±5	85 ±1.2	2,943 ±39	153 ±17	521 ±57	6.1 ±0.7
Male	22,855	196 ±4	86 ±1.7	1,364 ±25	71 ±12	519 ±86	6.1 ±1
Female	22,638	193 ±4	85 ±1.7	1,578 ±29	83 ±12	524 ±76	6.1 ±0.9
Age 35-49							
Total	47,640	509 ±7	107 ±1.5	2,302 ±32	189 ±19	819 ±84	7.7 ±0.8
Male	23,465	262 ±5	112 ±2.2	1,068 ±21	91 ±14	850 ±129	7.6 ±1.2
Female	24,175	247 ±5	102 ±2	1,234 ±25	98 ±14	793 ±111	7.8 ±1.1
Age 50-64							
Total	33,552	217 ±3	65 ±1	918 ±14	58 ±8	629 ±92	9.7 ±1.4
Male	16,330	109 ±2	67 ±1.4	398 ±8	23 ±6	583 ±150	8.7 ±2.2
Female	17,222	107 ±2	62 ±1.3	520 ±11	35 ±6	664 ±114	10.7 ±1.8
Age 65+							
Total	28,316	142 ±2	50 ±0.7	239 ±3	15 ±2	643 ±102	12.8 ±2
Male	11,241	52 ±1	47 ±0.9	85 ±2	5 ±1	581 ±100	12.5 ±2.2
Female	17,075	90 ±2	52 ±0.9	155 ±3	10 ±2	677 ±148	12.9 ±2.8

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 4, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	193,083	1,754 ±13	91 ±0.7	12,438 ±102	726 ±41	584 ±34	6.4 ±0.4
Male	92,644	880 ±10	95 ±1	6,298 ±75	333 ±32	529 ±51	5.6 ±0.5
Female	100,439	873 ±9	87 ±0.9	6,140 ±68	393 ±27	640 ±44	7.4 ±0.5
Age 18-34							
Total	63,312	501 ±7	79 ±1.1	5,262 ±72	237 ±25	451 ±47	5.7 ±0.6
Male	31,615	258 ±5	82 ±1.6	2,914 ±57	109 ±20	374 ±68	4.6 ±0.8
Female	31,697	242 ±5	76 ±1.5	2,347 ±45	128 ±15	546 ±65	7.1 ±0.9
Age 35-49							
Total	56,605	697 ±10	123 ±1.7	4,488 ±65	330 ±29	735 ±66	6.0 ±0.5
Male	28,048	370 ±7	132 ±2.6	2,236 ±46	152 ±23	679 ±102	5.1 ±0.8
Female	28,557	327 ±7	114 ±2.3	2,252 ±46	178 ±19	791 ±85	6.9 ±0.8
Age 50-64							
Total	40,452	318 ±5	79 ±1.2	1,946 ±29	113 ±14	580 ±74	7.4 ±0.9
Male	19,726	168 ±4	85 ±1.8	885 ±19	54 ±10	610 ±118	7.1 ±1.4
Female	20,726	150 ±3	72 ±1.6	1,061 ±22	59 ±10	555 ±94	7.7 ±1.3
Age 65+							
Total	32,714	238 ±3	73 ±0.9	743 ±8	46 ±6	621 ±80	8.5 ±1.1
Male	13,255	84 ±1	63 ±1.1	263 ±4	18 ±3	688 ±100	10.9 ±1.6
Female	19,459	155 ±3	79 ±1.3	480 ±7	28 ±5	584 ±111	7.3 ±1.4

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Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 5, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	177,804	876 ±7	49 ±0.4	5,412 ±43	313 ±20	579 ±37	11.8 ±0.7
Male	87,890	419 ±5	48 ±0.5	2,569 ±30	148 ±14	577 ±54	12.1 ±1.2
Female	89,914	457 ±5	51 ±0.5	2,843 ±31	165 ±14	581 ±49	11.4 ±1
Age 18-34							
Total	56,575	271 ±4	48 ±0.7	2,291 ±30	102 ±13	445 ±56	9.3 ±1.2
Male	29,796	147 ±3	49 ±1	1,231 ±23	55 ±10	448 ±80	9.1 ±1.6
Female	26,779	124 ±3	46 ±1	1,060 ±20	47 ±8	441 ±77	9.6 ±1.7
Age 35-49							
Total	57,706	333 ±5	58 ±0.8	1,935 ±27	131 ±14	678 ±71	11.7 ±1.2
Male	28,850	156 ±3	54 ±1.1	896 ±18	59 ±9	660 ±102	12.2 ±1.9
Female	28,856	177 ±4	61 ±1.3	1,038 ±21	72 ±10	693 ±99	11.3 ±1.6
Age 50-64							
Total	36,304	134 ±2	37 ±0.6	822 ±12	52 ±5	636 ±67	17.2 ±1.8
Male	17,841	73 ±2	41 ±0.9	318 ±7	26 ±4	821 ±117	20.1 ±2.9
Female	18,463	62 ±1	33 ±0.8	505 ±11	26 ±4	520 ±80	15.6 ±2.4
Age 65+							
Total	27,219	138 ±2	51 ±0.7	364 ±4	28 ±3	772 ±79	15.2 ±1.6
Male	11,403	43 ±1	38 ±0.8	124 ±2	8 ±1	637 ±81	16.8 ±2.2
Female	15,816	95 ±2	60 ±1	240 ±4	20 ±3	841 ±112	14.1 ±1.9

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 6, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	654,224	4,668 ±32	71 ±0.5	21,253 ±175	2,203 ±89	1,037 ±43	14.5 ±0.6
Male	310,016	2,216 ±23	71 ±0.7	10,012 ±122	1,056 ±63	1,055 ±64	14.8 ±0.9
Female	344,208	2,452 ±23	71 ±0.7	11,241 ±125	1,147 ±63	1,021 ±57	14.3 ±0.8
Age 18-34							
Total	198,748	1,414 ±19	71 ±0.9	8,563 ±122	813 ±54	950 ±64	13.4 ±0.9
Male	98,886	740 ±14	75 ±1.4	4,226 ±85	434 ±39	1,026 ±93	13.7 ±1.3
Female	99,862	674 ±13	67 ±1.3	4,337 ±88	380 ±37	876 ±88	13.0 ±1.3
Age 35-49							
Total	211,327	1,574 ±22	74 ±1	7,436 ±113	798 ±61	1,073 ±83	14.4 ±1.1
Male	103,456	814 ±16	79 ±1.5	3,795 ±82	414 ±44	1,090 ±119	13.9 ±1.5
Female	107,871	760 ±15	70 ±1.4	3,641 ±78	385 ±41	1,056 ±116	15.0 ±1.7
Age 50-64							
Total	134,685	830 ±12	62 ±0.9	3,117 ±48	361 ±30	1,159 ±98	18.8 ±1.6
Male	64,517	368 ±8	57 ±1.2	1,367 ±30	142 ±20	1,037 ±149	18.2 ±2.6
Female	70,168	462 ±9	66 ±1.3	1,750 ±37	219 ±22	1,254 ±130	19.0 ±2
Age 65+							
Total	109,464	850 ±9	78 ±0.8	2,137 ±23	231 ±20	1,079 ±95	13.9 ±1.2
Male	43,157	294 ±4	68 ±1	624 ±10	67 ±9	1,075 ±149	15.8 ±2.2
Female	66,307	556 ±8	84 ±1.2	1,513 ±21	163 ±18	1,080 ±119	12.9 ±1.4

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 7, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	286,137	2,370 ±18	83 ±0.6	5,041 ±41	629 ±39	1,248 ±79	15.1 ±1
Male	137,605	1,191 ±13	87 ±1	2,456 ±29	355 ±28	1,445 ±115	16.7 ±1.3
Female	148,532	1,179 ±13	79 ±0.8	2,586 ±29	274 ±28	1,061 ±108	13.4 ±1.4
Age 18-34							
Total	94,080	815 ±11	87 ±1.2	2,031 ±27	258 ±24	1,269 ±119	14.7 ±1.4
Male	46,752	439 ±8	94 ±1.8	1,028 ±19	159 ±17	1,546 ±169	16.5 ±1.8
Female	47,328	376 ±7	79 ±1.5	1,002 ±19	99 ±17	985 ±167	12.4 ±2.1
Age 35-49							
Total	93,821	940 ±13	100 ±1.4	2,020 ±29	272 ±29	1,346 ±144	13.4 ±1.4
Male	46,757	480 ±10	103 ±2	1,026 ±21	149 ±20	1,452 ±202	14.1 ±2
Female	47,064	460 ±9	98 ±2	994 ±20	123 ±20	1,236 ±205	12.7 ±2.1
Age 50-64							
Total	56,167	360 ±5	64 ±1	769 ±12	70 ±12	913 ±152	14.3 ±2.4
Male	27,311	175 ±4	64 ±1.4	327 ±7	36 ±8	1,101 ±235	17.2 ±3.7
Female	28,856	185 ±4	64 ±1.4	443 ±9	34 ±9	773 ±200	12.1 ±3.1
Age 65+							
Total	42,069	256 ±3	61 ±0.7	221 ±3	29 ±3	1,326 ±131	21.7 ±2.2
Male	16,785	98 ±2	58 ±1	75 ±2	11 ±1	1,463 ±158	25.1 ±2.7
Female	25,284	159 ±3	63 ±1	147 ±3	18 ±3	1,256 ±180	20.0 ±2.9

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 8, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	41,452	215 ±2	52 ±0.5	2,964 ±24	115 ±5	389 ±18	7.5 ±0.4
Male	20,016	112 ±2	56 ±0.8	1,537 ±18	55 ±4	355 ±29	6.4 ±0.5
Female	21,436	104 ±1	48 ±0.7	1,427 ±16	61 ±3	426 ±22	8.8 ±0.5
Age 18-34							
Total	12,125	86 ±1	71 ±1.2	1,393 ±18	51 ±4	367 ±30	5.2 ±0.4
Male	6,082	52 ±1	86 ±1.9	797 ±15	30 ±3	375 ±44	4.4 ±0.5
Female	6,043	33 ±1	55 ±1.4	596 ±11	21 ±2	357 ±37	6.5 ±0.7
Age 35-49							
Total	12,611	69 ±1	55 ±1	1,008 ±14	45 ±3	451 ±32	8.2 ±0.6
Male	6,280	31 ±1	50 ±1.3	523 ±10	17 ±3	322 ±48	6.5 ±1
Female	6,331	38 ±1	60 ±1.5	485 ±10	29 ±2	590 ±40	9.8 ±0.7
Age 50-64							
Total	9,010	32 ±1	36 ±0.8	413 ±6	13 ±1	306 ±37	8.6 ±1
Male	4,439	18 ±1	41 ±1.3	167 ±4	6 ±1	345 ±71	8.5 ±1.8
Female	4,571	14 ±0	31 ±1	245 ±5	7 ±1	280 ±38	9.1 ±1.3
Age 65+							
Total	7,706	28 ±1	36 ±0.8	150 ±2	6 ±1	398 ±42	10.9 ±1.2
Male	3,215	10 ±0	31 ±1.2	49 ±1	2 ±0	404 ±71	12.9 ±2.3
Female	4,491	18 ±0	40 ±1.1	101 ±2	4 ±1	396 ±53	9.8 ±1.3

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 10, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	162,796	1,718 ±13	106 ±0.8	9,856 ±81	696 ±37	706 ±38	6.7 ±0.4
Male	79,086	787 ±8	100 ±1.1	5,062 ±61	313 ±26	618 ±52	6.2 ±0.5
Female	83,710	931 ±10	111 ±1.2	4,794 ±53	383 ±26	800 ±55	7.2 ±0.5
Age 18-34							
Total	50,528	553 ±7	109 ±1.5	4,444 ±60	271 ±24	610 ±54	5.6 ±0.5
Male	25,771	281 ±5	109 ±2	2,514 ±48	139 ±18	554 ±71	5.1 ±0.7
Female	24,757	272 ±5	110 ±2.1	1,930 ±36	132 ±15	683 ±81	6.2 ±0.7
Age 35-49							
Total	47,529	630 ±9	133 ±1.9	3,510 ±50	270 ±25	768 ±73	5.8 ±0.6
Male	23,747	276 ±5	116 ±2.3	1,770 ±36	106 ±17	601 ±98	5.2 ±0.9
Female	23,782	355 ±7	149 ±3	1,740 ±35	163 ±19	939 ±108	6.3 ±0.7
Age 50-64							
Total	36,148	308 ±5	85 ±1.3	1,400 ±21	102 ±13	728 ±91	8.5 ±1.1
Male	17,671	145 ±3	82 ±1.9	594 ±13	45 ±8	752 ±142	9.2 ±1.7
Female	18,477	163 ±3	88 ±1.9	806 ±17	57 ±9	710 ±119	8.0 ±1.4
Age 65+							
Total	28,591	227 ±3	79 ±1	502 ±6	54 ±5	1,068 ±92	13.5 ±1.2
Male	11,897	86 ±2	72 ±1.3	184 ±3	23 ±2	1,224 ±128	17.0 ±1.8
Female	16,694	141 ±2	85 ±1.4	318 ±5	31 ±4	978 ±125	11.6 ±1.5

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 11, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	121,476	1,287 ±10	106 ±0.9	8,463 ±68	855 ±23	1,010 ±29	9.5 ±0.3
Male	58,351	677 ±8	116 ±1.4	4,291 ±49	454 ±18	1,058 ±43	9.1 ±0.4
Female	63,125	610 ±7	97 ±1.1	4,172 ±47	401 ±15	961 ±38	9.9 ±0.4
Age 18-34							
Total	37,290	491 ±7	132 ±1.9	3,103 ±41	329 ±15	1,062 ±52	8.1 ±0.4
Male	18,508	304 ±6	164 ±3.2	1,589 ±30	210 ±12	1,324 ±80	8.1 ±0.5
Female	18,782	187 ±4	100 ±2	1,514 ±28	119 ±10	786 ±65	7.9 ±0.7
Age 35-49							
Total	38,167	452 ±6	119 ±1.7	3,293 ±47	323 ±15	982 ±47	8.3 ±0.4
Male	18,757	229 ±5	122 ±2.4	1,691 ±34	158 ±11	933 ±69	7.6 ±0.6
Female	19,410	223 ±4	115 ±2.3	1,602 ±32	165 ±10	1,033 ±65	9.0 ±0.6
Age 50-64							
Total	26,816	249 ±4	93 ±1.5	1,764 ±28	166 ±9	941 ±54	10.1 ±0.6
Male	13,211	113 ±3	85 ±2.1	874 ±20	75 ±6	858 ±76	10.0 ±0.9
Female	13,605	136 ±3	100 ±2.2	890 ±19	91 ±7	1,023 ±78	10.2 ±0.8
Age 65+							
Total	19,203	95 ±1	49 ±0.8	304 ±4	36 ±2	1,199 ±81	24.3 ±1.7
Male	7,875	31 ±1	40 ±1	137 ±3	11 ±1	780 ±109	19.7 ±2.8
Female	11,328	63 ±1	56 ±1.1	167 ±3	26 ±2	1,544 ±118	27.6 ±2.2

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 12, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	91,201	1,367 ±11	150 ±1.2	5,957 ±48	626 ±26	1,051 ±45	7.0 ±0.3
Male	44,137	790 ±9	179 ±2.1	2,970 ±34	363 ±21	1,223 ±71	6.8 ±0.4
Female	47,064	577 ±6	123 ±1.4	2,987 ±34	263 ±16	880 ±55	7.2 ±0.5
Age 18-34							
Total	27,653	602 ±8	218 ±3	2,298 ±30	280 ±19	1,219 ±83	5.6 ±0.4
Male	13,837	369 ±7	267 ±5	1,164 ±22	160 ±15	1,377 ±133	5.2 ±0.5
Female	13,816	233 ±4	169 ±3.2	1,135 ±21	120 ±11	1,057 ±96	6.3 ±0.6
Age 35-49							
Total	28,857	471 ±7	163 ±2.4	2,356 ±33	242 ±17	1,027 ±72	6.3 ±0.4
Male	14,324	284 ±6	198 ±4	1,203 ±24	154 ±13	1,282 ±109	6.5 ±0.6
Female	14,533	187 ±4	128 ±2.6	1,153 ±23	88 ±11	760 ±93	5.9 ±0.7
Age 50-64							
Total	20,174	200 ±3	99 ±1.6	1,120 ±17	83 ±8	738 ±74	7.5 ±0.8
Male	9,954	102 ±2	103 ±2.3	519 ±12	41 ±6	789 ±113	7.7 ±1.1
Female	10,220	97 ±2	95 ±2.2	601 ±13	42 ±6	694 ±98	7.3 ±1
Age 65+							
Total	14,517	95 ±1	65 ±1	183 ±3	22 ±2	1,186 ±103	18.2 ±1.6
Male	6,022	34 ±1	57 ±1.3	84 ±2	8 ±1	936 ±144	16.5 ±2.6
Female	8,495	60 ±1	71 ±1.4	99 ±2	14 ±1	1,397 ±147	19.7 ±2.1

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 13, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	177,872	2,248 ±18	126 ±1	8,727 ±71	967 ±44	1,108 ±51	8.8 ±0.4
Male	85,497	1,160 ±13	136 ±1.6	4,637 ±54	488 ±33	1,053 ±73	7.8 ±0.5
Female	92,375	1,088 ±12	118 ±1.3	4,090 ±46	479 ±28	1,170 ±70	9.9 ±0.6
Age 18-34							
Total	55,458	1,007 ±13	182 ±2.4	3,498 ±47	407 ±32	1,164 ±93	6.4 ±0.5
Male	27,724	551 ±10	199 ±3.7	1,951 ±37	222 ±25	1,135 ±130	5.7 ±0.7
Female	27,734	456 ±8	164 ±3.1	1,547 ±29	186 ±20	1,200 ±131	7.3 ±0.8
Age 35-49							
Total	53,361	795 ±11	149 ±2.1	3,340 ±48	396 ±27	1,186 ±83	8.0 ±0.6
Male	26,381	401 ±8	152 ±3	1,781 ±36	191 ±20	1,075 ±117	7.1 ±0.8
Female	26,980	394 ±8	146 ±2.9	1,559 ±31	205 ±18	1,313 ±118	9.0 ±0.8
Age 50-64							
Total	39,241	286 ±4	73 ±1.1	1,507 ±23	123 ±11	820 ±75	11.3 ±1
Male	19,239	135 ±3	70 ±1.5	740 ±16	54 ±8	736 ±108	10.5 ±1.6
Female	20,002	151 ±3	75 ±1.6	767 ±16	69 ±8	900 ±105	12.0 ±1.4
Age 65+							
Total	29,812	160 ±2	54 ±0.7	381 ±5	40 ±3	1,051 ±80	19.6 ±1.5
Male	12,153	72 ±1	60 ±1.1	165 ±3	21 ±1	1,268 ±94	21.3 ±1.6
Female	17,659	88 ±2	50 ±0.9	217 ±4	19 ±3	885 ±122	17.8 ±2.5

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 14, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	147,152	2,409 ±18	164 ±1.2	7,354 ±59	800 ±43	1,089 ±59	6.6 ±0.4
Male	70,428	1,136 ±12	161 ±1.7	3,527 ±41	374 ±30	1,061 ±85	6.6 ±0.5
Female	76,724	1,273 ±13	166 ±1.7	3,826 ±42	426 ±30	1,114 ±81	6.7 ±0.5
Age 18-34							
Total	41,767	888 ±12	213 ±2.8	2,990 ±41	334 ±28	1,117 ±95	5.3 ±0.5
Male	20,826	448 ±8	215 ±3.9	1,600 ±31	171 ±21	1,071 ±130	5.0 ±0.6
Female	20,941	440 ±8	210 ±3.9	1,389 ±27	162 ±19	1,169 ±139	5.6 ±0.7
Age 35-49							
Total	42,652	871 ±12	204 ±2.8	2,591 ±36	310 ±28	1,195 ±111	5.8 ±0.6
Male	21,058	412 ±8	196 ±3.8	1,217 ±24	126 ±20	1,037 ±162	5.3 ±0.8
Female	21,594	459 ±9	212 ±4.2	1,374 ±27	183 ±21	1,334 ±153	6.3 ±0.7
Age 50-64							
Total	34,019	372 ±6	109 ±1.7	1,336 ±20	122 ±14	913 ±105	8.3 ±1
Male	16,466	173 ±4	105 ±2.3	543 ±11	60 ±8	1,098 ±157	10.5 ±1.5
Female	17,553	200 ±4	114 ±2.4	793 ±16	62 ±11	787 ±140	6.9 ±1.2
Age 65+							
Total	28,714	278 ±3	97 ±1.2	437 ±5	35 ±5	802 ±113	8.3 ±1.2
Male	12,078	104 ±2	86 ±1.5	167 ±3	17 ±3	1,007 ±183	11.7 ±2.1
Female	16,636	174 ±3	105 ±1.7	270 ±4	18 ±4	675 ±144	6.5 ±1.4

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

Rates of Hospitalization for Behavioral Health Care in General Hospitals
 General Population and CMHC Service Recipients
 Region 15, Kentucky FY 2002

	General Population			Community Mental Health			Relative Rate of Hospitalization
	Total Population	Number Hospitalized	Rate Per 10,000	Total Served	Number Hospitalized	Rate Per 10,000	
Total	526,882	2,532 ±18	48 ±0.3	15,045 ±126	862 ±59	573 ±40	11.9 ±0.8
Male	253,306	1,167 ±12	46 ±0.5	6,534 ±78	364 ±39	557 ±60	12.1 ±1.3
Female	273,576	1,365 ±13	50 ±0.5	8,511 ±99	498 ±45	585 ±53	11.7 ±1.1
Age 18-34							
Total	189,903	851 ±11	45 ±0.6	6,343 ±87	348 ±39	549 ±62	12.2 ±1.4
Male	95,578	406 ±8	42 ±0.8	2,894 ±56	159 ±26	549 ±89	12.9 ±2.1
Female	94,325	445 ±8	47 ±0.9	3,449 ±67	189 ±29	548 ±85	11.6 ±1.8
Age 35-49							
Total	158,855	876 ±12	55 ±0.8	5,594 ±83	349 ±40	624 ±72	11.3 ±1.3
Male	77,934	419 ±8	54 ±1	2,464 ±51	144 ±27	586 ±108	10.9 ±2
Female	80,921	456 ±9	56 ±1.1	3,130 ±66	204 ±30	653 ±96	11.6 ±1.7
Age 50-64							
Total	102,403	399 ±6	39 ±0.6	2,404 ±37	111 ±18	460 ±77	11.8 ±2
Male	49,305	195 ±4	40 ±0.8	952 ±20	43 ±12	454 ±125	11.5 ±3.2
Female	53,098	204 ±4	38 ±0.8	1,452 ±31	67 ±14	464 ±97	12.1 ±2.5
Age 65+							
Total	75,721	405 ±5	54 ±0.6	703 ±9	54 ±8	773 ±119	14.4 ±2.2
Male	30,489	147 ±3	48 ±0.8	223 ±4	18 ±3	785 ±156	16.3 ±3.3
Female	45,232	259 ±4	57 ±0.9	480 ±8	37 ±8	767 ±158	13.4 ±2.8

Based on analysis of data sets provided by Kentucky's Community Mental Health Programs and General Hospitals. Episodes of hospitalization for behavioral health care include those coded with Major Diagnostic Category 19 or 20 (Mental Health or Substance Abuse). Because these data sets do not share unique personal identifiers, Probabilistic Population Estimation was used to determine overlap. General population is based on data from the United States Census 2000.

PROBABILISTIC POPULATION ESTIMATION

Probabilistic Population Estimation is a statistical procedure that determines the number of people (with known confidence intervals) who are represented in data sets that do not contain unique person identifiers. Probabilistic Population Estimation uses information on the distribution of birth dates in a data set to determine the number of people represented in the data set. The number of people necessary to produce the number of birthdays observed in a single birth year cohort, for instance, would be calculated using the following formula:

$$P_j(l_j) = \sum_{i=1}^{l_j} \frac{365}{365-i}$$

where “ P_j ” is the number of people and “ l_j ” is the number of birth dates observed. Similar logic is used to determine the number of people who appear in more than one data set. The table below provides illustrative results of Probabilistic Population Estimation for populations of specified size.

Population Estimates for Specified Numbers of Birth Dates Within a Year

Birth Dates	Number of People	Birth Dates	Number of People
1	1.003 ± .103	180	249 ± 20
10	10.15 ± .776	250	423 ± 38
20	20.6 ± 1.54	300	632 ± 64
50	54. ± 4	330	860 ± 101
100	117. ± 9	360	1630 ± 325

POPULATION OVERLAP

In order to probabilistically determine the number of people shared across data sets that do not include a common person identifier, the sizes of three populations are determined and the results are compared. The number of people in each of the original data sets are the first two populations. The number of people in a data set that is formed by combining the two original data sets is the third data set.

The number of people who are shared by the two data sets is the difference between the sum of the numbers of people represented in the two original data sets and the number of people represented in the combined data set. This occurs because the sum of the number of people represented in the two original data sets includes a double count of every person who is represented in both data sets. The number of people represented in the combined data set does not include this duplication. The difference between these two numbers is the size of the duplication between the two original data sets, the size of the caseload overlap. In terms of mathematical set theory, the intersection of two sets is the difference between the sum of the sizes of the two sets ($A+B$) and the union of the two sets ($A \cup B$):

$$(A \cap B) = (A + B) - (A \cup B).$$

Related Readings

The Utilization of State and General Hospitals for Inpatient Psychiatric Care. *American Journal of Public Health*, 88 (3), 448-451, March 1998. (Banks and Pandiani)

Practice Patterns and Hospitalization Rates: A Statewide Program Evaluation. *Administration and Policy in Mental Health*, 26(1), 33-44, September, 1998. (Banks, Pandiani, Gauvin, Reardon, Schacht, and Zovistoski)

A Risk Adjusted Measure of Hospitalization Rates for Evaluating Community Mental Health Program Performance. *Administration and Policy in Mental Health*, 26(4), 269-279, March, 1999. (Pandiani, Banks, Schacht, and Gauvin)

Utilization of Local Jails and General Hospitals by State Psychiatric Center Patients. *The Journal of Behavioral Health Services and Research*, November 2000 (Banks, Stone, Pandiani, Cox, and Morchauser)

Does Closing Inpatient Beds in One Public Mental Health System Result in Increased Use of Inpatient Services in Other Systems? *Mental Health Services Research*, 2000, Vol. 2 #4 (Rosenheck, Banks, and Pandiani)

Measuring Access To Mental Health Care: A Multi-indicator Approach to Program Evaluation. *Evaluation and Program Planning* 25 (2002) 271-285 (Pandiani, Banks, Bramley, Pomeroy, Simon).

Personal Privacy vs. Public Accountability: A Technological Solution to an Ethical Dilemma. *Journal of Behavioral Health Services and Research*, 25,(4), 456-463, November 1998. (Pandiani, Banks, and Schacht)

Probabilistic Population Estimation of the Size and Overlap of Data Sets Based on Date of Birth. *Statistics in Medicine*, 20, 1421-1430, May 2001, (Banks and Pandiani)

Large Data Sets Are Powerful. *Psychiatric Services*, May 2003, vol. 54 No. 5, p.746. (Pandiani and Banks)