Assessing a Rate Calculating Methodology: Comparing County of Arrest to County of Residence in a Sample of Arrest Events Submitted to the Wisconsin Centralized Criminal History Repository

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Introduction:

Rates are an important statistical tool to compare the occurrence of an event when the populations being compared are not equal. This is especially true with criminal justice data when trying to understand if events such as arrests, charges, or convictions are occurring disproportionately between one location and another, or between one group of people and another. For example, in terms of comparability, 200 arrests in a large city are not proportionately the same as 200 arrests in a small rural community. Similarly, 200 arrests of Native Americans are not proportionately the same as 200 arrests of Whites, when the overall population distributions of Native Americans and Whites is not equal.

Rates are calculated with the number of the occurrences in the numerator, the population of the group in the denominator, and the result of that is multiplied by a set factor of a number of people. For example, 20,000 arrests divided by a population of 1,000,000 people times a set factor of 10,000 people would give a rate of 200 arrests per 10,000 people.

When calculating rates of an event occurring in a defined group within the United States (U.S.), a common methodology uses the U.S. Census data to estimate the population of that defined group. This allows for the comparison of arrest rates between one county and another and could be even further sub divided by demographic classes captured both in the census data and criminal justice records, like race and sex. Research questions such as: are Whites arrested at a higher rate than other races and does one specific city have a higher arrest rate for drug crimes than a different specific rural community, can be answered.

This methodology, using census data as the populations (denominators) in the rate calculations, however, makes one large assumption -- that the person who was arrested, charged, or convicted lived in the same state, county, city (depending on the grouping) that they were arrested, charged, or convicted in. This research brief tests that assumption by assessing how frequently a Wisconsin sample of arrestees were arrested by a law enforcement agency in a county in which they did not reside.

Method:

The dataset is comprised of arrest events that occurred statewide between 1/1/2019 and 12/31/2019 and were submitted to Wisconsin centralized criminal history repository (CCH) at the Wisconsin Department of Justice (DOJ) and where at least one of the of the arrest charges was listed as a statutory violation (as opposed to non-criminal/ordinance violation arrests). An arrest event occurs when a law enforcement agency fingerprints someone and sends those fingerprints along with details of the arrest (information about the arrestee and information about the why they were arrested) to DOJ to be added to the CCH and an individual's rap sheet. Arrest events that had an arrestee home address submitted with them were put through a geocoding process to identify which Wisconsin county that address fell within. This process involved first sending the addresses to the US Census Bureau's geocoding application programing interface (API). Addresses that were not able to be matched were then geocoded with latitudinal and longitudinal coordinates from the ARCGIS online API and then sent to the Federal Communications Commission (FCC) geocoding API to get a specific Wisconsin county. A variable was then created identifying arrest events in which the county of the arresting agency and the county of the arrestee's home address matched.

Results:

For 2019, 138,410 unique arrest events were submitted to the Wisconsin CCH. Two thirds (66%; 91,598) of the arrests occurred in the same county as the arrestee resided, whereas twenty-four percent (33,295 arrests) occurred in a county in which the arrestee did not reside. Ten percent (13,528) of the arrests either did not have an arrestee address submitted with the arrest event or had an address that could not be placed into a particular Wisconsin county during the coding process.

Statewide

Arrest occurred in same county as arrestee residence	*Number of Arrests*	*Percentage of Arrests*
Yes	91,598	66.18%
No	33,295	24.06%
Unknown	13,528	9.77%
Total	**138,410**	**100%**

Menominee, Iron, and Ozaukee counties had the highest percentage of arrests that occurred in a county different to the arrestee residence (88%, 63%, 62% respectively). Milwaukee, Rock and La Crosse counties had the lowest percentage of arrests that occurred in a county different to the arrestee residence (6%, 13%, 17% respectively).

Wisconsin Counties

County	*Different Counties*		*Same Counties*		*Unknown*	
	Number of Arrests	**% of Arrests**	**Number of Arrests**	**% of Arrests**	**Number of Arrests**	**% of Arrests**
MENOMINEE	30	88.24%	2	5.88%	2	5.88%
IRON	106	63.10%	60	35.71%	2	1.19%
OZAUKEE	1,059	61.71%	614	35.78%	43	2.51%
CALUMET	417	57.12%	291	39.86%	22	3.01%
BUFFALO	140	50.00%	128	45.71%	12	4.29%
DANE	380	48.16%	394	49.94%	15	1.90%
WAUKESHA	3,225	46.18%	3,549	50.82%	213	3.05%
PEPIN	53	45.30%	60	51.28%	4	3.42%
IOWA	344	43.75%	426	54.06%	18	2.28%
WAUSHARA	413	43.65%	506	53.60%	25	2.65%
MARQUETTE	194	43.40%	238	53.24%	15	3.36%
SHAWANO	551	41.71%	733	55.49%	37	2.80%
COLUMBIA	774	41.38%	1,065	56.68%	40	2.13%
FLORENCE	24	41.38%	34	58.62%	1	1.72%
ONEIDA	457	41.21%	632	56.99%	20	1.80%
WASHINGTON	1,109	41.19%	1,469	54.81%	102	3.81%

PIERCE	316	40.20%	404	51.40%	66	8.40%
WASHBURN	169	39.58%	241	56.44%	17	3.98%
GREEN LAKE	216	39.39%	313	55.89%	31	5.54%
OUTAGAMIE	1,154	38.57%	1,710	58.36%	66	2.25%
CRAWFORD	138	38.44%	217	60.45%	4	1.11%
ST. CROIX	435	38.12%	676	59.25%	30	2.63%
JEFFERSON	795	37.39%	1,250	58.06%	109	5.06%
JUNEAU	307	36.93%	497	60.54%	17	2.07%
WALWORTH	1,020	36.53%	1,704	61.03%	69	2.47%
OCONTO	221	36.05%	376	61.34%	16	2.61%
MONROE	331	34.37%	621	64.49%	11	1.14%
CLARK	224	33.49%	409	60.41%	44	6.50%
FOREST	152	33.33%	302	64.81%	12	2.58%
LAFAYETTE	146	33.30%	274	62.84%	16	3.67%
MARINETTE	241	33.10%	481	66.07%	6	0.82%
SAUK	652	33.09%	1,218	62.21%	88	4.49%
TREMPEALEAU	182	32.62%	351	64.29%	13	2.38%
BURNETT	264	31.69%	550	65.63%	24	2.86%
JACKSON	225	31.56%	469	66.06%	16	2.25%
POLK	309	31.50%	646	65.99%	24	2.45%
ADAMS	131	31.49%	277	65.18%	17	4.00%
DODGE	599	31.33%	1,216	63.93%	87	4.57%
DUNN	323	30.82%	691	67.02%	17	1.65%
LANGLADE	148	30.71%	325	67.43%	9	1.87%
BARRON	310	29.67%	722	68.83%	17	1.62%
EAU CLAIRE	1,295	29.55%	2,937	67.30%	132	3.02%
CHIPPEWA	489	29.18%	1,164	69.45%	23	1.37%
FOND DU LAC	593	29.04%	1,340	65.62%	109	5.34%
GRANT	173	28.93%	411	67.82%	22	3.63%
VERNON	151	28.55%	359	68.77%	12	2.30%
KEWAUNEE	95	27.83%	248	71.88%	2	0.58%
PRICE	78	27.76%	197	70.11%	6	2.14%
RACINE	1,552	27.54%	3,985	71.45%	40	0.72%
BAYFIELD	113	27.23%	291	70.12%	11	2.65%
DOUGLAS	356	26.45%	957	71.10%	33	2.45%
LINCOLN	228	26.45%	585	67.87%	49	5.68%
RUSK	69	26.23%	185	70.08%	10	3.79%
WINNEBAGO	745	26.14%	2,036	71.69%	59	2.08%
KENOSHA	1,078	25.12%	3,168	73.81%	46	1.07%
WAUPACA	455	25.11%	1,301	71.80%	57	3.15%

RICHLAND	85	24.32%	257	72.80%	11	3.12%
SAWYER	297	24.08%	896	73.38%	28	2.29%
TAYLOR	94	23.44%	299	74.56%	8	2.00%
DOOR	127	22.48%	411	72.74%	27	4.78%
GREEN	102	22.27%	331	72.27%	25	5.46%
MANITOWOC	426	22.24%	1,477	75.05%	65	3.30%
MARATHON	600	22.16%	2,077	75.25%	83	3.01%
PORTAGE	240	21.91%	834	77.01%	9	0.83%
VILAS	282	21.74%	989	76.85%	16	1.24%
WOOD	376	21.65%	1,231	72.80%	84	4.97%
ASHLAND	113	21.16%	409	76.59%	12	2.25%
SHEBOYGAN	436	19.13%	1,752	76.88%	91	3.99%
BROWN	992	18.01%	4,427	80.39%	88	1.60%
LA CROSSE	499	16.73%	2,454	82.29%	29	0.97%
ROCK	341	13.22%	2,170	84.11%	69	2.67%
MILWAUKEE	1,759	6.24%	26,279	93.16%	174	0.62%

Felony Arrests

When at least one of the charges listed for the arrest was marked as a felony, sixty-seven percent (36,449) of the arrests occurred in the same county as the arrestee resided. This is in contrast to twenty-three percent (12,779) of the arrests occurring in a county different to the county in which the person arrested resided; ten percent (5,304) of the arrests either did not have an arrestee address submitted with the arrest event or had an address that could not be placed into a particular Wisconsin county during the coding process.

Felony Arrests Statewide

Arrest occurred in same county as arrestee residence	*Number of Arrests*	*Percentage of Arrests*
Yes	36,449	66.84%
No	12,779	23.43%
Unknown	5,304	9.73%
Total	**54,530**	**100%**

Menominee, Ozaukee and Iron counties had the highest percentage of arrests where at least one charge was for a felony that occurred in a county different to the arrestee residence (88%, 63%, 63% respectively). Milwaukee, Rock and La Crosse counties had the lowest percentage of felony arrests that occurred in a county different to the arrestee residence (6%, 16%, 18% respectively).

Felony Arrests by Wisconsin County

County	*Different Counties*		*Same Counties*		*Unknown*	
	Number of Arrests	**% of Arrests**	**Number of Arrests**	**% of Arrests**	**Number of Arrests**	**% of Arrests**
MENOMINEE	15	88.24%	1	5.88%	1	5.88%
OZAUKEE	259	63.33%	144	35.21%	6	1.47%
IRON	29	63.04%	16	34.78%	1	2.17%
CALUMET	174	62.37%	98	35.13%	7	2.51%
BUFFALO	65	58.04%	41	36.61%	6	5.36%
DANE	198	52.52%	174	46.15%	5	1.33%
CRAWFORD	59	49.17%	60	50.00%	1	0.83%
WASHINGTON	325	48.29%	317	47.10%	31	4.61%
ST. CROIX	190	47.26%	201	50.00%	11	2.74%
FLORENCE	8	47.06%	8	47.06%	1	5.88%
PIERCE	113	46.69%	114	47.11%	15	6.20%
ONEIDA	147	46.08%	170	53.29%	2	0.63%
WAUKESHA	1,174	45.05%	1,360	52.19%	72	2.76%
JEFFERSON	240	44.28%	284	52.40%	19	3.51%
WAUSHARA	103	44.21%	124	53.22%	6	2.58%
WASHBURN	71	44.10%	87	54.04%	3	1.86%
SHAWANO	203	44.03%	253	54.88%	5	1.08%
TREMPEALEAU	91	43.54%	113	54.07%	5	2.39%
OUTAGAMIE	477	42.55%	627	55.93%	17	1.52%
GREEN LAKE	73	41.48%	97	55.11%	6	3.41%
MARQUETTE	45	41.28%	58	53.21%	6	5.50%
COLUMBIA	342	41.06%	473	56.78%	18	2.16%
MONROE	207	39.88%	306	58.96%	6	1.16%
IOWA	117	39.26%	174	58.39%	7	2.35%
LAFAYETTE	58	38.67%	87	58.00%	5	3.33%
FOREST	71	38.59%	109	59.24%	4	2.17%
POLK	129	38.05%	206	60.77%	4	1.18%
MARINETTE	103	36.14%	176	61.75%	6	2.11%
CHIPPEWA	272	36.07%	471	62.47%	11	1.46%
JUNEAU	110	36.07%	189	61.97%	6	1.97%
BURNETT	132	35.39%	233	62.47%	8	2.14%
SAUK	190	34.61%	335	61.02%	24	4.37%
CLARK	56	34.36%	98	60.12%	9	5.52%
DUNN	130	34.03%	244	63.87%	8	2.09%
BARRON	167	33.94%	319	64.84%	6	1.22%
WAUPACA	136	33.25%	258	63.08%	15	3.67%

FOND DU LAC	262	33.16%	487	61.65%	41	5.19%
EAU CLAIRE	633	32.03%	1,257	63.61%	86	4.35%
WALWORTH	299	31.47%	625	65.79%	26	2.74%
JACKSON	66	31.43%	140	66.67%	4	1.90%
ADAMS	52	31.33%	108	65.06%	6	3.61%
DODGE	192	31.02%	399	64.46%	28	4.52%
LANGLADE	63	30.88%	137	67.16%	4	1.96%
BAYFIELD	37	30.58%	80	66.12%	4	3.31%
RICHLAND	37	30.33%	84	68.85%	1	0.82%
PRICE	29	29.59%	67	68.37%	2	2.04%
PEPIN	5	29.41%	11	64.71%	1	5.88%
GRANT	57	29.38%	128	65.98%	9	4.64%
KEWAUNEE	26	29.21%	62	69.66%	1	1.12%
VERNON	47	28.48%	116	70.30%	2	1.21%
KENOSHA	427	28.33%	1,061	70.40%	19	1.26%
RACINE	542	27.78%	1,394	71.45%	15	0.77%
DOOR	47	27.17%	116	67.05%	10	5.78%
WINNEBAGO	261	27.05%	680	70.47%	24	2.49%
DOUGLAS	111	26.88%	288	69.73%	14	3.39%
TAYLOR	25	26.04%	71	73.96%		
GREEN	43	25.90%	115	69.28%	8	4.82%
SAWYER	141	25.59%	397	72.05%	13	2.36%
WOOD	154	24.96%	438	70.99%	25	4.05%
PORTAGE	116	24.73%	348	74.20%	5	1.07%
OCONTO	24	24.00%	70	70.00%	6	6.00%
RUSK	26	23.85%	80	73.39%	3	2.75%
LINCOLN	98	23.79%	285	69.17%	29	7.04%
VILAS	88	22.17%	305	76.83%	4	1.01%
ASHLAND	54	21.95%	188	76.42%	4	1.63%
MARATHON	267	21.58%	930	75.18%	40	3.23%
MANITOWOC	131	21.16%	466	75.28%	22	3.55%
BROWN	567	19.23%	2,332	79.08%	50	1.70%
SHEBOYGAN	152	17.84%	656	77.00%	44	5.16%
LA CROSSE	240	17.51%	1,121	81.77%	10	0.73%
ROCK	141	16.11%	726	82.97%	8	0.91%
MILWAUKEE	874	6.43%	12,656	93.05%	72	0.53%

All Arrests by Sex

The sex of the arrestee (male/female) was a significant factor when comparing the difference between the number of people who were arrested in a county different to which they resided (X^2 (2, N = 138,415) = 41.39, p <0 .001). Sixty seven percent (68,559) of the males and sixty five percent (23,039) of the females arrested resided in the same county in which they were arrested. This is in comparison to twenty four percent (24,323) of the males arrested and twenty five percent (8,972) of the females arrested who resided in a county different to the one they were arrested in. Ten percent of both the males (10,074) and females (3,448) arrested either did not have an address submitted with the arrest event or had an address that could not be placed into a particular Wisconsin county during the coding process.

Arrestee Sex	*Different Counties*		*Same Counties*		*Unknown*	
	Number of Arrests	**% of Arrests**	**Number of Arrests**	**% of Arrests**	**Number of Arrests**	**% of Arrests**
MALE	24,323	23.63%	68,559	66.60%	10,074	9.79%
FEMALE	8,972	25.30%	23,039	64.98%	3,448	9.72%

All Arrests by Race

The race of the arrestee (Asian or Pacific Islander, Black, Native American or Alaskan Native, White, or Unknown) was also a significant factor when comparing the difference between the number of people who were arrested in a county different to which they resided (X^2 (8, N=139,285) = 1,090.8, p<0.001). Seventy percent (26,243) of the Black arrestees, sixty-five percent (4,089) of the Native American or Alaskan Native arrestees, sixty-five percent (58,577) of the White arrestees and, sixty-three percent (1,084) of the Asian or Pacific Islander arrestees were arrested in the same county in which they resided. This is in comparison to the thirty percent (1,881) of Native American or Alaskan Native arrestees, twenty-six percent (411) of Asian or Pacific Islander arrestees, twenty-five percent (22,904) of White arrestees and nineteen percent (7,199) of Black arrestees who were arrested in a county different to the one in which they resided. Eleven percent (195) of the Asian or Pacific Islander arrestees, ten percent of the Black (4,019) and White (8.832) arrestees, and four percent (277) of the Native American or Alaskan Native arrestees either did not have an address submitted with the arrest event or had an address that could not be placed into a particular Wisconsin county during the coding process.

Arrestee Race	*Different Counties*		*Same Counties*		*Unknown*	
	Number of Arrests	**% of Arrests**	**Number of Arrests**	**% of Arrests**	**Number of Arrests**	**% of Arrests**
ASIAN or PACIFIC ISLANDER	411	25.64%	1,084	63.02%	195	11.34%
BLACK	7,199	19.22%	26,243	70.05%	4,019	10.73%
NATIVE AMERCIAN or ALASKIAN NATIVE	1,881	30.11%	4,089	65.46%	277	4.43%
WHITE	22,904	25.36%	58,577	64.87%	8,832	9.78%
UNKNOWN	870	32.54%	1,605	60.02%	199	7.44%

Discussion:

One common methodology for calculating rates utilizing criminal justice data is to use U.S. Census counts for the number of people/population of interest. One limitation for that methodology is it assumes the person who was arrested, charged, or convicted is represented in the Census data - essentially that they lived in the same place that they were arrested, charged or convicted. This research brief assessed whether that was a fair assumption to make, by analyzing the county in which an arrestee lived in comparison to the county in which they were arrested in for a sample of arrests made in Wisconsin in 2019. Despite finding significant relationships between sex and race and whether the person's arrest was in the same county or different county than their home address, the general finding was that two thirds of the arrestees were arrested in the same county that they resided in. This supports a methodology of using Census data and county populations when calculating arrest rates.

A few limitations exist in this analysis. An assumption was made that the home addresses listed for the arrestees would have been the same address that the person had during the Census. There are a few reasons why this assumption could prove inaccurate. One, people move and change home addresses for various reason, some more frequently than others. It could be possible that some people had one home address during the Census and a different home address when they were arrested. If those were in different counties, that would affect the results of this analysis. Two, it is not known how the law enforcement agency that conducted the arrest obtained the home address of the arrestee. It could be that the agency used the address listed on the arrestee's identification card (i.e. driver's license). As some identification cards are valid for long periods of time, the address listed on the card could have been inaccurate at the time of arrest and potentially even different than the home address of that person during the Census.

Future research briefs could explore the racial and sex differences found in more detail as well as attempt to understand the instances where a person was arrested in a county different to which they resided. Perhaps there are certain types of crimes where these differences are more common.