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Differences in Rural vs. Urban Injury Hospitalizations and Access to Care in Maine (2015 – 2020): Statistical and Geographic Perspectives

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For completion of master's in public health degree requirement

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Table of Contents

Background: **3**

Methods: **3**

Inpatient Hospitalization Data **3**

Statistical Analysis **4**

Geographic Analysis **4**

Results: **6**

Statistical Analysis: **6**

Table 1: Frequency of Injury Hospitalizations by Intent of Injury 6

Table 2: Leading Causes of Injury Hospitalization by Frequency by Mechanism of Injury 7

Figure 1: Percent Distribution of Hospital Discharges (All Injuries), by nature of injury 7

Figure 2: Percent Distribution of Hospital Discharges (All Injuries), by body level of injury 8

Geographic Analysis: **9**

Table 3: Stratified Analysis of Unadjusted, Quarterly Injury Hospitalization Rates and Rate Ratios by Demographics by Rurality Categorization 10

Table 4: Age and Sex Adjusted Quarterly Injury Rates by Rurality of Residence for Select Mechanisms of Injury[7] 11

Figure 3: Gravity-Based Model for Hospital Accessibility 12

Figure 4: 2SFCA Model for Hospital Accessibility 13

Discussion: **14**

Figure 5: Rate Ratios by Age Groups for Motor Vehicle Accidents (Appendix Table 6): 14

Figure 6: Adjusted Rate Ratios by Age Group for Hospitalization due to Unintentional Drug Poisonings (Appendix Table 7): 15

Figure 7: Rate for Hospitalization due to Intentional Self-Harm by Age Group, Male (Appendix Table 9): 15

Figure 8: Rate for Hospitalization due to Intentional Self-Harm by Age Group, Female (Appendix Table 9) 16

Limitations: **17**

Citations: **17**

Appendix: Supplemental Tables **19**

Table 1: *Overall Injury Hospitalizations (All Intents)* **19**

Table 2: *Firearm Related Injuries (All Intents)* **20**

Table 3: *Traumatic Brain Injuries (All Intents)* **21**

Table 4: *Unintentional Injuries (All Mechanisms)* **22**

Table 5: *Unintentional Falls* **23**

Table 6: *Unintentional Motor Vehicle Accidents (Occupant)* **24**

Table 7: *Unintentional Poisoning (Drug)* **25**

Table 8: Intentional Self-Harm (All Mechanisms) **26**

Table 9: Intentional Self-Harm (Poisoning (Drug)) **27**

Background:

Each year, injuries are among the leading cause of death and disability in the United States. According to the Centers for Disease Control and Prevention (CDC), from 2012 to 2019 unintentional injuries were among the leading cause of death for individuals ages 1-44, with suicide being the second leading cause in the same period of time (CDC, 2019). In addition to this substantial loss of human life, injuries impose major economic burdens and can dramatically decrease quality of living. In 2013 alone, the estimated combined medical and work-loss costs associated with traumatic injuries exceeded $214 billion (Florence et al, 2015).

At the national level in the United States, individuals in rural areas are hospitalized at higher rates when compared to their urban counterparts (Coben et al, 2008). Likewise, trauma deaths in rural areas tend to result from less severe injuries than in urban areas due to the delayed access to trauma care caused by increased travel distances to trauma facilities (Peek-Asa et al, 2004). This comes at a time when rural hospitals are closing at an increasing rate, which may have significant consequences for preventing mortality from otherwise preventable deaths in rural areas across the country.

At present, the state of Maine has a small trauma system that includes only three trauma centers, all of which are located in the southern and central parts of the state. This paper aims to serve as an exploratory analysis into understanding the burden of injury that exists in Maine's rural communities and their access to hospital care for traumatic injuries, which may be critical in preventing excess death in rural areas.

Methods:

Inpatient Hospitalization Data

This study analyzed the Maine Health Data Organization (MHDO)'s hospital database for inpatient encounters from the fourth quarter 2015 to the fourth quarter 2019.[1] Patients who suffered an injury in this timeframe were identified using the 10th revision of the CDC's ICD-10-CM Injury Diagnoses Matrix. Following recommendations found in the Safe States Alliance's Injury Surveillance Workgroup 9 (ISW9) report, *The Transition from ICD-9-CM to ICD-10-CM*, the injury subset consisted of patients whose injury code was reported in the principal diagnoses field (Injury Surveillance Workgroup 9, 2016). This subset of identified injury patients was then further categorized by their external cause injury code into five categories described by the intentionality of the injury: unintentional, intentional self-harm, assault, undetermined and legal intervention/war. Again, following recommendations from the ISW9, this study based a patient's cause of injury on the first valid external cause of injury code (Injury Surveillance Workgroup 9, 2016).

Patients who were not residents of Maine were excluded from this study and patients with missing age, sex or zip code data were only included in total rate calculations. All population level data was obtained from the United States Census Bureau's American Community Survey

[1] MHDO reporting quarters are three-month periods: Jan-Mar, Apr-Jun, Jul-Sept, Oct-Dec.

(ACS) 5-Year estimates. Patient zip codes were used to determine the level of rurality of a patient's residence by linking the zip codes to its corresponding Rural-Urban Commuting Area (RUCA) code, developed by the United States Department of Agriculture's Economic Research Service.

Statistical Analysis

Data for this study were aggregated for the overall population, as well as by MHDO data reporting quarter, sex, age group and rurality category. Sex was aggregated into two levels (male and female); ages were aggregated into 11 age groups that aligned with the age groups found in the ACS (0-4, 5-14, 25-24… 85+); and RUCA codes were aggregated into a 4-level rurality categorization (Urban, Large Rural, Small Rural and Isolated)[2]. Poisson regression with a natural log offset for the population was utilized to generate incidence rates and incidence rate ratios (IRR) for each aggregated dataset[3], 95% confidence intervals (CI), and to assess for trends. Rates and rate ratios were adjusted to account for differences in age, sex and the rurality of patient residence.

Geographic Analysis

Injuries resulting in hospitalization tend be more severe than other injuries making timely access to hospital services critical. In addition to understanding the potential burden injuries place on different communities, this study conducted exploratory analyses into the access to hospital care for traumatic injuries available to Maine's communities.

To do this, this study utilized the two methods proposed by Luo and Wang (2003) for a gravity-based spatial accessibility and two step floating catchment area (2SFCA) model. The gravity-based index method generates an accessibility index based on the ratio of supply to demand for a given location given the following:

$$A_i^G = \sum_{j=1}^{n} \frac{S_j d_{ij}^{-\beta}}{V_j}, where\ V_j = \sum_{k=1}^{m} D_k d_{kj}^{-\beta}$$

- A_i^G represents the gravity-based index.
- S_j represents the total supply at location *j*
- d_{ij} is the distance between a demand point *i* and the supply point *j*
- *Beta* is the travel-friction coefficient
- V_j represent the potential demand at location *j*

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[2] See Figure 1 for the four level rurality codes visualized.
Urban Associated RUCA Codes: 1, 1.1
Large Rural Associated RUCA Codes: 2, 2.1, 3, 4, 4.1, 5, 5.1, 6
Small Rural Associated RUCA Codes: 7, 7.1, 7.2, 8, 8.1, 8.2, 9, 10.1, 10.2, 10.3
Isolated Associated RUCA Codes: 10

[3] The following variables were used as reference groups for their respective datasets IRR calculations: 4th quarter 2015, Female, Urban and the 85 and older age group.

- *n* and *m* represent the total number of supply point and demand points.

While the formulation of the 2SFCA model is derived from:

$$R_j = \left(\frac{S_j}{\sum_{k \{d_{kj} \leq d_0\}} P_k}\right)$$

$$A_i^F = \sum_{j \in \{d_{ij} \leq d_0\}} R_j = \sum_{j \in \{d_{ij} \leq d_0\}} \left(\frac{S_j}{\sum_{k \{d_{kj} \leq d_0\}} P_k}\right)$$

- For each population location (i) search all physician locations (j) that are within the distance threshold (d0).
- For the catchment area (A_i^F) sum up the population ratio Rj at each population location.

In each of these models, the same data and data sources were utilized. First, a road network feature set was built from road data obtained from Maine GeoLibrary's E911 database. Supply points were identified as Critical Access and Short-Term care hospitals using public data and cost reports published by the office of Health Resources and Services Administration (HRSA). The total supply at each site was determined by finding the ratio of FTE of providers (physicians, physician assistants and nurse practitioners) over the number of hospital beds available. Demand was determined using Maine 2010 Census Block population estimates with Census Blocks that were unpopulated being excluded. With these points and networks in place, ArcGIS' O-D cost matrix was used to determine the drive time from Census tract centroids to the hospitals around the state. Data were then exported into SAS to calculate the equations shown above. While calculating the index, additional sensitivity analyses were conducted by varying *Beta* coefficient in the gravity-based model. The index was then rejoined in ArcGIS for sensitivity testing using data visualization.[4]

This combined approach was chosen as each have different limitations. While the gravity-based model allows travel information to be incorporated, the gravity-based model tends to inflate areas with poor access to care, meaning the results presented in this study may overestimate access in certain areas (Luo and Wang, 2003). While the 2SFCA approach tends to not inflate the ratios in the same way, it treats all points within the distance threshold as equally accessible, meaning a hospital thirty minutes away is treated the same as one with a sixty-minute travel time. Especially in emergency situations, this is not always true. Because of these limitations, both models were chosen, with the gravity-based model's friction coefficient offsetting the travel time issues of 2SFCA, and the 2SFCA not inflating low access areas. The true accessibility to hospital care may lay somewhere in between these two modeling approaches.

All statistical and geographic analyses were conducted using SAS 9.4 and ArcGIS 10.7.1.

[4] The spatial index scores were inflated by 1,000 as exporting small index values would lead to data loss.

Results:

Statistical Analysis:

From the fourth quarter 2015 to the fourth quarter 2019, there were 591,188 hospitalizations in the state of Maine. Of these hospitalizations, 32,932 were classified as injuries based on the primary diagnose code. This study identified 30,219 of these injuries as the result of an unintentional injury; 2,142 as intentional self-harm; 385 as assault; 171 undetermined injuries and 15 were identified as the result of legal intervention or war (Table 1).[5] Falls, drug poisonings and motor vehicle accidents were the leading causes of injury over the study period (Table 2). The most frequent nature of injuries were fractures, internal organ injuries and poisonings, with the most frequent body-levels affected being lower extremities, systemwide injuries and traumatic brain injury (TBI) (Figures 1 & 2).

Additional tables for specific intents and mechanisms can be found in the Appendix of this paper.

Table 1: Frequency of Injury Hospitalizations by Intent of Injury

Intent	***Frequency***
Unintentional	30219
Self-Harm	2142
Assault	385
Undetermined	171
Legal/War	15
Total	***32,219***

[5] When expanding the classification criteria for injury to any diagnoses field, there was a total of 56,524 injury diagnoses, of these 52,253 were unintentional, 3264 were intentional-self harm, 672 were assault, 248 were undetermined and 87 were the result of legal intervention or war.

Table 2: Leading Causes of Injury Hospitalization by Frequency by Mechanism of Injury

Mechanism	***Frequency***
Fall	20690
Poisoning (Drug)	3719
Motor Vehicle Accident (Occupant)	2497
Struck by/Against	960
Unspecified	806
Motor Vehicle Accident (Motorcyclist)	585
Motor Vehicle Accident (Non-Traffic)	584
Other Land Transport	440
Cut/Pierce	277
Motor Vehicle Accident (Pedestrian)	246

Figure 1: Percent Distribution of Hospital Discharges (All Injuries), by nature of injury

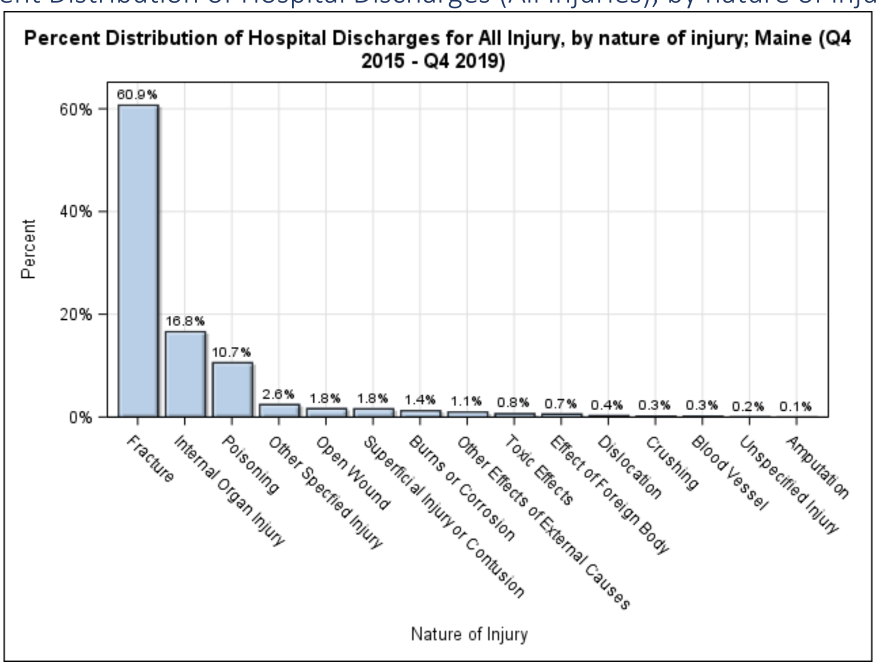
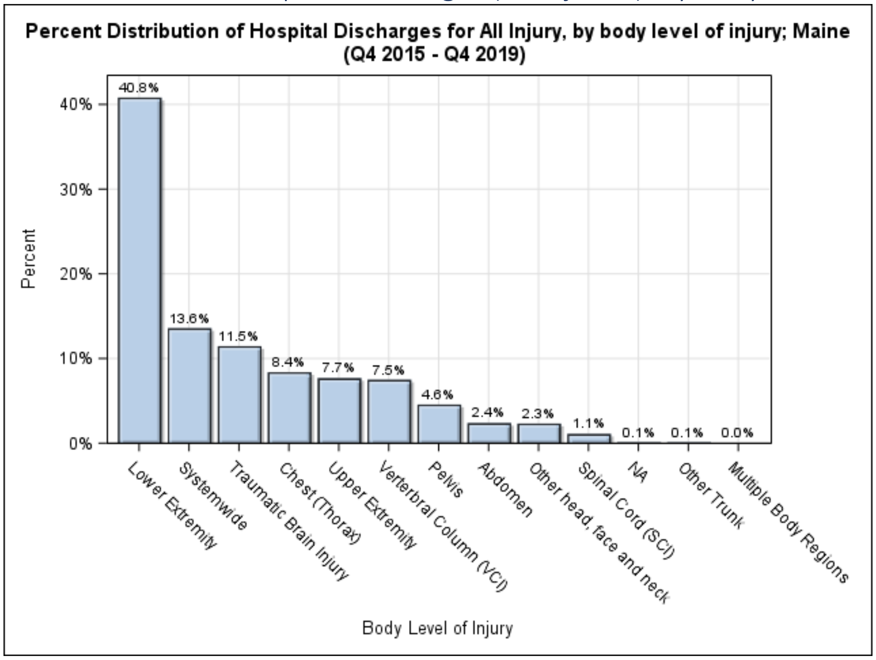


Figure 2: Percent Distribution of Hospital Discharges (All Injuries), by body level of injury



Overall, there were significantly different rates of injury hospitalization between rural and urban areas. In particular, the most rural areas in Maine (the small rural and isolated rural areas) had unadjusted injury hospitalization rates that were higher than those among in urban areas (Table 3). Rates in small rural areas were 18% (95% CI: 15%, 23%; p<.0001) higher than the rates in urban areas, while the rates in isolated rural areas were 10% higher (95% CI: 6%, 13%; p<.0001). Large rural areas had 6% lower rates of injury hospitalization than in urban areas (95% CI: -8%, -3%; p<.0001).

As our stratified analysis shows, injury hospitalization rates for men, women, and four out of the ten age groups were higher in small rural areas than in urban areas, while rates were higher in urban area for persons aged 65-74 (Table 3). Isolated rural areas also saw higher injury hospitalization rates in men and among young adults aged 15-34, while persons aged<5 and aged 65-74 had higher rates in urban areas. Large rural areas had lower rates for females, persons aged <5, 45-54, and 65+, compared to urban areas, and higher rates for persons aged 15-24.

After adjusting for age and sex, unintentional injury hospitalizations were the highest in small rural areas, at quarterly rate of 101.8 per 100,000 population (95% CI: 98.5, 105.1). These were higher when compared to the quarterly rate found in urban areas, which was 97.2 per 100,000 (95% CI: 94.8, 99.7; p = .01); for large rural and isolated rural areas, the rates were not significantly different from urban. The rate of hospitalization for motor vehicle accidents (where the patient was a vehicle occupant) was higher for all rural areas when compared against urban areas. The quarterly rate of motor vehicle accidents leading to hospitalizations in urban areas was 5.6 per 100,000 population (95% CI: 5.0, 6.2), in large rural areas this rate was 9.9 per

100,000 (95% CI: 9.1, 10.8, p < .001), in small rural areas this rate was 9.4 per 100,000 (95% CI: 8.3, 10.5, p<.0001) and in isolated rural areas this rate was 10.5 per 100,000 (95% CI: 9.4, 11.7, p<.0001).

Geographic Analysis:

North and east of Bangor, access to Short Term Care hospitals in Maine is limited. These regions possess only rural Critical Access Hospitals. When comparing the two spatial models produced by this report, different patterns stand out. From the gravity-based analysis, central Maine (the region from Lewiston to Bangor, along U.S. Route 95) had the highest and most dense coverage of good spatial accessibility when it comes to hospital care, while counties in both Eastern Maine and Western Maine (Aroostook, Franklin, Somerset, Oxford, and Washington Counties) had relatively low scores on the accessibility index (Figure 3). From the 2SFCA model, accessibility still appears high in the parts of central Maine, but Aroostook, Washington and Southern Piscataquis Counties also appear to have the greater access to hospitals than they did in the gravity-based model (Figure 4). Finally, across both models, Western Maine has the lowest access to hospital care.

Table 3: Stratified Analysis of Unadjusted, Quarterly Injury Hospitalization Rates and Rate Ratios by Demographics by Rurality Categorization[6]

	Urban (Reference)			Large Rural							Small Rural							Isolaed Rural						
	Rate per 100,000	*CI 95% Lower*	*CI 95% Upper*	*Rate per 100,000*	*CI 95% Lower*	*CI 95% Upper*	*Rate Ratio*	*CI 95% Lower*	*CI 95% Upper*	*p-value*	*Rate per 100,000*	*CI 95% Lower*	*CI 95% Upper*	*Rate Ratio*	*CI 95% Lower*	*CI 95% Upper*	*p-value*	*Rate per 100,000*	*CI 95% Lower*	*CI 95% Upper*	*Rate Ratio*	*CI 95% Lower*	*CI 95% Upper*	*p-value*
Overall:	142.39	139.68	145.17	134.76	131.24	138.4	0.94	0.92	0.97	**<.0001**	169.10	163.6	174.84	1.18	1.15	1.23	**<.0001**	156.10	151.13	161.22	1.10	1.06	1.13	**<.0001**
Sex:																								
Female	157.42	153.44	161.5	140.61	135.67	145.74	0.89	0.86	0.93	**<.0001**	182.99	175.08	191.24	1.16	1.11	1.21	**<.0001**	163.42	156.4	170.74	1.04	0.99	1.08	0.095
Male	126.47	122.81	130.25	128.74	123.75	133.94	1.02	0.98	1.06	0.38	154.41	146.9	162.3	1.22	1.16	1.28	**<.0001**	148.6	141.65	155.89	1.17	1.12	1.23	**<.0001**
Age:																								
< 5	40.21	34.23	47.24	26.39	20.66	33.72	0.66	0.51	0.84	**0.0008**	36.97	27.07	50.48	0.92	0.67	1.26	0.60	19.33	13.05	28.61	0.48	0.32	0.71	**0.00**
5 - 14	17.53	14.79	20.78	17.16	13.39	21.51	0.98	0.78	1.23	0.85	17.87	20.92	24.33	1.02	0.75	1.39	0.90	16.20	11.94	21.97	0.92	0.68	1.25	0.61
14 - 24	49.12	44.99	53.64	68.84	61.28	77.32	1.40	1.25	1.57	**<.0001**	70.67	60.63	82.37	1.44	1.23	1.68	**<.0001**	67.62	58.11	78.68	1.38	1.18	1.60	**<.0001**
25 - 34	66.98	62.11	72.24	78.08	70.35	86.66	1.17	1.05	1.29	**0.0039**	91.36	79.78	104.62	1.36	1.19	1.56	**<.0001**	84.60	73.71	97.10	1.26	1.10	1.45	**0.0009**
35 - 44	82.38	76.55	88.65	81.32	73.60	89.87	0.99	0.89	1.09	0.80	88.79	77.71	101.44	1.08	0.94	1.23	0.27	88.99	78.13	101.36	1.08	0.95	1.23	0.25
45 - 54	90.59	84.87	96.69	77.08	70.49	84.29	0.85	0.78	0.93	**0.0004**	103.25	92.24	115.55	1.14	1.02	1.28	**0.02**	82.40	73.47	92.43	0.91	0.81	1.02	0.11
55 - 64	91.36	79.78	104.62	125.05	116.25	134.52	1.02	0.95	1.10	0.56	133.41	121.56	146.41	1.09	0.99	1.20	**0.07**	116.22	106.18	127.23	0.95	0.87	1.04	0.26
65 - 75	236.28	224.89	248.27	220.29	206.26	235.29	0.93	0.87	1.00	**0.04**	218.62	201.25	237.49	0.93	0.85	1.01	**0.07**	192.64	178.06	208.41	0.82	0.75	0.88	**<.0001**
75 - 84	565.68	541.54	590.95	521.56	491.14	553.81	0.92	0.87	0.98	**0.01**	542.25	504.02	583.31	0.96	0.89	1.03	0.26	514.41	479.59	551.82	0.91	0.85	0.98	**0.01**
85+	1299.36	1248.28	1352.39	1208.25	1139.02	1281.81	0.93	0.88	0.99	**0.02**	1264.24	1180.30	1354.01	0.97	0.91	1.04	0.43	1265.50	1182.43	1354.55	0.97	0.91	1.04	0.45

[6] Boldface, blue values indicate where RRs showed rural rates higher than those found urban areas, while boldface yellow values indicate that urban rates were higher than that category of rural areas.

Table 4: Age and Sex Adjusted Quarterly Injury Rates by Rurality of Residence for Select Mechanisms of Injury[7]

	Age and Sex Adjusted Quarterly Injury Rates			
	Urban *Rate (95% CI)*	**Large Rural** *Rate (95% CI)*	**Small Rural** *Rate (95% CI)*	**Isolated** *Rate (95% CI)*
Unintentional	97.2 (94.8, 99.7)	95.8 (93.5, 98.1)	101.8 (98.5, 105.1)	95.4 (92.4, 98.4)
Fall	41.2 (39.5, 42.9)	37.6 (36.1, 39.2)	40.4 (38.5, 42.3)	36.9 (35.2, 38.7)
Moter Vehicle - Transport (Occupant)	5.6 (5.0, 6.2)	9.9 (9.1, 10.8)	9.4 (8.3, 10.5)	10.5 (9.4, 11.7)
Poisoning(Drug)	7.8 (7.1, 8.6)	6 (5.4, 6.6)	7 (6.2, 8)	5.2 (4.5, 6)
Intetional Self-Harm	5.4 (4.4, 6.7)	4.7 (3.8, 5.8)	5.3 (4.2, 6.7)	3.5 (2.8, 4.4)
Poisoning (Drug)	4.5 (3.6, 5.6)	3.9 (3.1, 4.8)	4.2 (3.4, 5.4)	2.8 (2.2, 3.6)
Assault	1.2 (.88, 1.5)	.75 (.57, 1.0)	.79 (.54, 1.1)	.71 (.50, 1.0)

Figure 3: Gravity-Based Model for Hospital Accessibility

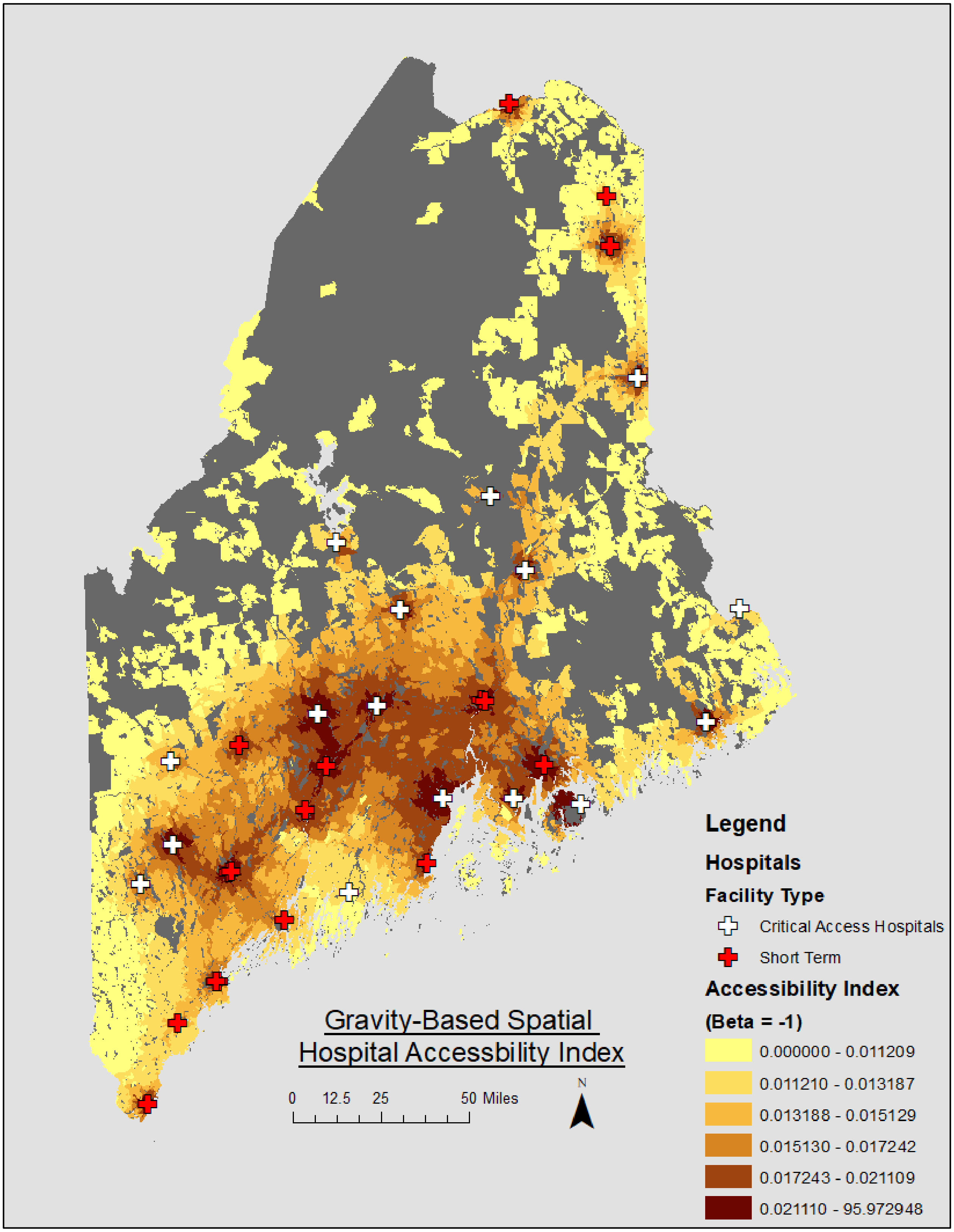
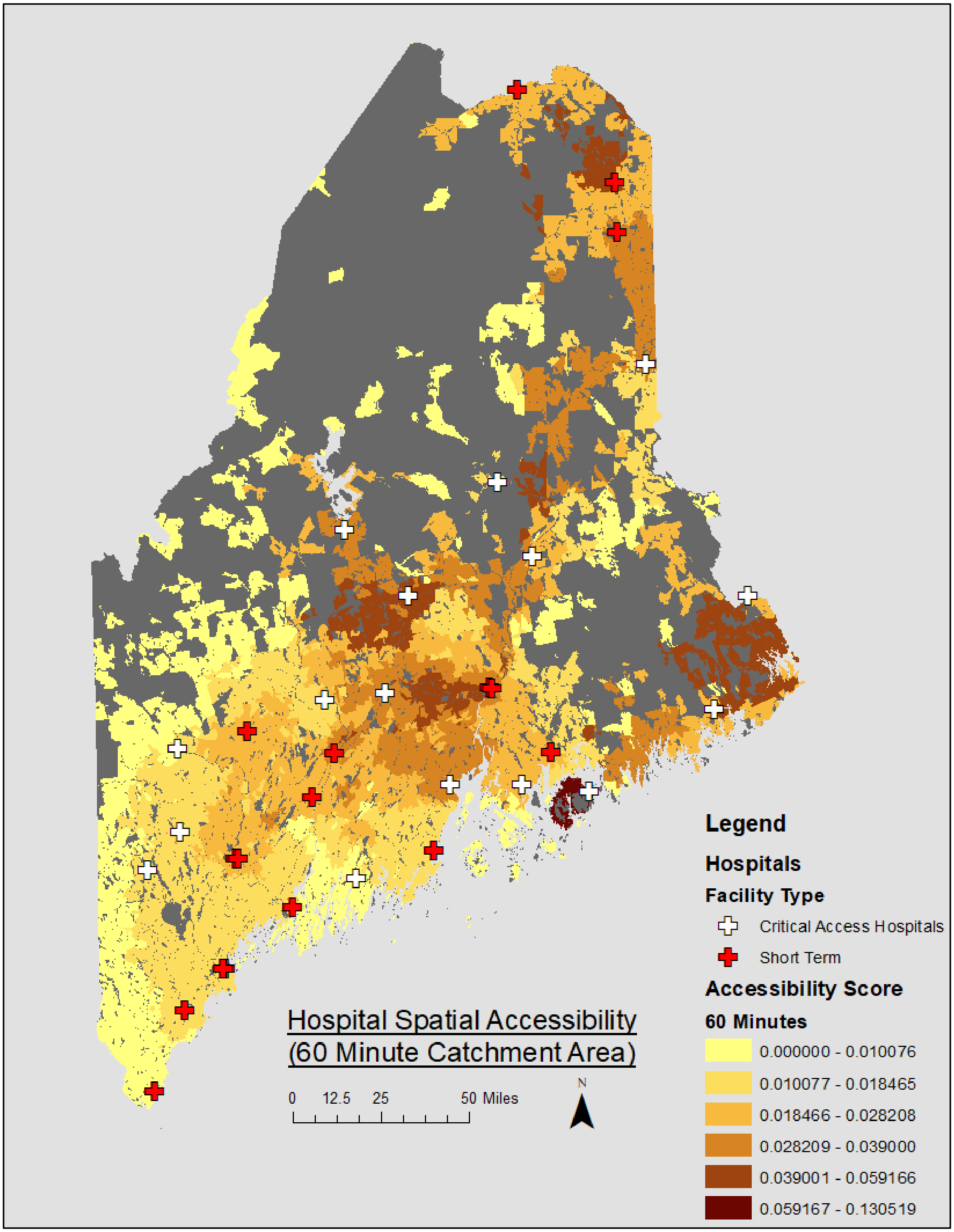


Figure 4: 2SFCA Model for Hospital Accessibility

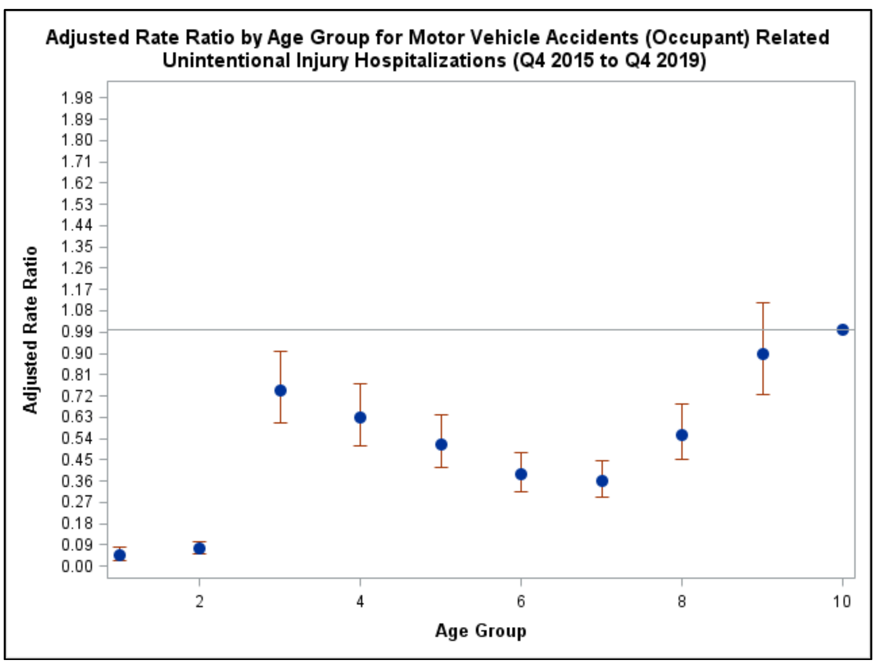


Discussion:

Overall, this study found that small rural areas consistently had the highest rates of injury hospitalizations throughout the state of Maine. These findings are generally consistent with the those from studies conducted on injury hospitalization rates at the national level and supports the notion that rural areas tend to have significantly higher rates of hospitalization for injuries than urban areas in the U.S. (Coben et al, 2008).

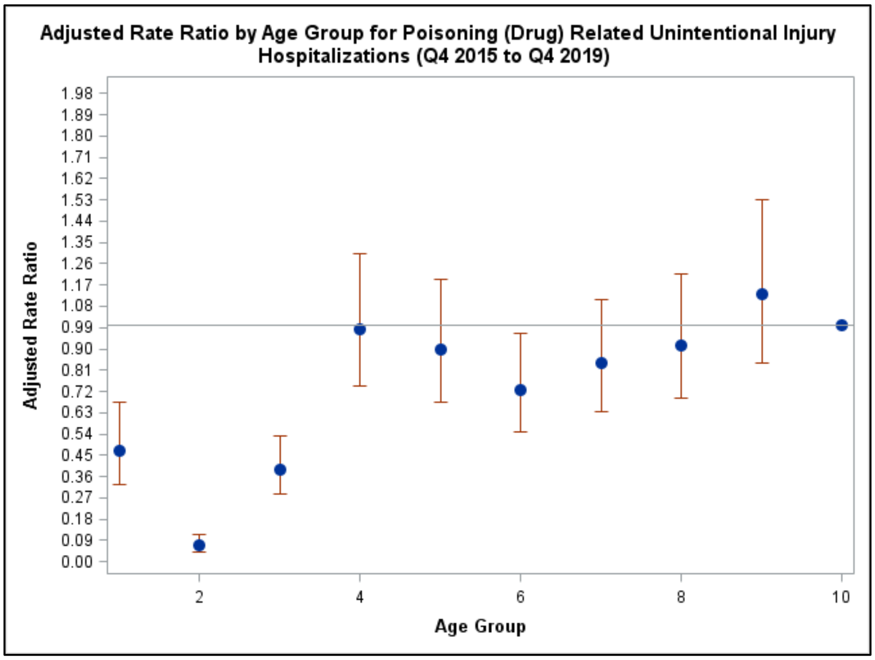
Another major factor for injury hospitalization rates we found in this study was age. As shown in the stratified analysis, persons ages 15-34 were hospitalized for injury at higher rates across all levels of rurality when compared to urban areas, and this trend continued to persons up to age 64 in small rural areas (with the exception of persons aged 35-44). This may be due to higher rates of unintentional injuries, specifically motor vehicle accidents and unintentional drug poisonings, as well as rates of intentional self-harm in these age groups (age group specific analyses of these unintentional injuries are show in Appendix tables). When comparing the rates across age groups, while older adults remained the population with the significantly highest hospitalization rate for vehicle accidents, there appears to be a parabolic relationship beginning at ages 15-24 before gradually decreasing until age 55-64 and increasing again until 85 and older (Figure 5). Likewise, another major contributor to injury hospitalization in the state of Maine are injuries related to unintentional drug poisonings. Between the age groups starting at age 25-34 and the oldest age group, there are no significant difference in rates (Figure 6).

Figure 5: Rate Ratios by Age Groups for Motor Vehicle Accidents (Appendix Table 6):[7]



[7] Age groups are based on a standard distribution, where Age Group 1 is ages < 5, Age Group 2 is 5-14, age group 3 is 25-34 and so on up to 85+.

Figure 6: Adjusted Rate Ratios by Age Group for Hospitalization due to Unintentional Drug Poisonings (Appendix Table 7):



Finally, among men, women and levels of rurality, there appears to be a negative parabolic relationship for rate of intention self-harm injury hospitalization with age, increasing dramatically after ages 5-14 before rates stabilize from 15-24 until 35-44 and gradually decreasing as age increases (Figures 5 & 6). These increased rates among the younger age demographics may be the contributing factor that leads to the increased rates being seen in rural areas when compared to their urban counterparts.

Figure 7: Rate for Hospitalization due to Intentional Self-Harm by Age Group, Male (Appendix Table 9):

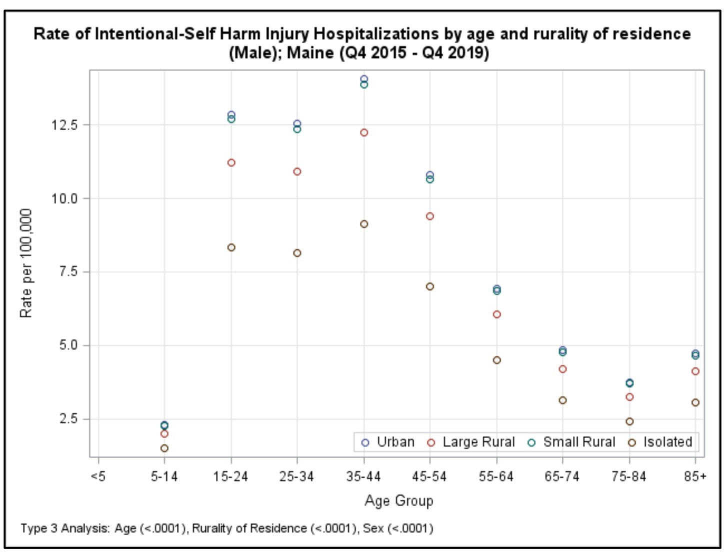
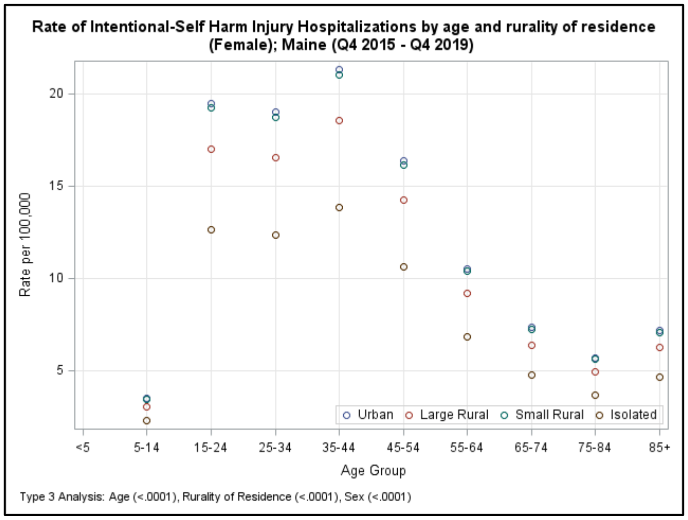


Figure 8: Rate for Hospitalization due to Intentional Self-Harm by Age Group, Female (Appendix Table 9)



Likewise, post-hoc hypothesis testing was also conducted on the Poisson regression models by isolating the adjustment variables, independent of other adjustment variables, and age had the greatest impact on the rate of injuries. Likewise, while we no longer saw a significant difference detected between the rates of unintentional injury hospitalizations between urban and isolated rural areas after adjusting for age and sex, this may imply that there is a large, older adult population in these isolated regions. This is important to note for the development of statewide injury intervention and prevention programs.

The true access to hospital care lies somewhere in between the two spatial model results, but this paper does show the importance of rural critical access hospitals throughout the state. Small rural areas where this paper shows elevated rates of injury hospitalizations, in particular, rely on the services of critical access hospitals. Aroostook, Piscataquis and Washington counties are all designated as either small or isolated rural areas in their entireties and in these regions only Critical Access Hospitals exist. The next step in this research would examine the outcomes associated with the utilization of Critical Access Hospitals for injury patients versus direct transportation to trauma centers. At this time there is no definitive research or policy guiding injury care in the pre-hospital environment, but there has been research that suggests resuscitation and stabilization at smaller, critical access hospitals prior to arrival at a trauma center may have morbidity benefits without effecting mortality (Von Dohlen & Jones, 2019). Additionally, while southern and western Maine appear to have lower accessibility from the models generated, it should be noted that this study only takes into account hospitals located in Maine and the effects of interstate hospitalization were not examined, which may have a significant impact on the residents of these communities.

Limitations:

This study had several key limitations. First, this study only used rates that were recorded after implementation of the ICD-10 coding system in the state of Maine. As an example, the quarterly, average rate of injury hospitalizations found by this study, for all intents and mechanisms, after age and sex adjustment was 113.1 per 100,000 population (95% CI: 111.1, 115.2), or roughly 452.4 hospitalization per 100,000 population each year. The last published report on injury hospitalizations and mortality published by the Maine CDC from 2006 reported an age-adjusted rate of injury hospitalization of 552.2 per 100,000 (Maine CDC, 2008). While this rate is higher than the rates found in this study, it does not necessarily indicate a decrease in overall injury hospitalization in the State of Maine from 2006 to the time frame of this study. First, this study adjusts age group distributions differences between rural and urban areas within Maine while the CDC age-adjusted rates standardize to the entire US population as of 2000. Additionally, one key difference between these two reports is the change from ICD-9 to ICD-10 in 2015. As published in the ISW-9, ICD-9 and 10 are substantially different, with ICD-10 containing 43,000 injury codes while ICD-9 contained only 2,600. Without a longitudinal analysis, it is at present not possible to assess the trends from that period to this. This also makes it difficult to assess the exact differences between this study and the Coben et al. study, Coben et al. relied on ICD-9. While no exact rates were compared between the two, the change in injury patterns may be an artifact from this change in coding. Likewise, as this study only investigated injuries that were reported as the principal diagnosis, the actual burden of injuries may be underestimated. While the ISW9 reports that the principal diagnoses field has national standards for reporting unlike other diagnosis code fields, there were still roughly 20,000 injury codes located in the subsequent fields. Another potential data artifact between this study and Coben et al. may lie in the determination of rural and urban areas. As stated, this study utilizes RUCA codes while Coben et al. relied on UIC codes, which could lead to differing determinations for areas considered urban and rural. A limitation of the spatial modeling included in this study is that we do not consider traffic when accounting for drive times. While the distance between points is further in rural areas, traffic congestion can increase the time prehospital. Finally, when examining spatial accessibility, this study only considered hospitals located in Maine and the influence of hospitals in neighboring states was not investigated. By adding hospitals from other states, border regions may see higher accessibility scores, particularly in south, western Maine.

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Appendix: Supplemental Tables[8]

Table 1: *Overall Injury Hospitalizations (All Intents)*

Selected Variable	**Rate (per 100,000)**	**Lower**	**Upper**	**IRR**	**Lower**	**Upper**	**p-value**	**Adjusted Rate**	**Lower**	**Upper**	**Adjusted RR**	**Lower**	**Upper**	**p-value**
State	145.4	143.9	147	-	-	-		113.1	111.1	115.2	-	-	-	-
Quarter:														
20154	147.1	140.7	153.8	1	Ref	Ref	Ref	117.8	112.5	123.5	1	Ref	Ref	Ref
20161	139.4	133.2	145.9	0.95	0.89	1.01	0.10	110.40	105.30	115.80	0.94	0.88	1.00	**0.04**
20162	137.6	131.4	144.1	0.94	0.88	1.00	**0.04**	109.00	103.90	114.30	0.92	0.87	0.99	**0.02**
20163	150.3	143.9	157	1.02	0.96	1.09	0.50	119.10	113.70	124.70	1.01	0.95	1.08	0.75
20164	142.5	136.2	149.1	0.97	0.91	1.03	0.32	112.90	107.70	118.30	0.96	0.90	1.02	0.18
20171	146.1	139.7	152.7	0.99	0.93	1.06	0.83	114.40	109.10	119.80	0.97	0.91	1.03	0.35
20172	140.3	134.1	146.8	0.95	0.90	1.02	0.14	109.80	104.70	115.20	0.93	0.87	0.99	**0.03**
20173	149.4	143	156.1	1.02	0.95	1.08	0.63	117.00	111.70	122.50	0.99	0.93	1.06	0.81
20174	152.9	146.4	159.7	1.04	0.98	1.11	0.22	119.70	114.40	125.30	1.02	0.95	1.08	0.62
20181	146.1	139.7	152.7	0.99	0.93	1.06	0.83	112.50	107.40	117.90	0.95	0.90	1.02	0.15
20182	138.2	132	144.7	0.94	0.88	1.00	0.05	106.50	101.50	111.70	0.90	0.85	0.96	**0.00**
20183	154.9	148.4	161.8	1.05	0.99	1.12	0.10	119.30	114.00	124.90	1.01	0.95	1.08	0.69
20184	140.7	134.5	147.2	0.96	0.90	1.02	0.17	108.40	103.30	113.60	0.92	0.86	0.98	**0.01**
20191	145.7	139.4	152.3	0.99	0.93	1.05	0.77	110.90	105.80	116.20	0.94	0.88	1.00	0.06
20192	143.8	137.5	150.3	0.98	0.92	1.04	0.48	109.40	104.30	114.60	0.93	0.87	0.99	**0.02**
20193	153.3	146.8	160.1	1.04	0.98	1.11	0.19	116.60	111.40	122.10	0.99	0.93	1.05	0.74
20194	144.3	138	150.9	0.98	0.92	1.04	0.55	109.80	104.70	115.00	0.93	0.87	0.99	**0.03**
Sex:														
Female	155.6	153.4	157.9	1.00	Ref	Ref	Ref	113.90	111.50	116.30	1.00	Ref	Ref	Ref
Male	134.8	132.7	137	0.87	0.85	0.89	**<.0001**	112.40	110.00	114.70	1.01	0.99	1.04	0.22
Four Level Rural Categorization (Based on RUCA Codes)														
Urban	142.4	139.7	145.2	1.00	Ref	Ref	Ref	114.40	111.70	117.10	1.00	Ref	Ref	Ref
Large Rural	134.8	132.3	137.2	0.95	0.92	0.97	**<.0001**	111.00	108.50	113.50	0.97	0.94	1.00	**0.03**
Small Rural	169.1	164.6	173.7	1.19	1.15	1.23	**<.0002**	118.50	114.90	122.10	1.04	1.00	1.07	**0.04**
Isolated	156.1	152.1	160.2	1.10	1.06	1.13	**<.0003**	108.90	105.70	112.20	0.95	0.92	0.98	**0.00**
Age Group														
< 5	31.4	28.3	34.9	0.02	0.01	0.01	**<.0001**	31.50	28.40	35.00	0.02	0.02	0.03	**<.0001**
5-14	17.2	15.7	18.9	0.01	0.02	0.03	**<.0001**	17.30	15.70	19.00	0.01	0.01	0.02	**<.0001**
15-24	61.5	58.6	64.5	0.05	0.01	0.02	**<.0001**	61.60	58.70	64.70	0.05	0.05	0.05	**<.0001**
25-34	76.4	73.1	79.8	0.06	0.05	0.05	**<.0001**	76.50	73.20	79.90	0.06	0.06	0.06	**<.0001**
35-44	83.8	80.3	87.3	0.07	0.06	0.06	**<.0001**	84.00	80.50	87.60	0.07	0.06	0.07	**<.0001**
45-54	85.5	82.4	88.7	0.07	0.06	0.07	**<.0001**	85.90	82.70	89.10	0.07	0.07	0.07	**<.0001**
55-64	123.9	120.3	127.6	0.10	0.07	0.07	**<.0001**	124.40	120.70	128.20	0.10	0.09	0.10	**<.0001**
65-74	218.4	212.7	224.3	0.17	0.09	0.10	**<.0001**	219.40	213.70	225.40	0.17	0.17	0.18	**<.0001**
75-84	536.3	523.5	549.3	0.43	0.17	0.18	**<.0001**	538.30	525.40	551.50	0.43	0.41	0.44	**<.0001**
85+	1259	1230	1289	1	Ref	Ref	Ref	1262	1232	1293	1	Ref	Ref	Ref

[8] *: Calculations based on values < 10 have been censored.

Table 2: *Firearm Related Injuries (All Intents)*

Selected Variable	**Rate (per 100,000)**	**Lower**	**Upper**	**IRR**	**Lower**	**Upper**	**p-value**	**Adjusted Rate**	**Lower**	**Upper**	**Adjusted RR**	**Lower**	**Upper**	**p-value**
State	0.6486	0.5848	0.8013	-	-	-	-	0.3554	0.2544	0.4987	-	-	-	-
Quarter:														
20154	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20161	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20162	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20163	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20164	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20171	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20172	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20173	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20174	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20181	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20182	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20183	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20184	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20191	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20192	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20193	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20194	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sex:														
Female	0.21	0.14	0.31	1.00	Ref	Ref	Ref	0.15	0.09	0.24	1.00	Ref	Ref	Ref
Male	1.20	1.00	1.40	5.69	3.68	8.79	**<.0001**	0.85	0.65	1.20	5.67	3.67	8.77	<.0001
Four Level Rural Categorization (Based on RUCA Codes)														
Urban	0.50	0.36	0.69	1.00	Ref	Ref	Ref	0.23	0.15	0.36	1.00	Ref	Ref	Ref
Large Rural	0.64	0.49	0.83	1.29	0.85	1.96	0.24	0.31	0.21	0.47	1.35	0.89	2.06	0.16
Small Rural	0.89	0.61	1.30	1.78	1.09	2.92	**0.02**	0.44	0.28	0.71	1.92	1.17	3.14	0.01
Isolated	0.98	0.71	1.40	1.98	1.25	3.14	**0.00**	0.50	0.32	0.77	2.14	1.34	3.40	0.0013
Age Group														
< 5	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5-14	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15-24	0.89	0.60	1.30	0.60	0.36	1.00	**0.05**	0.68	0.44	1.00	0.58	0.35	0.96	**0.04**
25-34	1.50	1.10	2.00	1.00	Ref	Ref	Ref	1.20	0.82	1.70	1.00	Ref	Ref	Ref
35-44	0.76	0.49	1.20	0.52	0.30	0.88	**0.02**	0.60	0.37	0.95	0.51	0.30	0.87	**0.01**
45-54	0.91	0.64	1.30	0.61	0.38	0.99	**0.05**	0.70	0.47	1.00	0.60	0.37	0.96	**0.03**
55-64	0.54	0.34	0.84	0.36	0.21	0.63	**0.00**	0.41	0.25	0.66	0.35	0.20	0.60	**0.0002**
65-74	0.48	0.27	0.84	0.32	0.17	0.61	**0.00**	0.35	0.20	0.63	0.30	0.16	0.58	**0.0003**
75-84	0.21	0.14	0.31	1.00	Ref	Ref	Ref	0.15	0.09	0.24	1.00	Ref	Ref	Ref
85+	1.20	1.00	1.40	5.69	3.68	8.79	**<.0001**	0.85	0.65	1.20	5.67	3.67	8.77	**<.0001**

Table 3: *Traumatic Brain Injuries (All Intents)*

Selected Variable	**Rate (per 100,000)**	**Lower**	**Upper**	**IRR**	**Lower**	**Upper**	**p-value**	**Adjusted Rate**	**Lower**	**Upper**	**Adjusted RR**	**Lower**	**Upper**	**p-value**
State	17	16.4	17.5	-	-	-	-	13.4	12.8	14.1	-	-	-	-
Quarter:														
20154	17.5	15.3	19.9	1	Ref	Ref	Ref	14.3	12.5	16.3	1	Ref	Ref	Ref
20161	16.5	14.4	18.8	0.94	0.78	1.14	0.13	13.30	11.60	15.20	0.93	0.78	1.12	0.45
20162	17.1	15	19.4	0.98	0.81	1.17	0.16	13.80	12.00	15.80	0.97	0.80	1.16	0.71
20163	18.3	16.2	20.8	1.05	0.88	1.26	0.23	14.80	13.00	16.90	1.04	0.87	1.24	0.68
20164	18	15.9	20.5	1.03	0.86	1.24	0.21	14.60	12.80	16.60	1.02	0.85	1.22	0.82
20171	18	15.8	20.4	1.03	0.86	1.23	0.21	14.30	12.60	16.30	1.00	0.84	1.20	0.96
20172	16	14	18.3	0.92	0.76	1.11	0.10	12.80	11.10	14.70	0.90	0.74	1.08	0.24
20173	18.7	16.5	21.2	1.07	0.90	1.28	0.25	14.90	13.10	17.00	1.05	0.88	1.25	0.62
20174	18.1	16	20.6	1.04	0.87	1.24	0.22	14.40	12.70	16.50	1.01	0.85	1.21	0.89
20181	15.9	13.9	18.2	0.91	0.76	1.10	0.09	12.50	10.90	14.40	0.88	0.73	1.06	0.16
20182	15.2	13.2	17.4	0.87	0.72	1.05	0.05	11.90	10.30	13.70	0.83	0.69	1.01	0.06
20183	19.1	16.9	21.6	1.09	0.91	1.30	0.27	15.00	13.20	17.00	1.05	0.88	1.25	0.60
20184	16	14	18.3	0.92	0.76	1.10	0.10	12.50	10.90	14.40	0.88	0.73	1.06	0.18
20191	14.6	12.7	16.8	0.84	0.69	1.01	**0.01**	11.30	9.80	13.10	0.79	0.66	0.96	0.02
20192	15.9	13.9	18.2	0.91	0.76	1.10	0.10	12.40	10.80	14.20	0.87	0.72	1.04	0.13
20193	17.7	15.6	20.2	1.02	0.85	1.22	0.20	13.70	12.00	15.70	0.96	0.81	1.16	0.70
20194	15.8	13.8	18.1	0.91	0.75	1.09	0.09	12.20	10.60	14.10	0.86	0.71	1.04	0.11
Sex:														
Female	12.8	12.2	13.5	1.00	Ref	Ref	Ref	0.15	9.10	10.30	1.00	Ref	Ref	Ref
Male	21.3	20.5	22.2	1.66	1.56	1.78	**<.0001**	18.70	17.70	19.70	1.93	1.81	2.06	**<.0001**
Four Level Rural Categorization (Based on RUCA Codes)														
Urban	17.2	16.2	18.1	1.00	Ref	Ref	Ref	14.50	13.60	15.40	1.00	Ref	Ref	Ref
Large Rural	16.3	15.5	17.2	0.95	0.88	1.03	0.19	13.90	13.00	14.80	0.96	0.89	1.03	0.27
Small Rural	17.1	15.8	18.7	1.00	0.90	1.11	0.98	12.60	11.50	13.80	0.87	0.79	0.96	0.01
Isolated	17.9	16.6	19.4	1.05	0.95	1.15	0.36	12.90	11.90	14.10	0.89	0.81	0.98	0.02
Age Group														
< 5	7.2	5.8	9	0.06	0.05	0.07	**<.0001**	6.60	5.30	8.20	0.05	0.04	0.07	<.0001
5-14	2.2	1.7	2.9	0.02	0.01	0.02	**<.0001**	2.10	1.60	2.70	0.02	0.01	0.02	<.0001
15-24	9.6	8.5	10.8	0.08	0.07	0.09	**<.0001**	8.80	7.70	9.90	0.07	0.06	0.08	<.0001
25-34	9.4	8.3	10.7	0.08	0.07	0.09	**<.0001**	8.70	7.70	9.90	0.07	0.06	0.08	<.0001
35-44	8.7	7.6	9.9	0.07	0.06	0.08	**<.0001**	8.10	7.10	9.20	0.06	0.06	0.07	<.0001
45-54	9.3	8.3	10.4	0.08	0.07	0.09	**<.0001**	8.70	7.70	9.70	0.07	0.06	0.08	<.0001
55-64	13.6	12.5	14.9	0.11	0.10	0.13	**<.0001**	12.80	11.70	14.10	0.10	0.09	0.11	<.0001
65-74	25.4	23.5	27.4	0.21	0.19	0.23	**<.0001**	24.00	22.20	26.00	0.19	0.17	0.21	<.0001
75-84	70	65.5	74.8	0.57	0.52	0.63	**<.0001**	68.10	63.70	72.90	0.54	0.49	0.60	<.0001
85+	122.6	113.7	132.2	1	1	1	Ref	126.2	116.9	136.2	1			

Table 4: *Unintentional Injuries (All Mechanisms)*

Selected Variable	**Rate (per 100,000)**	**Lower**	**Upper**	**Rate Ratio**	**Lower**	**Upper**	**p-value**	**Adjusted Rate**	**Lower**	**Upper**	**Adjusted RR**	**Lower**	**Upper**	**p value**
State	133.5	132	135	-	-	-	-	97.5	95.6	99.4	-	-	-	-
Quarter:														
20154	126.7	120.8	132.9	1.00	Ref	Ref	Ref	102.1	97.2	107.2	1	Ref	Ref	Ref
20161	124.3	118.4	130.4	0.94	0.88	1.00	0.0575	94.5	89.8	99.3	0.93	0.87	0.99	**0.02**
20162	137.6	131.4	144.1	0.92	0.86	0.98	0.0142	92.7	88.1	97.5	0.91	0.85	0.97	**0.00**
20163	130.9	124.9	137.2	1.02	0.95	1.09	0.5851	102.6	97.7	107.7	1.01	0.94	1.07	0.88
20164	136.2	130.1	142.6	0.97	0.91	1.03	0.3456	97.6	92.9	102.6	0.96	0.90	1.02	0.18
20171	125.8	120	132	1.01	0.94	1.08	0.8084	100.2	95.5	105.3	0.98	0.92	1.05	0.59
20172	136.7	130.5	143.1	0.93	0.87	1.00	0.0363	92.6	88.1	97.4	0.91	0.85	0.97	**0.00**
20173	139.5	133.3	146	1.01	0.95	1.08	0.7323	100.6	95.8	105.6	0.99	0.92	1.05	0.66
20174	134.9	128.8	141.3	1.03	0.97	1.10	0.3327	102.7	97.9	107.8	1.01	0.94	1.07	0.85
20181	126.6	120.7	132.8	1.00	0.94	1.07	0.9599	97.5	92.8	102.4	0.96	0.89	1.02	0.17
20182	140.8	134.5	147.3	0.94	0.88	1.00	0.0537	91.5	87	96.2	0.90	0.84	0.96	**0.00**
20183	131.3	125.3	137.6	1.04	0.98	1.11	0.2166	101.7	96.9	106.7	1.00	0.93	1.06	0.92
20184	136.4	130.3	142.8	0.97	0.91	1.04	0.3923	94.9	90.3	99.7	0.93	0.87	0.99	**0.03**
20191	131.8	125.8	138.1	1.01	0.95	1.08	0.7734	97.2	92.6	102.1	0.95	0.89	1.02	0.15
20192	140.8	134.6	147.3	0.98	0.91	1.04	0.4552	93.9	89.4	98.7	0.92	0.86	0.98	**0.01**
20193	133.4	127.3	139.7	1.04	0.98	1.11	0.215	100.3	95.6	105.3	0.98	0.92	1.05	0.61
20194	135.1	129	141.5	0.99	0.92	1.05	0.6934	95.1	90.5	99.8	0.93	0.87	0.99	**0.03**
Sex:														
Female	142.9	140.7	145.1	1.00	Ref	Ref	Ref	96.2	94.1	98.4	1.00	Ref	Ref	Ref
Male	123.6	121.6	125.7	0.87	0.85	0.88	**<.0001**	98.8	1	101.1	1.03	1.00	1.05	**0.02**
Four Level Rurality														
Urban	128.2	125.6	130.8	1.00	Ref	Ref	Ref	97.2	94.8	99.7	1.00	Ref	Ref	Ref
Large Rural	123.4	121.1	125.8	0.96	0.94	0.99	**0.007**	95.8	93.5	98.1	0.99	0.96	1.01	0.30
Small Rural	156.5	152.2	160.9	1.22	1.18	1.26	**<.0001**	101.8	98.5	105.1	1.05	1.01	1.08	**0.01**
Isolated	147.6	143.7	151.6	1.15	1.11	1.19	**<.0001**	95.4	92.4	98.4	0.98	0.95	1.01	0.26
Age Group														
< 5	27.7	24.8	31	0.02	0.020	0.025	**<.0001**	27.8	24.9	31.1	0.02	0.02	0.02	**<.0001**
5-14	14.5	13.1	16.1	0.01	0.010	0.013	**<.0001**	14.6	13.2	16.2	0.01	0.01	0.01	**<.0001**
15-24	43.9	41.5	46.5	0.04	0.033	0.037	**<.0001**	44.1	41.7	46.7	0.04	0.03	0.04	**<.0001**
25-34	57.6	54.8	60.6	0.05	0.044	0.049	**<.0001**	57.9	55	60.9	0.05	0.04	0.05	**<.0001**
35-44	64.3	61.3	67.5	0.05	0.049	0.054	**<.0001**	64.7	61.6	67.8	0.05	0.05	0.05	**<.0001**
45-54	70.1	67.3	73	0.06	0.053	0.059	**<.0001**	70.5	67.6	73.4	0.06	0.05	0.06	**<.0001**
55-64	113.8	110.3	117.4	0.09	0.087	0.094	**<.0001**	114.4	110.9	118	0.09	0.09	0.09	**<.0001**
65-74	212.2	206.6	217.9	0.17	0.164	0.176	**<.0001**	213.3	207.6	219.1	0.17	0.16	0.18	**<.0001**
75-84	530.9	518.2	543.8	0.42	0.410	0.439	**<.0001**	533.9	521	547	0.42	0.41	0.44	**<.0001**
85+	1252	1223	1282	1.00	Ref	Ref	Ref	1260	1230	1291	1	Ref	Ref	Ref

Table 5: *Unintentional Falls*

Selected Variable	*Rate (per 100,000)*	*Lower*	*Upper*	*IRR*	*Lower*	*Upper*	*p-value*	*Adjusted Rate*	*Lower*	*Upper*	*Adjusted RR*	*Lower*	*Upper*
State	91.3	90	92.5	-	-	-	-	39	37.6	40.4	-	-	-
***Quarter**:*													
20154	91.4	86.4	96.7	1.00	Ref	Ref	Ref	42.4	39.8	45.3	1.00	Ref	Ref
20161	80.2	75.5	85.1	0.96	0.89	1.04	0.32	40.1	37.6	42.8	0.95	0.87	1.02
20162	88.4	83.4	93.5	0.84	0.78	0.91	**<.0001**	35.2	32.8	37.7	0.83	0.76	0.90
20163	91.5	86.5	96.8	0.93	0.86	1.01	0.07	38.8	36.3	41.4	0.91	0.84	0.99
20164	103	97.7	108.6	0.96	0.89	1.04	0.33	40.1	37.6	42.9	0.95	0.87	1.02
20171	85.6	80.7	90.7	1.08	1.00	1.17	**0.04**	44.4	41.7	47.3	1.05	0.97	1.13
20172	85.3	80.5	90.4	0.90	0.83	0.97	**0.009**	36.9	34.5	39.5	0.87	0.80	0.94
20173	97	91.8	102.4	0.90	0.83	0.97	**0.008**	36.8	34.4	39.4	0.87	0.80	0.94
20174	100.6	95.4	106.1	1.02	0.94	1.10	0.62	41.8	39.2	44.6	0.99	0.91	1.07
20181	83.4	78.6	88.4	1.06	0.98	1.14	0.16	42.4	39.8	45.1	1.00	0.92	1.08
20182	87.3	82.4	92.4	0.88	0.81	0.95	0.001	35.1	32.8	37.5	0.83	0.76	0.90
20183	90.1	85.2	95.4	0.92	0.85	0.99	0.033	36.7	34.4	39.3	0.87	0.80	0.94
20184	99.5	94.3	105	0.95	0.87	1.02	0.17	37.9	35.5	40.5	0.89	0.83	0.97
20191	88.4	83.5	93.5	1.05	0.97	1.13	0.27	41.1	38.6	43.8	0.97	0.90	1.05
20192	90.8	85.9	96.1	0.93	0.86	1.01	0.067	36.5	34.2	39	0.86	0.80	0.93
20193	94	88.9	99.3	0.95	0.88	1.03	0.24	37.5	35.2	40.1	0.88	0.82	0.96
20194	95.2	90.1	100.6	0.99	0.91	1.07	0.75	38.8	36.4	41.4	0.92	0.85	0.99
***Sex**:*													
Female	109.6	107.7	111.5	1.00	Ref	Ref	Ref	42.7	41.1	44.4	1.00	Ref	Ref
Male	72.2	70.6	73.8	0.66	0.64	0.68	**< .0001**	35.6	34.2	37	0.83	0.81	0.86
Four Level Rural Cat													
Urban	91.3	89.1	93.5	1.00	Ref	Ref	Ref	41.2	39.5	42.9	1.00	Ref	Ref
Large Rural	80.5	78.6	82.4	0.88	0.85	0.91	**< .0001**	37.6	36.1	39.2	0.91	0.88	0.94
Small Rural	109.7	106.1	113.4	1.20	1.15	1.25	**< .0001**	40.4	38.5	42.3	0.98	0.94	1.02
Isolated	100.6	97.4	103.9	1.10	1.06	1.15	**< .0001**	36.9	35.2	38.7	0.90	0.86	0.93
Age Group													
< 5	8.8	7.2	10.8	0.01	0.01	0.01	**<.0001**	8.80	7.2	10.7	0.01	0.01	0.01
5-14	4.7	3.9	5.6	0.00	0.00	0.00	**<.0001**	4.70	3.9	5.6	0.00	0.00	0.01
15-24	5.3	4.5	6.2	0.00	0.00	0.01	**<.0001**	5.30	4.5	6.2	0.00	0.00	0.01
25-34	11.4	10.1	12.7	0.01	0.01	0.01	**<.0001**	11.20	10	12.6	0.01	0.01	0.01
35-44	20.1	18.4	21.9	0.02	0.02	0.02	**<.0001**	19.90	18.3	21.7	0.02	0.02	0.02
45-54	30.5	28.7	32.4	0.03	0.02	0.03	**<.0001**	30.30	28.5	32.3	0.03	0.03	0.03
55-64	70.4	67.7	73.2	0.06	0.06	0.06	**<.0001**	70.00	67.3	72.8	0.06	0.06	0.07
65-74	159.6	154.7	164.6	0.14	0.13	0.14	**<.0001**	158.90	154	164	0.14	0.14	0.15
75-84	452.1	440.5	464.1	0.39	0.38	0.41	**<.0001**	445.30	433.6	457.3	0.40	0.39	0.42
85+	1152	1124	1181	1.00	Ref	Ref	Ref	1112	1084	1141	1	Ref	Ref

Table 6: *Unintentional Motor Vehicle Accidents (Occupant)*

Selected Variable	***Rate (per 100,000)***	***Lower***	***Upper***	***IRR***	***Lower***	***Upper***	***p-value***	***Adjusted Rate***	***Lower***	***Upper***	***Adjusted RR***	***Lower***	***Upper***
State	11	10.6	11.4	-	-	-	-	8.6	8	9.3	-	-	-
***Quarter**:*													
20154	10.4	8.8	12.3	1.00	Ref	Ref	Ref	9.1	7.7	10.8	1.00	Ref	Ref
20161	10.9	9.3	12.8	0.90	0.71	1.13	0.35	8.1	6.8	9.7	0.89	0.71	1.12
20162	12.8	11	14.9	0.94	0.75	1.18	0.60	8.6	7.2	10.2	0.94	0.75	1.18
20163	11.5	9.8	13.5	1.10	0.89	1.37	0.38	10	8.5	11.8	1.10	0.88	1.37
20164	8.9	7.4	10.6	0.99	0.79	1.24	0.95	9	7.6	10.7	0.99	0.79	1.24
20171	8.9	7.5	10.7	0.77	0.60	0.97	**0.03**	6.9	5.7	8.4	0.76	0.60	0.97
20172	12.6	10.8	14.6	0.77	0.61	0.98	**0.03**	7	5.8	8.5	0.77	0.60	0.97
20173	11.7	10	13.6	1.08	0.87	1.35	0.47	9.8	8.3	11.6	1.08	0.86	1.34
20174	9.2	7.7	11	1.01	0.80	1.26	0.96	9.1	7.7	10.8	1.00	0.80	1.25
20181	10.4	8.8	12.3	0.80	0.63	1.01	0.06	7.2	6	8.7	0.79	0.62	1.00
20182	15.1	13.1	17.3	0.90	0.72	1.13	0.37	8.1	6.8	9.7	0.89	0.71	1.12
20183	11	9.4	13	1.30	1.06	1.61	**0.01**	11.8	10.1	13.7	1.29	1.04	1.59
20184	9.8	8.3	11.6	0.95	0.76	1.19	0.67	8.6	7.2	10.2	0.94	0.75	1.18
20191	9.8	8.3	11.6	0.85	0.67	1.07	0.16	7.6	6.3	9.2	0.83	0.66	1.05
20192	9.9	8.3	11.7	0.85	0.67	1.07	0.16	7.6	6.3	9.2	0.83	0.66	1.05
20193	12.6	10.8	14.6	0.85	0.68	1.08	0.18	7.7	6.4	9.2	0.84	0.67	1.06
20194	11.6	9.9	13.6	1.09	0.87	1.35	0.46	9.8	8.3	11.5	1.07	0.86	1.33
***Sex**:*													
Female	9.5	9	10.1	1.00	Ref	Ref	Ref	7.4	6.8	8.1		Ref	Ref
Male	12.5	11.9	13.2	1.31	1.21	1.42	**< .0001**	10	9.2	10.8	1.35	1.24	1.46
Four Level Rural Cat													
Urban	7.3	6.7	8	1.00	Ref	Ref	Ref	5.6	5	6.2	1.00	Ref	Ref
Large Rural	12.5	11.8	13.3	1.71	1.54	1.90	**< .0001**	9.9	9.1	10.8	1.78	1.61	1.98
Small Rural	12.2	11.1	13.5	1.67	1.47	1.91	**< .0001**	9.4	8.3	10.5	1.68	1.47	1.91
Isolated	13.7	12.6	15	1.88	1.66	2.12	**< .0001**	10.5	9.4	11.7	1.88	1.67	2.13
Age Group													
< 5	1	0.56	1.8	0.05	0.02	0.08	**<.0001**	1	0.5542	1.8	0.04	0.02	0.08
5-14	1.7	1.3	2.3	0.08	0.05	0.11	**<.0001**	1.7	1.2	2.3	0.07	0.05	0.10
15-24	16.8	15.3	18.4	0.76	0.63	0.93	**0.01**	17.1	15.5	18.8	0.74	0.61	0.91
25-34	14	12.7	15.5	0.64	0.52	0.78	**<.0001**	14.4	13	16	0.63	0.51	0.77
35-44	11.8	10.6	13.2	0.54	0.44	0.67	**<.0001**	11.9	10.6	13.3	0.52	0.42	0.64
45-54	9	8	10.1	0.41	0.33	0.51	**<.0001**	8.9	7.9	10	0.39	0.31	0.48
55-64	8.5	7.6	9.5	0.39	0.31	0.48	**<.0001**	8.3	7.4	9.3	0.36	0.29	0.45
65-74	13.2	11.8	14.7	0.60	0.49	0.74	**<.0001**	12.8	11.5	14.2	0.56	0.45	0.69
75-84	20.8	18.4	23.5	0.95	0.76	1.17	0.62	20.6	18.2	23.3	0.90	0.72	1.12
85+	21.9	18.4	26.2	1.00	Ref	Ref	Ref	22.9	19.2	27.4	1	Ref	Ref

Table 7: *Unintentional Poisoning (Drug)*

Selected Variable	***Rate (per 100,000)***	***Lower***	***Upper***	***IRR***	***Lower***	***Upper***	***p-value***	***Adjusted Rate***	***Lower***	***Upper***	***Adjusted RR***	***Lower***	***Upper***
State	7.8	7.4	8.2	-	-	-	-	6.4	6	6.9	-	-	-
***Quarter**:*													
20154	8	6.6	9.6	1	Ref	Ref	Ref	6.7	0	0	1	ref	ref
20161	6.9	5.6	8.5	0.99	0.76	1.30	0.94	6.60	5.40	8.10	0.99	0.75	1.29
20162	7.4	6.1	9.1	0.86	0.65	1.14	0.29	5.70	4.60	7.10	0.86	0.65	1.13
20163	7.3	6	8.9	0.92	0.70	1.22	0.57	6.20	5.00	7.60	0.92	0.70	1.21
20164	7.1	5.8	8.7	0.91	0.69	1.19	0.48	6.10	4.90	7.40	0.90	0.69	1.19
20171	7.9	6.5	9.6	0.88	0.67	1.16	0.36	5.80	4.70	7.20	0.87	0.66	1.15
20172	8	6.6	9.6	0.98	0.75	1.28	0.89	6.50	5.30	8.00	0.97	0.74	1.27
20173	8	6.7	9.7	0.99	0.76	1.29	0.94	6.60	5.40	8.00	0.98	0.75	1.28
20174	7.6	6.2	9.2	1.00	0.76	1.31	1.00	6.60	5.50	8.10	0.99	0.76	1.30
20181	8.1	6.7	9.8	0.94	0.72	1.24	0.66	6.20	5.10	7.60	0.93	0.71	1.22
20182	8.3	6.8	9.9	1.01	0.77	1.32	0.96	6.70	5.50	8.10	0.99	0.76	1.30
20183	8.7	7.3	10.4	1.03	0.79	1.34	0.85	6.80	5.60	8.20	1.01	0.78	1.32
20184	6.7	5.4	8.2	1.08	0.83	1.41	0.56	7.20	5.90	8.70	1.07	0.82	1.39
20191	9.5	8	11.3	0.83	0.62	1.10	0.19	5.50	4.40	6.80	0.81	0.61	1.08
20192	7.3	6	8.9	1.18	0.91	1.53	0.20	7.80	6.50	9.30	1.16	0.90	1.50
20193	7.6	6.3	9.3	0.90	0.69	1.19	0.46	5.90	4.80	7.30	0.89	0.67	1.17
20194	8.1	6.7	9.7	0.95	0.72	1.24	0.70	6.30	5.10	7.70	0.93	0.71	1.22
***Sex**:*													
Female	7.4	6.9	7.9	1	Ref	Ref	Ref	6	5.5	6.5	1.00	Ref	Ref
Male	8.2	7.7	8.8	1.12	1.02	1.23	**0.02**	6.9	6.3	7.5	1.15	1.05	1.27
Four Level Rural Cat													
Urban	9.2	8.5	9.9	1.00	Ref	Ref	Ref	7.8	7.1	8.6	1.00	Ref	Ref
Large Rural	7	6.5	7.6	0.76	0.68	0.85	**< .0001**	6	5.4	6.6	0.76	0.68	0.85
Small Rural	8.5	7.5	9.6	0.93	0.80	1.07	0.29	7	6.2	8	0.90	0.78	1.04
Isolated	6.3	5.5	7.2	0.69	0.59	0.80	**< .0001**	5.2	4.5	6	0.66	0.57	0.77
Age Group													
< 5	5.1	3.9	6.6	0.48	0.33	0.69	**<.0001**	4.9	3.8	6.4	0.47	0.32	0.67
5-14	0.7329	0.4618	1.2	0.07	0.04	0.12	**<.0001**	0.7143	0.4497	1.1	0.07	0.04	0.11
15-24	4.3	3.6	5.2	0.40	0.29	0.55	**<.0001**	4.1	3.4	4.9	0.39	0.28	0.53
25-34	10.9	9.7	12.2	1.02	0.77	1.34	0.91	10.4	9.2	11.7	0.98	0.74	1.30
35-44	9.8	8.7	11.1	0.91	0.69	1.21	0.53	9.5	8.4	10.8	0.90	0.68	1.19
45-54	7.8	6.9	8.9	0.73	0.55	0.97	**0.03**	7.7	6.8	8.7	0.73	0.55	0.97
55-64	9	8.1	10.1	0.84	0.64	1.11	0.23	8.9	7.9	9.9	0.84	0.64	1.11
65-74	9.7	8.6	11	0.91	0.68	1.21	0.51	9.7	8.5	11	0.92	0.69	1.22
75-84	12.1	10.3	14.2	1.13	0.84	1.53	0.43	12	10.2	14.1	1.13	0.84	1.53
85+	10.7	8.3	13.8	1.00	1	Ref	Ref	Ref	8.2	13.6	1	Ref	Ref

Table 8: Intentional Self-Harm (All Mechanisms)

Selected Variable	*Rate (per 100,000)*	*Lower*	*Upper*	*IRR*	*Lower*	*Upper*	*p-value*	*Adjusted Rate*	*Lower*	*Upper*	*Adjusted RR*	*Lower*	*Upper*
State	9.5	9.1	9.9	-	-	-	-	4.7	3.8	5.7	-	-	-
***Quarter**:*													
20154	9.3	7.8	11.1	1	Ref	Ref	Ref	4.6	3.5	6	1		
20161	9.9	8.4	11.8	1.06	0.83	1.36	0.62	4.90	3.70	6.40	1.07	0.84	1.36
20162	10	8.4	11.9	1.07	0.84	1.37	0.58	4.90	3.80	6.40	1.08	0.84	1.37
20163	10.1	8.5	11.9	1.08	0.85	1.38	0.54	5.00	3.80	6.40	1.08	0.85	1.38
20164	9.2	7.7	11	0.98	0.77	1.26	0.89	4.50	3.40	5.90	0.99	0.77	1.27
20171	7.5	6.2	9.1	0.81	0.62	1.05	0.11	3.70	2.80	4.90	0.81	0.62	1.06
20172	11.9	10.2	13.9	1.27	1.01	1.61	0.04	5.90	4.50	7.60	1.28	1.01	1.62
20173	9.9	8.4	11.8	1.06	0.83	1.36	0.62	4.90	3.80	6.40	1.07	0.84	1.37
20174	10.1	8.6	12	1.09	0.85	1.39	0.50	5.00	3.90	6.50	1.10	0.86	1.40
20181	9.3	7.8	11.1	1.00	0.78	1.28	0.98	4.60	3.50	6.00	1.01	0.79	1.29
20182	9.8	8.2	11.6	1.05	0.82	1.34	0.72	4.80	3.70	6.30	1.06	0.83	1.35
20183	11	9.4	13	1.18	0.93	1.50	0.17	5.50	4.20	7.10	1.20	0.94	1.52
20184	7.8	6.4	9.5	0.84	0.64	1.09	0.18	3.90	2.90	5.10	0.85	0.65	1.10
20191	7.9	6.5	9.5	0.84	0.65	1.09	0.20	3.90	3.00	5.20	0.86	0.66	1.11
20192	9.1	7.6	10.9	0.98	0.76	1.26	0.87	4.50	3.50	5.90	0.99	0.77	1.28
20193	9.4	7.9	11.2	1.00	0.78	1.29	0.98	4.70	3.60	6.10	1.02	0.79	1.31
20194	8.6	7.2	10.3	0.92	0.72	1.19	0.54	4.30	3.30	5.60	0.94	0.73	1.21
***Sex**:*													
Female	11.3	10.7	11.9	1.00	Ref	Ref	Ref	5.80	4.70	7.10	1.00	Ref	Ref
Male	7.5	7	8.1	0.67	0.61	0.73	<.0001	3.80	3.10	4.70	0.66	0.61	0.72
Four Level Rural Cat													
Urban	11	10.2	11.8	1.00	Ref	Ref	Ref	5.40	4.40	6.70	1.00	Ref	Ref
Large Rural	9.2	8.6	9.8	0.84	0.76	0.92	0.00	4.70	3.80	5.80	0.87	0.79	0.96
Small Rural	10.2	9.1	11.3	0.93	0.81	1.06	0.26	5.30	4.20	6.70	0.99	0.87	1.12
Isolated	6.5	5.7	7.4	0.60	0.52	0.69	<.0001	3.50	2.80	4.40	0.65	0.56	0.75
Age Group													
< 5	*	*	*	*	*	*	*	*	*	*	*	*	*
5-14	2.6	2	3.3	0.18	0.14	0.23	<.0001	2.40	1.90	3.10	0.18	0.14	0.24
15-24	14.5	13.2	16.1	1.02	0.88	1.17	0.80	13.70	12.30	15.20	1.03	0.89	1.18
25-34	14.3	12.9	15.8	1.00	Ref	Ref	Ref	13.30	12.00	14.80	1.00	Ref	Ref
35-44	15.9	14.5	17.5	1.12	0.97	1.28	0.13	15.00	13.50	16.50	1.12	0.98	1.29
45-54	12.1	11	13.4	0.85	0.74	0.98	0.02	11.50	10.40	12.70	0.86	0.75	0.99
55-64	7.8	6.9	8.7	0.54	0.47	0.64	<.0001	7.40	6.50	8.30	0.55	0.47	0.65
65-74	5.4	4.5	6.3	0.38	0.31	0.46	<.0001	5.10	4.30	6.10	0.39	0.32	0.47
75-84	4.3	3.3	5.6	0.30	0.22	0.40	<.0001	4.00	3.00	5.20	0.30	0.22	0.40
85+	5.6	4	8	0.39	0.27	0.57	<.0001	5.00	3.50	7.10	0.38	0.26	0.54

Table 9: Intentional Self-Harm (Poisoning (Drug))

Selected Variable	***Rate (per 100,000)***	***Lower***	***Upper***	***IRR***	***Lower***	***Upper***	***p-value***	***Adjusted Rate***	***Lower***	***Upper***	***Adjusted RR***	***Lower***	***Upper***
State	8.1	7.7	8.4	-	-	-	-	3.8	3.1	4.7	-	-	-
***Quarter**:*													
20154	7.7	6.4	9.4	1	-	-	-	3.6	2.7	4.8	1		
20161	8.3	6.9	10	1.07	0.82	1.40	0.63	3.90	2.90	5.10	1.07	0.82	1.40
20162	8.7	7.3	10.5	1.13	0.86	1.47	0.38	4.10	3.10	5.40	1.13	0.87	1.47
20163	8.4	7	10.1	1.09	0.83	1.42	0.54	4.00	3.00	5.20	1.09	0.84	1.43
20164	8.6	7.2	10.4	1.12	0.86	1.46	0.42	4.10	3.10	5.30	1.12	0.86	1.46
20171	6.3	5.1	7.8	0.81	0.61	1.09	0.16	3.00	2.20	4.00	0.82	0.62	1.10
20172	9.2	7.7	11	1.18	0.91	1.54	0.21	4.30	3.30	5.70	1.19	0.92	1.55
20173	8.6	7.1	10.3	1.11	0.85	1.44	0.46	4.00	3.10	5.30	1.11	0.85	1.46
20174	9.2	7.7	11	1.19	0.92	1.55	0.19	4.40	3.30	5.70	1.20	0.93	1.56
20181	8	6.6	9.6	1.03	0.78	1.35	0.85	3.80	2.90	5.00	1.04	0.79	1.36
20182	8	6.6	9.7	1.04	0.79	1.36	0.80	3.80	2.90	5.00	1.05	0.80	1.37
20183	9.1	7.6	10.8	1.17	0.90	1.52	0.24	4.30	3.30	5.60	1.19	0.91	1.54
20184	6.5	5.2	8	0.83	0.63	1.11	0.21	3.10	2.30	4.10	0.84	0.63	1.12
20191	6.4	5.1	7.9	0.82	0.62	1.09	0.18	3.00	2.30	4.10	0.83	0.63	1.11
20192	7.9	6.5	9.5	1.01	0.77	1.33	0.92	3.70	2.80	4.90	1.03	0.79	1.35
20193	8.6	7.2	10.3	1.11	0.85	1.45	0.44	4.10	3.10	5.40	1.13	0.87	1.47
20194	7.4	6.1	9	0.96	0.73	1.26	0.75	3.50	2.70	4.70	0.97	0.74	1.28
***Sex**:*													
Female	10.2	9.7	10.8	1.00	Ref	Ref	Ref	5.10	4.10	6.30	1.00	Ref	Ref
Male	5.8	5.4	6.3	0.57	0.51	0.62	<.0001	2.80	2.30	3.50	0.56	0.51	0.62
Four Level Rural Cat													
Urban	9.5	8.8	10.2	1.00	Ref	Ref	Ref	4.50	3.60	5.60	-	-	-
Large Rural	7.9	7.3	8.5	0.83	0.75	0.92	**0.00**	3.90	3.10	4.80	0.86	0.78	0.96
Small Rural	8.4	7.4	9.4	0.88	0.75	1.02	0.86	4.20	3.40	5.40	0.94	0.82	1.08
Isolated	5.4	4.7	6.2	0.57	0.49	0.67	**<.0001**	2.80	2.20	3.60	0.62	0.53	0.73
Age Group													
< 5	0.09112	0.01284	0.6469	0.01	0.00	0.05	**<.0001**	0.08	0.01	0.60	0.01	0.00	**0.00**
5-14	2.3	1.8	3	0.20	0.15	0.26	**<.0001**	2.20	1.70	2.80	0.20	0.78	0.96
15-24	13	11.7	14.4	1.09	0.94	1.27	0.26	11.90	10.60	13.20	1.10	0.82	1.08
25-34	11.9	10.6	13.3	1.00	Ref	Ref	Ref	10.80	9.60	12.10	1.00	-	-
35-44	13.4	12.1	14.9	1.13	0.97	1.32	0.11	12.20	11.00	13.70	1.14	0.98	1.33
45-54	10.4	9.4	11.6	0.88	0.75	1.02	0.09	9.60	8.60	10.70	0.89	0.76	1.04
55-64	6.5	5.7	7.4	0.55	0.46	0.65	**<.0001**	6.00	5.20	6.80	0.56	0.47	0.66
65-74	4.6	3.8	5.5	0.39	0.31	0.48	**<.0001**	4.30	3.60	5.20	0.40	0.32	0.49
75-84	3.3	2.4	4.5	0.28	0.20	0.38	**<.0001**	3.00	2.20	4.00	0.28	0.20	0.38
85+	8.1	7.7	8.4	1.00	Ref	Ref	Ref	3.80	3.10	4.70			