

The Geography of Diabetes

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HCIN 547

Professor Berkovich

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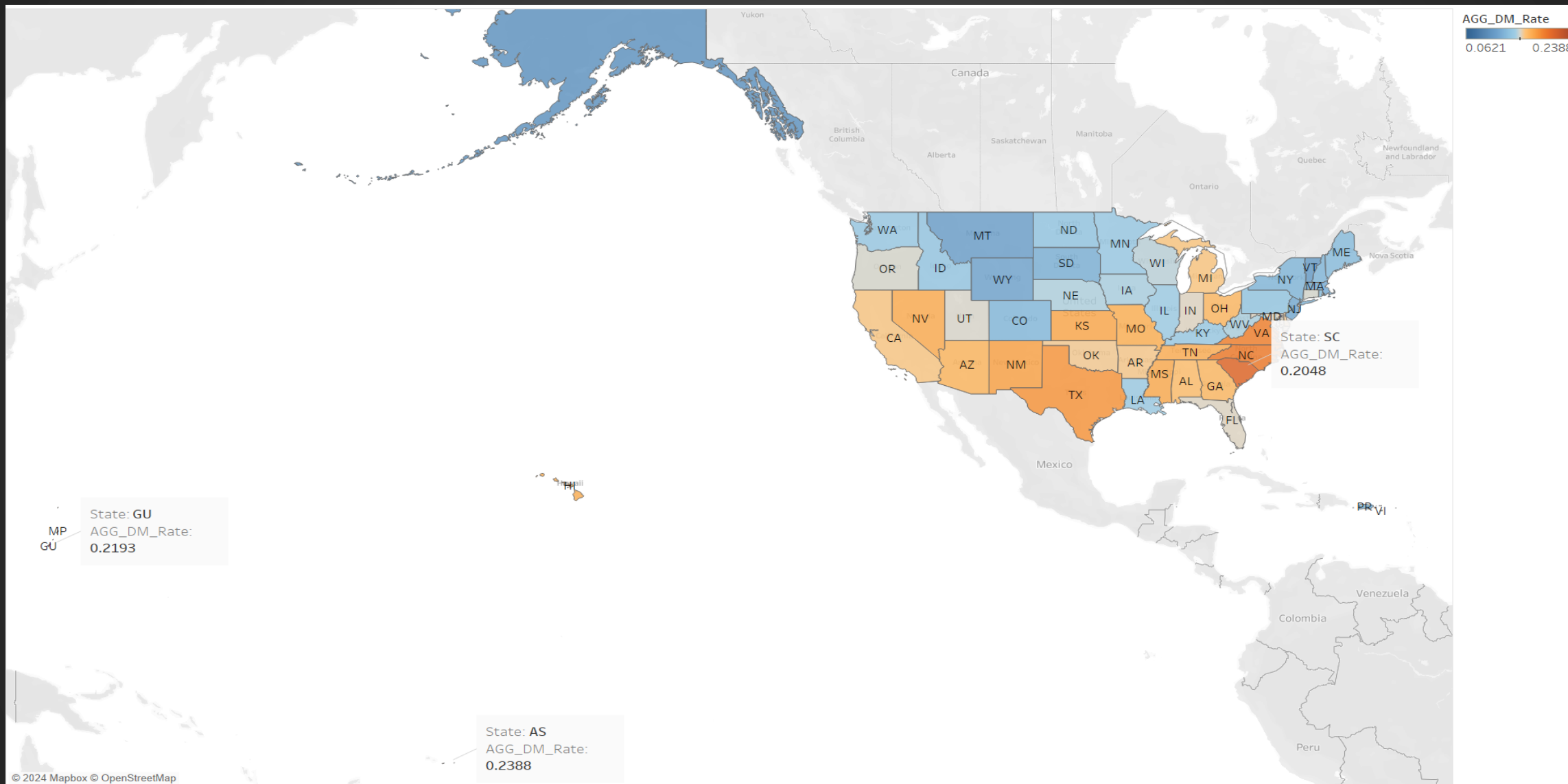
Introduction

- Health Resources and Services Administration (HRSA)
 - Governmental organization that aims to improve equity in healthcare among underserved communities
 - Collects and aggregates data from affiliated healthcare organizations (HRSA, 2024)
 - The National Health Center Program Uniform Data System (UDS) Awardee Data provides a comprehensive view of the performance of affiliated healthcare organizations from 2017 to 2021 (HRSA, 2022a).
- Diabetes Mellitus (DM) is a major epidemiological concern (CDC, 2024)
 - 38.4 Million Americans have DM (11.6% of the population)
 - 38.1 million adults = 14.7% of American adults
 - 8.7 million did not know they had diabetes before diagnosis
- Diabetes Mellitus is a burden on the American healthcare system
 - Younger adults and individuals from underserved communities have the highest burden of uncontrolled DM (Liu et Al., 2021)

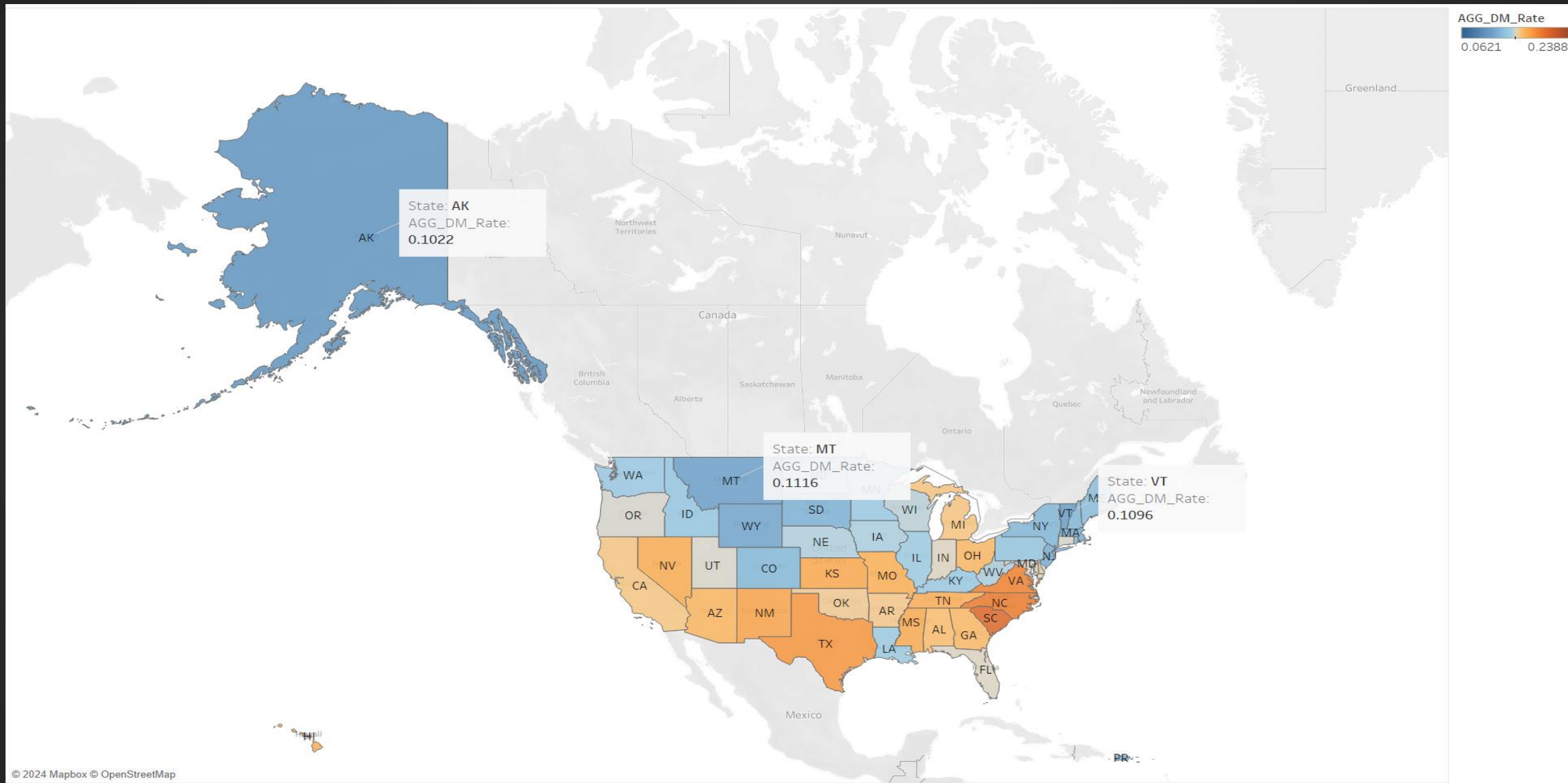
Methods

- Data Source: Health Resources and Services Administration – National Aggregated Health Center Data 2017-2021 (HRSA, 2022a)
- Tools & Technology Used
 - Microsoft SQL Server (2022) & MS SQL Server Management Studio
 - Tableau
- Variables and Aggregations:
 - Latitude/Longitude (Tableau-Generated for each State/Territory)
 - Diabetes Rate (by Health Center)
 - Uncontrolled Diabetes Rate (by Health Center)
 - Total Patients (by Health Center)
 - Total Diabetes Patient Count (by Health Center)
 - Aggregated Diabetes Rate (Weighted Average by State)
 - Aggregated Uncontrolled Diabetes Rate (Weighted Average by State)

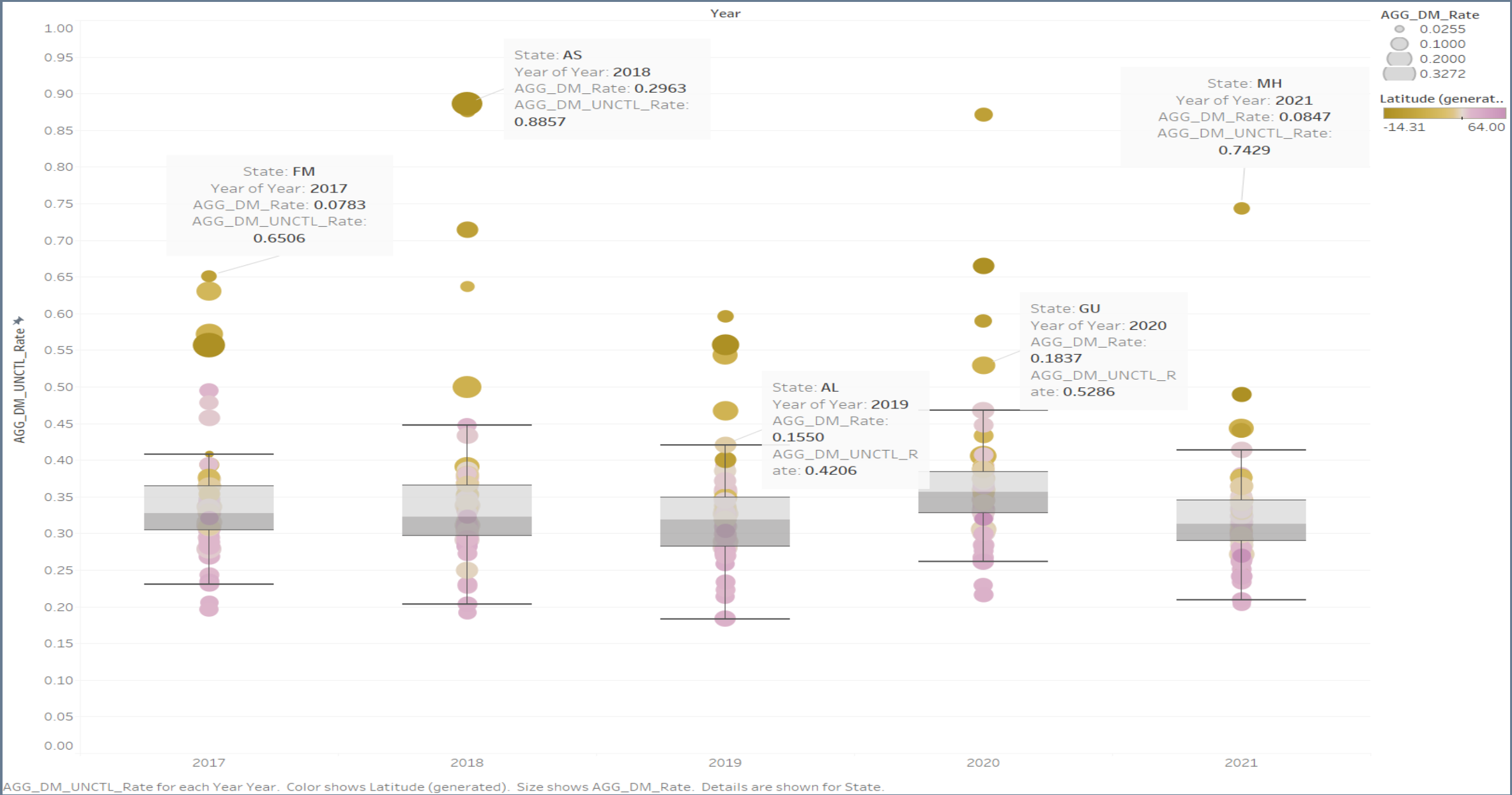
Results 1a



Map based on Longitude (generated) and Latitude (generated). Color shows AGG_DM_Rate. The marks are labeled by State. Details are shown for State.



Results 2



Results 3

State	Year						Grand Total	F	AGG_DM_Rate
	2017	2018	2019	2020	2021				
AS	0.3272	0.2963	0.2408	0.1536	0.1299		0.2388		
GU	0.2352	0.2620	0.1978	0.1837	0.1968		0.2193		
SC	0.2123	0.2059	0.2002	0.2005	0.2059		0.2048		
MP			0.2112	0.2236	0.1593		0.1944		
NC	0.2022	0.2103	0.2010	0.1793	0.1731		0.1918		
VA	0.1949	0.1965	0.1920	0.1792	0.1845		0.1892		
TX	0.1793	0.1835	0.1812	0.1771	0.1808		0.1804		
VI	0.1848	0.1979	0.1586	0.1711	0.1688		0.1761		
NM	0.1714	0.1765	0.1741	0.1764	0.1741		0.1745		
KS	0.1941	0.1768	0.1761	0.1576	0.1643		0.1727		
MS	0.1736	0.1831	0.1725	0.1627	0.1611		0.1706		
NV	0.1716	0.1763	0.1710	0.1561	0.1759		0.1702		
TN	0.1609	0.1656	0.1727	0.1725	0.1747		0.1693		
MO	0.1657	0.1731	0.1731	0.1637	0.1680		0.1687		
HI	0.1648	0.1712	0.1707	0.1692	0.1664		0.1685		
AZ	0.1694	0.1622	0.1659	0.1650	0.1657		0.1656		
OH	0.1691	0.1633	0.1644	0.1590	0.1674		0.1646		
GA	0.1768	0.1775	0.1706	0.1492	0.1529		0.1643		
AL	0.1614	0.1551	0.1550	0.1619	0.1773		0.1618		
MI	0.1561	0.1690	0.1570	0.1524	0.1574		0.1585		
CA	0.1585	0.1599	0.1605	0.1513	0.1613		0.1583		
AR	0.1561	0.1642	0.1659	0.1455	0.1583		0.1577		
OK	0.1518	0.1554	0.1618	0.1548	0.1599		0.1570		
DE	0.1499	0.1516	0.1646	0.1583	0.1572		0.1562		
IN	0.1449	0.1529	0.1502	0.1557	0.1577		0.1525		
MD	0.1475	0.1473	0.1521	0.1564	0.1586		0.1523		
FL	0.1532	0.1564	0.1535	0.1463	0.1524		0.1523		
UT	0.1444	0.1491	0.1507	0.1491	0.1644		0.1516		
OR	0.1513	0.1514	0.1566	0.1450	0.1502		0.1511		
CT	0.1492	0.1518	0.1498	0.1523	0.1516		0.1509		
WI	0.1385	0.1450	0.1571	0.1378	0.1577		0.1473		
NE	0.1431	0.1430	0.1416	0.1450	0.1546		0.1456		
WV	0.1370	0.1438	0.1521	0.1455	0.1471		0.1452		
IA	0.1501	0.1489	0.1532	0.1316	0.1427		0.1450		
LA	0.1433	0.1391	0.1434	0.1376	0.1449		0.1417		
IL	0.1399	0.1422	0.1491	0.1301	0.1461		0.1415		
KY	0.1435	0.1468	0.1459	0.1345	0.1348		0.1407		
WA	0.1338	0.1366	0.1428	0.1401	0.1436		0.1395		
MN	0.1276	0.1406	0.1389	0.1373	0.1540		0.1393		
ID	0.1377	0.1415	0.1394	0.1293	0.1416		0.1379		
PA	0.1255	0.1401	0.1368	0.1387	0.1424		0.1367		
ND	0.1248	0.1327	0.1406	0.1377	0.1455		0.1359		
RI	0.1262	0.1290	0.1313	0.1286	0.1432		0.1318		
ME	0.1273	0.1306	0.1332	0.1317	0.1306		0.1307		
PR	0.1292	0.1274	0.1279	0.1241	0.1342		0.1287		
CO	0.1267	0.1288	0.1266	0.1240	0.1301		0.1272		
NH	0.1189	0.1245	0.1285	0.1325	0.1306		0.1271		
NY	0.1271	0.1240	0.1262	0.1251	0.1317		0.1268		
SD	0.1173	0.1153	0.1235	0.1284	0.1243		0.1222		
MA	0.1212	0.1225	0.1226	0.1168	0.1224		0.1212		
DC	0.1192	0.1132	0.1130	0.1260	0.1272		0.1196		
MH	0.1113	0.1486	0.1504	0.1024	0.0847		0.1194		
NJ	0.1147	0.1167	0.1262	0.1182	0.1192		0.1191		
WY	0.1163	0.1133	0.1136	0.1149	0.1172		0.1151		
MT	0.1085	0.1077	0.1149	0.1130	0.1132		0.1116		
VT	0.1037	0.1084	0.1127	0.1165	0.1070		0.1096		
AK	0.1058	0.0988	0.1024	0.0994	0.1044		0.1022		
FM	0.0783	0.0810	0.0847	0.0974	0.1115		0.0904		

AGG_DM_Rate broken down by Year Year vs. State. Color shows AGG_DM_Rate. The marks are labeled by AGG_DM_Rate. The view is filtered on Exclusions (State,YEAR(Year)) and State. The Exclusions (State,YEAR(Year)) filter keeps 293 members. The State filter excludes PW.

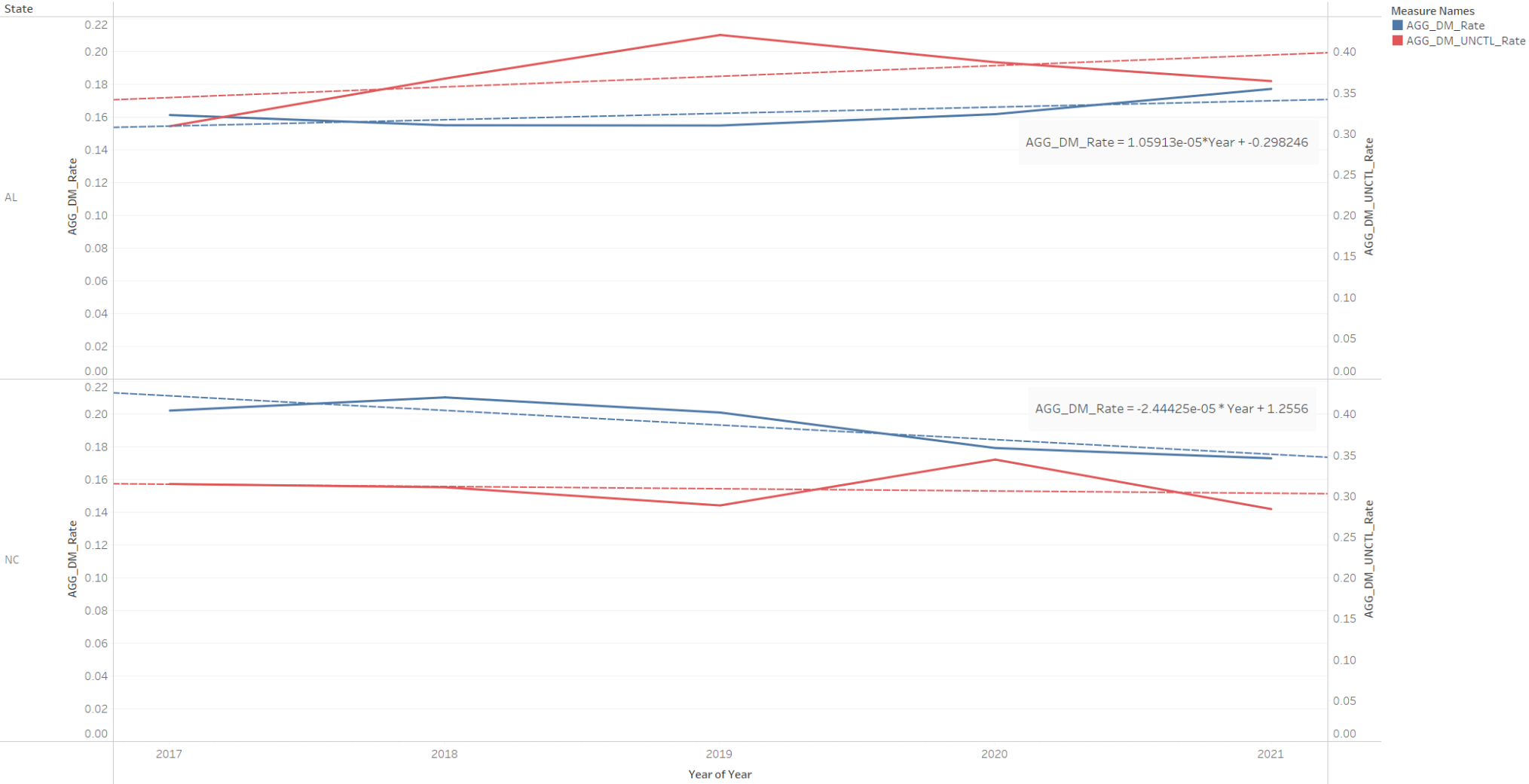
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Results 4

Comparing Alabama vs. North Carolina's DM Rates



The trends of AGG_DM_Rate and AGG_DM_UNCTL_Rate for Year Year broken down by State. Color shows details about AGG_DM_Rate and AGG_DM_UNCTL_Rate. The view is filtered on State, which keeps AL and NC.

Discussion

- There is a high prevalence of DM and Uncontrolled DM in the Southern latitudes of the United States.
 - States in the American South show the highest DM rates in the contiguous US
 - The Carolinas (20.48%), Virginia (18.92%), Texas (18.04%), New Mexico (17.45%)
 - Pacific Island Territories report some of the highest DM rates nationwide
 - American Samoa (23.88%), Guam (21.93%), Northern Mariana Islands (19.44%)
 - Uncontrolled DM runs rampant in these communities
 - Likely due to a high presence of Comorbidities and other Cultural/Socioeconomic Factors (Koh, 2013)
 - Micronesia reported a very low DM rate, but high Uncontrolled DM rates
 - Likely due to underreporting in remote areas (HRSA, 2022b)
- Northern States have generally lower rates of DM and Uncontrolled Diabetes
 - Alaska (10.22%), Vermont (10.96%), Montana (11.16%), Wyoming (11.51%), New Jersey (11.91%)
- Year-by-year DM rate changes are inconsistent
 - DM Rate Increases
 - Alabama increased from 16.14% in 2017 to 17.73% in 2021 -
 - DM Rate Decreases
 - North Carolina dropped from 20.22% in 2017 to 17.31% in 2021
 - Could be the result of the Diabetes Prevention Program (DPP) in North Carolina (North Carolina General Assembly, 2022)

Call to Action

- Certain cultural and socioeconomic reasons may contribute to the high prevalence of DM in the southern United States (Danaei et Al., 2009)
- Populations in the American Pacific Territories have some of the highest burdens of uncontrolled diabetes.
- Use evidence-based methods to prevent and control diabetes.
 - Modeled after North Carolina's Diabetes Prevention Program (DPP) (North Carolina General Assembly, 2022)
 - North Carolina's DM rate dropped by ~3 percentage points between 2017 and 2021
 - Regular and Accessible Screenings in highly prevalent communities
 - Community-based patient education on diabetes prevention and management
 - Promoting dialogue around healthy lifestyle modifications
 - Increasing access to support services

References

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