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IST 659

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Final Project

**NutriMetrics**

**Introduction**

Have you ever just had a craving for some sort of snack or meal at any given point in the day? Or, have you ever just decided to have something delivered to due to convenience? Today, we can have items, food, and other groceries on demand. This can be delivered to our house or picked up directly from a store or supermarket. This convenience in the United States is leaps and bounds ahead of the process from the past centuries. From having to travel long and wide, to having a supermarket or store within a reasonable distance has transformed the community. However, has this innovation been beneficial to the health of the citizens within each state? Or is this convenience providing other issues that differ from before? To seek an answer for this problem, we have created a Food Access Portal System called NutriMetrics.

The Food Access Portal System envisions becoming a comprehensive, nationwide database management system, catering to both health officials and the public. The primary objective is to efficiently organize information regarding the accessibility of healthy food throughout each state and its correlation with obesity rates. By serving as a centralized hub, the system aims to offer a seamless resource for officials seeking insights into strategically addressing obesity hotspots through the expansion of food access. Key features will include obesity prevalence data and proximity analysis, indicating how closely most of the population resides in relation to local shopping centers. This initiative is poised to empower decision-makers with valuable data for informed policy interventions and promote healthier lifestyle choices among the public. To evaluate the “NutriMetrics” of the United States, we acquired data that presents population in each state, categorizing their distance from a supermarket and the obesity percentiles per state for the corresponding year. By making a centralized hub, the system aims to offer a seamless resource for officials seeking insights into strategically addressing obesity hotspots through the expansion of food access.

**The Data**

The first source of data is a dataset from Kaggle that’s primary focus is defining the accessibility of food across the country. This information was established from the United States Department of Agriculture’s Economic Research Service in 2010. Here is an example of the data below in Figure 1.

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**Figure 1: Food Access Excel Spread Sheet**

This information provided a total of 25 columns and 3143 rows, providing individualized populations per county within the 50 states. Now, let’s explain what the columns within each section mean for a better understanding of the metrics.

**Columns**

* County – County Name
* Population – The Total Count from the 2010 Census
* State – State Name
* Housing Data (Residing in Group Quarters) – Count of Population Residing in Group Quarters
* Housing Data (Total Housing Units) – Occupied Housing Unit Count from 2010 Census
* Vehicle Access – Housing Units without Vehicles Beyond ½ Mile, 1 Mile, 10 Miles, and 20 Miles
* Low Access Numbers
  + Children – Population of Children Beyond ½ Mile, 1 Mile, 10 Miles, and 20 Miles

Low Income – Low Income Beyond ½ Mile, 1 Mile, 10 Miles, and 20 Miles

* + Seniors – Senior Population Beyond ½ Mile, 1 Mile, 10 Miles, and 20 Miles
  + Total – Total Population Count Beyond ½ Mile, 1 Mile, 10 Miles, and 20 Miles

With the columns defined, we can understand how the population counts of the various categories. To simplify this data, compressed all the information to categorize the rows by state. Here is an example of the new table.  
A screen shot of a computer

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**Figure 2: Totals for Each State**

The last form of data used for this project is the obesity rates for each state in 2010. This was acquired from the CDC government website to evaluate all the percentages. Here is an example of the data below for 2010. However, we used ChatGPT to randomize the numbers to create a better evaluation of the metrics.

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**Figure 3: Obesity Percentages in 2010**

**Stakeholders**

With all the data in place, the next step was to identify the stakeholders for the project. Since we are dealing with the metrics of nutritional health that is based on access to a supermarket, here is the listing of all the different areas where the assumption will affect.

|  |  |
| --- | --- |
| Government Health Departments | Primary stakeholders at national, state, and local levels. Rely on system data for informed decision-making and policy planning. |
| Public Health Officials | Utilize the system to identify trends, assess intervention effectiveness, and allocate resources strategically. |
| Healthcare Providers | Hospitals, clinics, and healthcare organizations interested in local food access trends for patient care and community health initiatives. |
| Research Institutions | Academic and research institutions focused on nutrition, public health, and obesity studies leverage system data for research. |
| Nonprofit Organizations | Health and nutrition advocacy nonprofits use the system to identify areas in need of intervention and support. |
| Local Businesses and Retailers | Supermarkets, grocery stores, and food retailers analyze the system to understand demand for healthy food options. |
| Community Organizations | Use the system to tailor health and wellness programs to address specific community needs. |
| Technology Providers | Companies providing technology solutions have a stake in system development and maintenance. |
| Policy Makers | Government officials and policymakers use system insights to shape policies on public health, food accessibility, and obesity prevention. |
| General Public | End-users interested in accessing information about food availability and obesity rates in their communities for informed choices. |
| Educational Institutions | Schools offering health, nutrition, and public policy programs find value in the system for educational and research purposes. |
| Insurance Companies | Health insurance providers use system data to understand regional health risks and tailor insurance plans accordingly. |
| Urban Planning Departments | Departments involved in urban planning use the system to inform decisions related to zoning, infrastructure, and community development. |

**SQL Up/Down**

Below is the coding that was used to add the data into SQL for processing:

DROP TABLE if exists dbo.PopulationData

drop table if exists dbo.obesity

drop table if exists dbo.StateLookup

GO

CREATE TABLE PopulationData (

    State VARCHAR(255),

    VehicleAccess\_1Mile INT,

    VehicleAccess\_HalfMile INT,

    VehicleAccess\_10Miles INT,

    VehicleAccess\_20Miles INT,

    LowAccessNumbers\_Children\_1Mile INT,

    LowAccessNumbers\_Children\_HalfMile INT,

    LowAccessNumbers\_Children\_10Miles INT,

    LowAccessNumbers\_Children\_20Miles INT,

    LowAccessNumbers\_LowIncomePeople\_1Mile INT,

    LowAccessNumbers\_LowIncomePeople\_HalfMile INT,

    LowAccessNumbers\_LowIncomePeople\_10Mile INT,

    LowAccessNumbers\_LowIncomePeople\_20Mile INT,

    LowAccessNumbers\_People\_1Mile INT,

    LowAccessNumbers\_People\_HalfMile INT,

    LowAccessNumbers\_People\_10Miles INT,

    LowAccessNumbers\_People\_20Miles INT,

    LowAccessNumbers\_Seniors\_1Mile INT,

    LowAccessNumbers\_Seniors\_HalfMile INT,

    LowAccessNumbers\_Seniors\_10Miles INT,

    LowAccessNumbers\_Seniors\_20Miles INT,

    state\_population int

);

INSERT INTO PopulationData

    (state,

    VehicleAccess\_1Mile,

    VehicleAccess\_HalfMile,

    VehicleAccess\_10Miles,

    VehicleAccess\_20Miles,

    LowAccessNumbers\_Children\_1Mile,

    LowAccessNumbers\_Children\_HalfMile,

    LowAccessNumbers\_Children\_10Miles,

    LowAccessNumbers\_Children\_20Miles,

    LowAccessNumbers\_LowIncomePeople\_1Mile,

    LowAccessNumbers\_LowIncomePeople\_HalfMile,

    LowAccessNumbers\_LowIncomePeople\_10Mile,

    LowAccessNumbers\_LowIncomePeople\_20Mile,

    LowAccessNumbers\_People\_1Mile,

    LowAccessNumbers\_People\_HalfMile,

    LowAccessNumbers\_People\_10Miles,

    LowAccessNumbers\_People\_20Miles,

    LowAccessNumbers\_Seniors\_1Mile,

    LowAccessNumbers\_Seniors\_HalfMile,

    LowAccessNumbers\_Seniors\_10Miles,

    LowAccessNumbers\_Seniors\_20Miles,

    state\_population

    )

    VALUES

    ('Alabama', 58528, 95414, 3920, 9, 703162, 977663, 27487, 45, 1073134, 1553294, 57031, 146, 2935582, 4097447, 122530, 233, 402876, 560997, 19804, 41, 4779736),

    ('Alaska', 12859, 18020, 6592, 5502, 102098, 151561, 17124, 11082, 98217, 143243, 27374, 19476, 383330, 571016, 64834, 40586, 28465, 42720, 5709, 3300, 710231),

    ('Arizona', 37619, 91538, 6898, 3422, 560688, 1155979, 58457, 22977, 744272, 1553289, 123764, 50991, 2269693, 4543901, 247526, 87651, 366755, 663121, 44039, 15731, 6392017),

    ('Arkansas', 35393, 59929, 3941, 42, 425984, 609724, 37730, 450, 684193, 1005188, 75859, 980, 1774428, 2496017, 171053, 2093, 264864, 361314, 29665, 394, 2915918),

    ('California', 78700, 301830, 3280, 673, 1683379, 4783092, 41593, 7924, 1810949, 5505259, 77123, 13629, 6882412, 19007542, 198184, 33728, 899908, 2302841, 28210, 4274, 37253956),

    ('Colorado', 18756, 54706, 1169, 342, 436466, 907348, 23701, 4914, 396228, 906289, 33007, 8328, 1731172, 3623972, 110662, 23194, 191935, 396156, 17769, 4615, 5029196),

    ('Connecticut', 20516, 60630, 2, 0, 346070, 602287, 28, 0, 210213, 500781, 15, 0, 1498221, 2636731, 130, 0, 223489, 386733, 17, 0, 3574097),

    ('Delaware', 6263, 13469, 0, 0, 95206, 157542, 0, 0, 100307, 173483, 0, 0, 410217, 682962, 0, 0, 60999, 101131, 0, 0, 897934),

    ('District of Columbia', 2770, 23539, 0, 0, 7355, 40157, 0, 0, 9661, 66866, 0, 0, 27650, 196290, 0, 0, 3740, 25843, 0, 0, 601723),

    ('Florida', 104091, 274913, 2106, 47, 1425661, 2831564, 25202, 949, 2070315, 4379650, 55410, 2074, 6571917, 13160276, 127788, 4167, 1188445, 2334618, 21576, 806, 18801310),

    ('Georgia', 93379, 175943, 2415, 5, 1385523, 2081402, 23981, 102, 1814602, 2841822, 46305, 295, 5306219, 8002291, 105355, 452, 590263, 862585, 16348, 73, 9687653),

    ('Hawaii', 6897, 12932, 226, 2, 122463, 203157, 2451, 66, 116837, 186753, 4422, 29, 505567, 864637, 11378, 254, 65341, 119176, 1649, 34, 1360301),

    ('Idaho', 6956, 14668, 713, 199, 218072, 342967, 19163, 5132, 244648, 421336, 28528, 8552, 759983, 1222049, 74003, 19650, 95031, 150712, 12064, 3358, 1567582),

    ('Illinois', 69252, 205958, 2585, 0, 997710, 2000592, 39364, 0, 956538, 2156820, 53121, 0, 4024103, 8047025, 168918, 0, 528658, 1050089, 29123, 0, 12830632),

    ('Indiana', 63883, 118744, 936, 0, 891742, 1333744, 17409, 0, 995662, 1669393, 22787, 0, 3552499, 5336466, 71400, 0, 458273, 685084, 10251, 0, 6483802),

    ('Iowa', 20111, 44066, 2136, 0, 341791, 554687, 38244, 0, 349553, 626763, 42649, 0, 1394763, 2294135, 157606, 0, 208196, 341375, 28695, 0, 3046355),

    ('Kansas', 20480, 42872, 1984, 36, 323045, 559914, 38205, 1063, 357979, 658541, 49447, 1434, 1248091, 2190503, 157628, 4467, 166111, 286458, 28926, 981, 2853118),

    ('Kentucky', 58269, 98438, 2207, 0, 611350, 861179, 21655, 0, 943326, 1358734, 39614, 0, 2531898, 3613932, 93183, 0, 328986, 476520, 14006, 0, 4339367),

    ('Louisiana', 55146, 99428, 3449, 21, 581431, 890545, 34363, 675, 876331, 1395028, 60978, 1047, 2267782, 3533298, 146763, 2846, 267127, 425756, 21868, 405, 4533372),

    ('Maine', 15667, 25108, 629, 78, 184976, 230449, 5569, 447, 240441, 315156, 12027, 1374, 865037, 1095549, 29869, 2576, 134362, 173685, 5752, 577, 1328361),

    ('Maryland', 29043, 95697, 153, 0, 492736, 957819, 1019, 0, 333298, 790985, 2002, 0, 2045346, 4007560, 5979, 0, 266788, 499782, 1325, 0, 5773552),

    ('Massachusetts', 36638, 119441, 125, 0, 546948, 978474, 1493, 0, 333689, 804271, 1852, 0, 2352256, 4343214, 8229, 0, 335569, 625202, 1305, 0, 6547629),

    ('Michigan', 84364, 195986, 1593, 140, 1095373, 1809231, 14819, 706, 1257689, 2334640, 28659, 2006, 4586209, 7623844, 80070, 5447, 645676, 1055990, 18405, 1727, 9883640),

    ('Minnesota', 36969, 81617, 3303, 181, 643089, 1013377, 48784, 1605, 523859, 918750, 61948, 2849, 2542048, 4086380, 207745, 8383, 330152, 523990, 38378, 1734, 5303925),

    ('Mississippi', 42540, 61704, 5087, 1, 517729, 671441, 47253, 55, 854012, 1135990, 96239, 98, 2037963, 2629199, 193028, 167, 259133, 334266, 26753, 10, 2967297),

    ('Missouri', 50627, 111091, 3275, 41, 716649, 1136528, 42180, 521, 898599, 1515308, 69643, 817, 2911826, 4704089, 178347, 2223, 405296, 655153, 30690, 470, 5988927),

    ('Montana', 5984, 12216, 1318, 545, 120783, 173798, 25426, 9670, 150794, 233706, 38751, 16230, 510680, 748668, 111252, 45417, 74615, 111119, 19241, 8820, 989415),

    ('Nebraska', 8594, 23564, 1328, 119, 171506, 332344, 29679, 2630, 169161, 363935, 34861, 3532, 681722, 1317439, 126039, 11355, 99726, 179665, 24569, 2364, 1826341),

    ('Nevada', 11028, 40612, 704, 460, 180310, 414149, 7703, 3633, 198838, 512615, 13114, 6845, 748846, 1702391, 42291, 17239, 96685, 213395, 6626, 3149, 2700551),

    ('New Hampshire', 11251, 18060, 134, 2, 194400, 248928, 2060, 11, 143330, 206135, 2394, 28, 858581, 1117073, 10847, 91, 115479, 151212, 1829, 18, 1316470),

    ('New Jersey', 45141, 123334, 92, 0, 618989, 1230711, 1075, 0, 402206, 921798, 1541, 0, 2641433, 5270456, 9094, 0, 393717, 771994, 706, 0, 8791894),

    ('New Mexico', 15813, 30559, 4316, 2049, 262877, 410490, 43193, 17979, 409905, 647078, 88429, 40273, 1013212, 1597065, 171987, 72400, 131895, 209478, 26105, 11867, 2059179),

    ('New York', 94676, 237812, 1548, 8, 1024428, 1856350, 16151, 52, 1027781, 1936663, 24441, 91, 4539897, 8204289, 70869, 369, 661743, 1200867, 11199, 106, 19378102),

    ('North Carolina', 93571, 168561, 1613, 3, 1287128, 1908754, 15843, 270, 1872217, 2813024, 30306, 588, 5330388, 7898390, 76623, 1291, 713730, 1028705, 13591, 197, 9535483),

    ('North Dakota', 3325, 8365, 1120, 316, 72488, 114259, 26679, 5883, 70648, 127947, 28867, 7610, 295484, 497244, 115849, 27933, 41261, 68230, 21117, 6315, 672591),

    ('Ohio', 111243, 245317, 1216, 0, 1297176, 2142768, 16661, 0, 1429544, 2697221, 23442, 0, 5323159, 8921811, 66685, 0, 741429, 1247511, 9377, 0, 11536504),

    ('Oklahoma', 30643, 59477, 2750, 100, 475626, 739032, 45922, 1362, 658290, 1086761, 76525, 2319, 1908973, 2968385, 193999, 5934, 267384, 403659, 32718, 1164, 3751351),

    ('Oregon', 17811, 50324, 1077, 303, 288167, 587608, 14794, 3282, 368685, 766560, 29481, 7955, 1291884, 2538759, 77411, 18717, 212140, 376009, 15910, 4383, 3831074),

    ('Pennsylvania', 114636, 268047, 1226, 0, 1217275, 1990753, 12527, 0, 1265323, 2308945, 19164, 0, 5419652, 8993338, 57318, 0, 848844, 1412036, 10187, 0, 12702379),

    ('Rhode Island', 6419, 21231, 12, 0, 70687, 153196, 163, 0, 60912, 175836, 245, 0, 343253, 727225, 1051, 0, 51054, 108252, 224, 0, 1052567),

    ('South Carolina', 60621, 96101, 2241, 27, 669921, 937341, 16626, 116, 1043424, 1465970, 34924, 372, 2817258, 3963572, 76492, 740, 378252, 535639, 11812, 144, 4625364),

    ('South Dakota', 6116, 11503, 1419, 229, 111780, 163258, 28473, 4262, 126476, 198587, 36630, 6198, 430467, 644381, 109940, 16892, 58974, 87415, 18725, 2987, 814180),

    ('Tennessee', 63451, 113919, 1391, 0, 894089, 1275104, 17722, 0, 1269324, 1923854, 35732, 0, 3750042, 5367311, 83840, 0, 513174, 721851, 13112, 0, 6346105),

    ('Texas', 135150, 315211, 6813, 694, 2711258, 5078377, 108388, 8668, 3280345, 6414876, 171318, 15568, 9967980, 18569856, 484675, 38613, 1096808, 1957261, 84790, 7762, 25145561),

    ('Utah', 6625, 20969, 519, 299, 307230, 645373, 14298, 5812, 218115, 527408, 17495, 8066, 891441, 1976267, 47746, 19287, 79286, 174973, 6747, 2615, 2763885),

    ('Vermont', 6642, 10643, 246, 0, 86870, 108468, 2781, 0, 101082, 136980, 4288, 0, 402568, 516438, 12940, 0, 58818, 74775, 2127, 0, 625741),

    ('Virginia', 60095, 121603, 2404, 25, 797956, 1389187, 24099, 90, 866518, 1500058, 40402, 202, 3414621, 5901333, 120484, 587, 477201, 761035, 20353, 144, 8001024),

    ('Washington', 27886, 76709, 1154, 115, 635726, 1145994, 19459, 1512, 602304, 1170239, 32834, 3043, 2594276, 4726080, 89451, 7275, 339935, 594698, 14877, 1204, 6724540),

    ('West Virginia', 33739, 50921, 1578, 14, 264045, 335542, 13682, 85, 463653, 607869, 30040, 250, 1228503, 1581105, 70103, 568, 192231, 252500, 11768, 121, 1852994),

    ('Wisconsin', 40393, 93641, 2110, 20, 639571, 1035332, 28924, 169, 611537, 1127191, 42111, 392, 2686562, 4349324, 134388, 1190, 378116, 603349, 25389, 333, 5686986),

    ('Wyoming', 3930, 6452, 372, 144, 78796, 113394, 11546, 3870, 82997, 126209, 13657, 5452, 319058, 466540, 51115, 18103, 37656, 56569, 7787, 3079, 5686986),

    ('Grand Total', 2080499, 4722832, 97425, 16213, 29935778, 52372933, 1171148, 128069, 35187961, 64915097, 1940796, 239139, 122826152, 215175065, 5144697, 542118, 16776591, 28743494, 863213, 95302,309347261);

Create table obesity(

    State VARCHAR(255),

    lessthan\_10 int,

    tento14 int,

    fifteento19 int,

    twentyto24 int,

    twentyfiveto29 int,

    greaterthanorequalto30 int

)

INSERT INTO obesity

    (State,

    lessthan\_10,

    tento14,

    fifteento19,

    twentyto24,

    twentyfiveto29,

    greaterthanorequalto30

    )

    values

    ('Alaska', 5, 8, 12, 15, 18, 22),

    ('Delaware', 3, 7, 11, 14, 17, 21),

    ('Alabama', 4, 9, 13, 16, 19, 23),

    ('Arizona', 6, 10, 14, 17, 20, 24),

    ('Arkansas', 2, 6, 10, 13, 16, 20),

    ('California', 7, 11, 15, 18, 21, 25),

    ('Colorado', 1, 5, 9, 12, 15, 19),

    ('Connecticut', 3, 8, 12, 15, 18, 22),

    ('Delaware', 4, 9, 13, 16, 19, 23),

    ('Florida', 8, 12, 16, 19, 22, 26);

CREATE TABLE StateLookup (

    StateID INT PRIMARY KEY,

    StateName VARCHAR(50) NOT NULL,

    Abbreviation CHAR(2) NOT NULL

);

INSERT INTO StateLookup (StateID, StateName, Abbreviation)

VALUES

   (1, 'Alabama', 'AL'),

   (2, 'Alaska', 'AK'),

   (3, 'Arizona', 'AZ'),

   (4, 'Arkansas', 'AR'),

   (5, 'California', 'CA'),

   (6, 'Colorado', 'CO'),

   (7, 'Connecticut', 'CT'),

   (8, 'Delaware', 'DE'),

   (9, 'Florida', 'FL'),

   (10, 'Georgia', 'GA'),

   (11, 'Hawaii', 'HI'),

   (12, 'Idaho', 'ID'),

   (13, 'Illinois', 'IL'),

   (14, 'Indiana', 'IN'),

   (15, 'Iowa', 'IA'),

   (16, 'Kansas', 'KS'),

   (17, 'Kentucky', 'KY'),

   (18, 'Louisiana', 'LA'),

   (19, 'Maine', 'ME'),

   (20, 'Maryland', 'MD'),

   (21, 'Massachusetts', 'MA'),

   (22, 'Michigan', 'MI'),

   (23, 'Minnesota', 'MN'),

   (24, 'Mississippi', 'MS'),

   (25, 'Missouri', 'MO'),

   (26, 'Montana', 'MT'),

   (27, 'Nebraska', 'NE'),

   (28, 'Nevada', 'NV'),

   (29, 'New Hampshire', 'NH'),

   (30, 'New Jersey', 'NJ'),

   (31, 'New Mexico', 'NM'),

   (32, 'New York', 'NY'),

   (33, 'North Carolina', 'NC'),

   (34, 'North Dakota', 'ND'),

   (35, 'Ohio', 'OH'),

   (36, 'Oklahoma', 'OK'),

   (37, 'Oregon', 'OR'),

   (38, 'Pennsylvania', 'PA'),

   (39, 'Rhode Island', 'RI'),

   (40, 'South Carolina', 'SC'),

   (41, 'South Dakota', 'SD'),

   (42, 'Tennessee', 'TN'),

   (43, 'Texas', 'TX'),

   (44, 'Utah', 'UT'),

   (45, 'Vermont', 'VT'),

   (46, 'Virginia', 'VA'),

   (47, 'Washington', 'WA'),

   (48, 'West Virginia', 'WV'),

   (49, 'Wisconsin', 'WI'),

   (50, 'Wyoming', 'WY');

**Normalizing Data Structure**

Here is the representation for how we normalized the data for processing:

-- StateLookup Table (Original)

CREATE TABLE StateLookup (

    StateID INT PRIMARY KEY,

    StateName VARCHAR(50) NOT NULL,

    Abbreviation CHAR(2) NOT NULL

);

-- StateLookup Table (3NF)

CREATE TABLE StateLookup (

    StateID INT PRIMARY KEY,

    StateName VARCHAR(50) NOT NULL,

    Abbreviation CHAR(2) NOT NULL

);

-- PopulationData Table (Original)

CREATE TABLE PopulationData (

    State VARCHAR(255),

    VehicleAccess\_10Miles INT,

    LowAccessNumbers\_Children\_10Miles INT,

    state\_population INT

);

-- PopulationData Table (3NF)

CREATE TABLE PopulationData (

    StateID INT FOREIGN KEY REFERENCES StateLookup(StateID),

    VehicleAccess\_10Miles INT,

    LowAccessNumbers\_Children\_10Miles INT,

    state\_population INT,

    PRIMARY KEY (StateID)

);

-- Obesity Table (Original)

CREATE TABLE obesity (

    State VARCHAR(255),

    greaterthanorequalto30 INT

);

-- Obesity Table (3NF)

CREATE TABLE obesity (

    StateID INT FOREIGN KEY REFERENCES StateLookup(StateID),

    greaterthanorequalto30 INT,

    PRIMARY KEY (StateID)

);

**Sample Input/Output**

For the application process, the idea for this project is to have an interactive map that can output the data based on the input. For the input, all that would be needed is to select the year by typing the value in and then selecting the state on the map. With those two inputs, the application will provide all the information from the tables listed above. The purpose of this style was to be able to make an easy and effective way to track the data by their location. Each year, information is added via the CDC and government records. Thus, each year can be easily obtained and inserted into the SQL coding for processing to keep the application up to date for any other outside evaluations.

A map of the united states

Description automatically generated **Figure 4: Application Example**

A map of united states with a red spot

Description automatically generated **Figure 5: Application Input/Output Example**

**Logical Model**

A screenshot of a computer

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**Conceptual Model**

A diagram of a data flow

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**Data Questions**

How would you join and display all relevant information as per the graphical interface shown in figure 4?

**A computer screen with white text

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How would you calculate obesity percentage given a state with more than 30% going by population?

**A screen shot of a computer

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Description automatically generated**

How would you display the correlation between vehicle access within 10 miles of a supermarket and state obesity percentage from each state?

A computer screen with white text

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A screenshot of a computer

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How would you display the 5 worst states with food shortages specifically regarding children within 10 miles of a supermarket?

A computer screen shot of white text

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A screenshot of a computer

Description automatically generated

How would you implement a trigger to enforce population constraints? i.e., when inserting new data how do you ensure the population will not decrease?

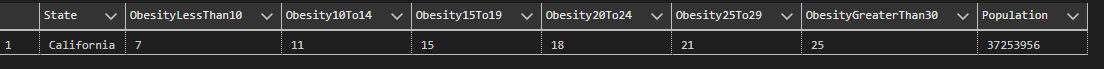
**A computer screen shot of a computer code

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How would you implement a function to get obesity and population info from a given state by abbreviation?

**A computer screen shot of a black screen with white text

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**Team Log**

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| **Meeting #** | **Progress/Tasks** |
| **1** | Discuss Project ideas and browse possible datasets to use |
| **2** | Solidify database and discuss possible ideas for implementation. i.e., what problem are we solving? |
| **3** | Start forming ERD, Conceptual Data Models. Discussed Obesity Data |
| **4** | Finalize data models and discuss code implementation. |
| **5** | Revise Conceptual/Logical data – Collaborate on GUI mockup |
| **6** | Discussed Data Import – We had issues with the built in Azure Tool. Utilized Chat GPT to format 1000 cells into our MSSQL insert statement |
| **7** | Go over up/down script and ensure table creation is complete. Ran some example selects, functions, and triggers |
| **8** | Finalize Documentation/Code  Work on Powerpoint |

**Summary**

Have you ever just had a craving for some sort of snack or meal at any given point in the day? Or have you ever just decided to have something delivered to due to convenience? Today, we can have items, food, and other groceries on demand. This can be delivered to our house or picked up directly from a store or supermarket. This convenience in the United States is leaps and bounds ahead of the process from the past centuries. From having to travel long and wide, to having a supermarket or store within a reasonable distance has transformed the community. However, has this innovation been beneficial to the health of the citizens within each state? Or is this convenience providing other issues that differ from before? Within this project, we will delve into this main topic while answering other business questions. To evaluate the “NutriMetrics” of the United States, we acquired data that presents population in each state, categorizing their distance from a supermarket and the obesity percentiles per state for the corresponding year.

Health and nutrition have been vital components for daily life and wellness. Every year, there are a numerous amount of people who have passed due to not managing their health and nutrition. Even with the innovation of being able to obtain food more easily than in the past, has this been more of a detriment to communities? Or has this innovation only brought about different problems for the American citizen? Six business questions were assessed from this database. Each question revolved around the main objective of organizing information about the accessibility of healthy food throughout each state and its correlation with obesity. After evaluating the data, we were able to find out some interesting results between all the states back in 2010.

To start the database, we had to figure out which of the states had the highest percentage of obesity through the data based on their population. Performing a join on the two sets, we accumulated the data within a new table. To calculate this metric, we took the obesity rate from the state, changed it into a whole number and then divided it by its population for the information. With all the percentages calculated per state population, we can see where obesity is more of an issue based on the population rather than the whole state itself.

Once the national scale was created, we decided to dive deeper into the sections presented from the population data. Each category within the dataset had four different distance markers attributing to their values. For the sake of simplicity, we took the Vehicle Access Category and the Low Access – Children Category. Creating two separate data tables, we were able to perform various listings of the two. The Vehicle Access Category was listed in descending order from the highest obesity rating to the lowest. On the other hand, the Low Access – Children Category was instructed to list the top five, worst states in terms of their obesity ratings in correlation to their population in the category.

We also included a trigger in our script to enforce population constraint. This is to preserve data integrity in the modification of the tables. As we planned for this system to be dynamic, it's important to note that new information can be loaded in via the insert statements. This trigger ensures that the total population is unable to decrease. Lastly, we demonstrated in our function that it's possible to retrieve obesity and population information based on a state's abbreviation. This function can be used to streamline the data output processes and could be used to implement a state search feature in future iterations.

**Reflection**

In conclusion of the project, the NutriMetrics database was able to enlighten us about some of the information calculated. For starters, we were able to discern some of the places that have the highest obesity rates based on their categories. One interesting piece of information was the ratio of obesity to total population for California in 2010. It had one of the lowest calculations, yet it had one of the largest populations. Regarding the Vehicle Access Category, Florida had the largest obesity rating out of the population that had access to a vehicle beyond 10 miles. Lastly, Texas, Arizona, Minnesota, Mississippi, and Oklahoma were the top five worst states in terms of obesity regarding the population of children beyond 10 miles from a supermarket. From these experiments, we can theorize that it is possible for NutriMetrics to work accurately for other implementations. It can take the data each year and update based off factual documentation to improve our understanding of each community nationwide. For example, tracking yearly data can then be used to isolate the trends in a particular state to see how obesity is plaguing that state. Also, the original data incorporated counties and cities individually. Therefore, NutriMetrics could even evolve to a more concise method of assessing all the cities, counties, and states across the United States!

**References**

Kaggle – US Food Access Data

<https://www.kaggle.com/datasets/mexwell/us-food-access>

Chat GPT – Data cleanup (for insert statements) and code formatting.

CDC. “Obesity Trends Among U.S. Adults Between 1985 and 2010”. CDC.gov.

<https://www.cdc.gov/obesity/downloads/obesity_trends_2010.pdf>