THE IMPACTS OF EDUCATION

Business Intelligence

Brief Description

The following documents will reflect our data comparing the impacts of education to see if there is a drastic difference between the different levels of education earned and specifically the impacts it could have on poverty. We will look at poverty levels within the levels of education, those with less than a high school diploma, a high school diploma only, 1-3 years of after high school education which may include an Associate's Degree, and those with an education level of 4 years or higher, including at least a Bachelor's Degree.

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Data Mart Design Description:

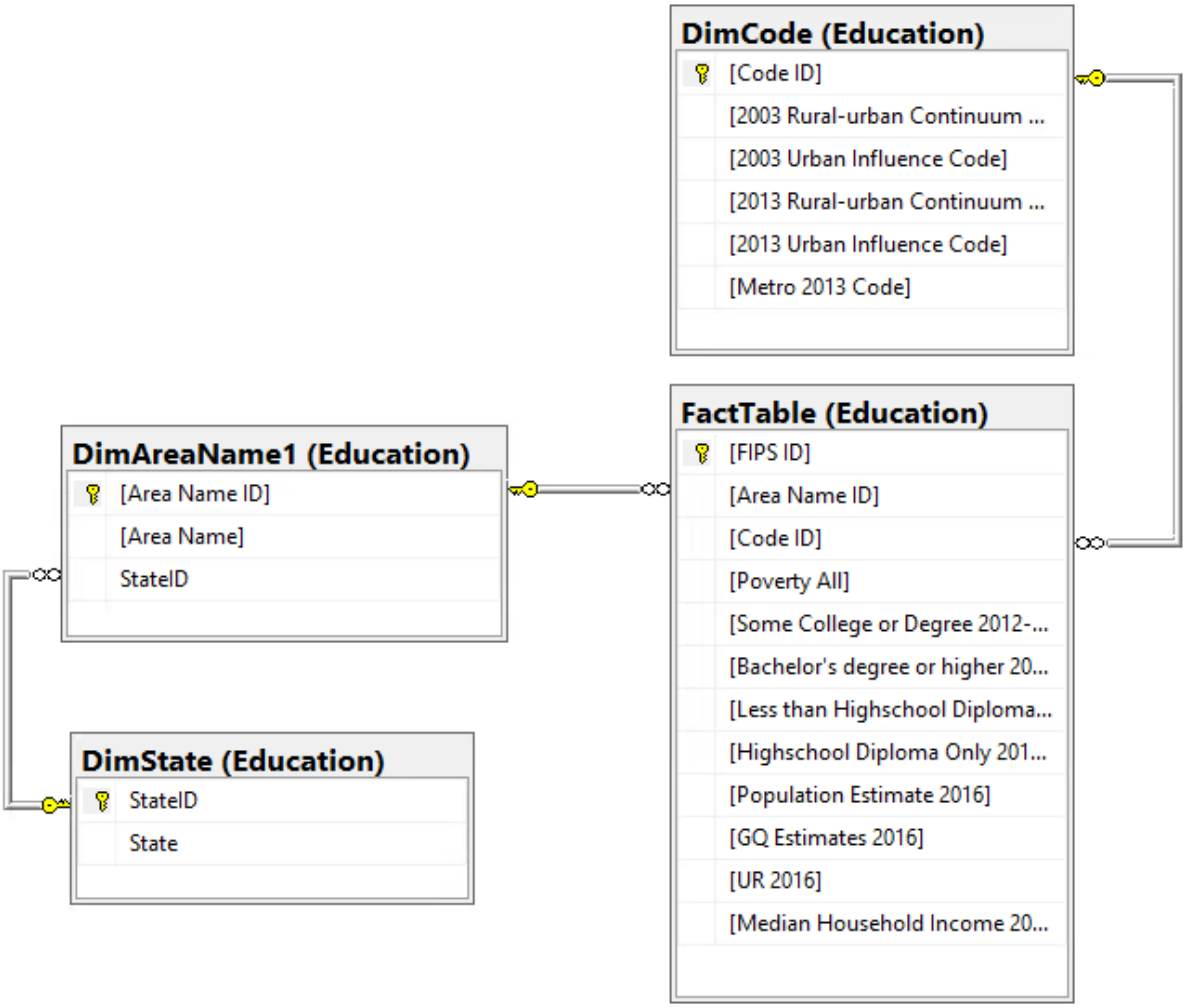
This document attempts to describe a proposed data mart design that can be used to analyze the Socioeconomic indicators: *Education, Population, Unemployment, and Poverty Estimates* data set provided by ers.usda.gov. The design will be implemented and replicated in Microsoft SQL Server Management Studio. SQL Server MS will be used to implement the analytical design in order to accommodate a variety of analytical technologies which could be used to perform the analysis. The analytical design is based off of the flat data structure included in the CSV and Excel files provided by Ers.Usda.gov and include county-level rural/urban codes and urban influence codes. They examine the Poverty, Population, Unemployment and Median Household Income, and Education estimates recorded by the United States Department of Agriculture, Economic Research Service and we will be using the data information dated between 2000 and 2017, specifically focusing on the years between 2012 and 2016, and compared by area/state.

This document will examine the proposed analytical tables and relationships based on structure seen in this partial sample. **NOTE: not all columns and rows are included in this sample**

FIPS ID	Area Name ID	Code ID	Poverty All	Some College or degree 2012-2016	Bachelor's degree or higher, 2012-2016	Less than a high school diploma, 2012-2016
1001	100	100	7444	10451	8960	9811
1003	101	101	24005	44486	25876	11718
1005	102	102	6787	4475	3240	2078
1007	103	103	4099	4234	3475	2513
1009	104	104	8033	13436	10735	8777

In the above data sample taken from one of the source CSV files, the proposed analytical design will consider the measurable columns such as “Poverty All”, “Bachelor’s degree or higher, 2012-2016”, “Less than a high school diploma, 2012-2016”, as “Facts”. The “Area Name ID” and “Code ID”, columns will be used to derive “Dimensions”. These tables will be used together to form an analytical schema design. This document will illustrate the schema and describe its proposed design. The *Education, Population, Unemployment, and Poverty Estimates* data set will be extracted, transformed, and loaded (ETL) into the analytical schema design using a custom-built SQL Server Integration Services (SSIS) package developed with SQL Server Data Tools (SSDT) in Visual Studio. Additionally, analysis will be performed on the Education, Population, Unemployment, and Poverty Estimates data using the database labeled Socioeconomic Project.

Data Mart Schema Diagram:



Data Mart Meta Data:

FACT TABLE - Education.FactTable			
Column Name	Data Type	Description	Key
FIPS ID	int	Primary Key	Primary
Area Name ID	int	Foreign Key	Foreign
Code ID	int	Foreign Key	Foreign
Poverty All	int	Estimate of people of all ages in poverty 2016	None
Some College or Degree 2012-16	int	People with Some College/Degree in the years 2012-2016	None
Bachelor's Degree or < 2012-16	int	People with Bachelor's Degree or higher in the years 2012-2016	None
< H.S. Diploma 2012-16	int	People without a High School Diploma	None
H.S. Diploma Only 2012-16	int	People with a High School Diploma but no Degree	None
Population Estimate 2016	int	Total size or composition of populations for 2016	None
GQ Estimates 2016	int	Total Size of People living in group housing facilities in 2016	None
UR 2016	int	Unemployment Rate Percentage of people unemployed but actively looked for work in 2016	None

DIMENSION TABLE Education.DimAreaName1			
Column Name	**Data Type**	**Description**	**Key**
Area Name ID	int	Primary Key	Primary
Area Name	varchar(8000)	Name of Area	None
State ID	int	Foreign Key	Foreign

DIMENSION TABLE Education.DimState			
Column Name	**Data Type**	**Description**	**Key**
State ID	int	Primary Key	Primary
State	varchar(8000)	Name of State	None

DIMENSION TABLE Education.DimCode			
Column Name	**Data Type**	**Description**	**Key**
Code ID	int	Primary Key	Primary
Rural Urban Continuum Code 2003	int	9-level classification of counties by metro-nonmetro status, location, and urban size 2003	None
Urban Influence Code 2003	int	12-level classification of counties by metro-micro-nonmetro status, location, and size of largest place 2003	None
Rural Urban Continuum Code 2013	int	9-level classification of counties by metro-nonmetro status, location, and urban size 2013	None
Urban Influence Code2013	int	12-level classification of counties by metro-micro-nonmetro status, location, and size of largest place 2013	None
Metro 2013 Code	int	Classification of counties by metro or non-metro; 1 = metro county and 0 = non-metro county	None

Data Mart ETL Description:

FactsDW.zip

This ETL process was built with SQL Server Data Tools, based on the SQL Server Integration Services template provided by Visual Studio. For our ETL process we took our cleaned Excel data and developed a staging table for our fact table data and dimensional table data. The staging table data was sourced from a flat file and the data types were transformed and values were then mapped to align with our database designs in SQL Server. From that point a simple combination of SSIS tasks were utilized to systematically load and alter the fact and dimension tables. These steps allow for dynamic changes to the data, table structure and simple and efficient loading and reloading of schemas. For basic loading of the dimension tables we used an OLE DB source and OLE DB destination data flow task, pulling data from our fact staging table. To map and assign the primary key values of the dimensions as surrogate keys, execute SQL tasks were utilized along with query building functions to update the fact staging table data to reflect the assigned surrogate keys. From that point the fact staging table served as a source for the final fact table, titled: Education.FactTable. This final load used the same basic loading process mentioned previously.

SSIS Package Details:

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION
Get Socioeconomic data from CSV	Data Flow Task	STEP1-Get source data from CSV	Connects to the .csv source data file and extracts the data
Get Socioeconomic data from CSV	Data Flow Task	STEP2-Transform staging data	Transforms columns to integers and decimal values
Get Socioeconomic data from CSV	Data Flow Task	STEP3-Load fact data into SQL Server	Moves data into final fact Staging Table. Loads data to Fact Staging Table

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION
Load State Dimension	Data Flow Task	STEP1-Grab States from Staging Table	Connects to SQL Server data regarding States
Load State Dimension	Data Flow Task	STEP2-Load States into State dimension	Transforms columns to integers and decimal values Loads data to State Dimension Table

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION
Update State ID into Fact Staging Table	Execute SQL Task	STEP1-Update State ID to change null values	Connects the database source and builds update query
Update State ID into Fact Staging Table	Execute SQL Task		Executes UPDATE query and loads data to Fact Staging Table and assigns surrogate key

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION

Load Area Name Dimension	Data Flow Task	STEP1-Grab Area Name and StateID from Staging Table	Pulls SQL server data for Area Name dimension
Load Area Name Dimension	Data Flow Task	STEP2-Load Area Name and StateID into DimAreaName1	Moves source data into queue for SQL Server Loads data to Area Name Dimension(DimAreaName1)

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION
Update Area Name ID into Fact Staging Table	Execute SQL Task	STEP1-Update Area Name ID into Fact Staging Table	Connects to database and builds Update query
Update Area Name ID into Fact Staging Table	Execute SQL Task		Executes UPDATE query & loads data to Fact Staging Table & assigns surrogate key

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION
Load Code Dimension	Data Flow Task	STEP1-Get Code data	Connects to database source (Fact Staging Table)
Load Code Dimension	Data Flow Task	STEP2-Load Code Dimension	Maps and moves SQL server data to Code Dimension Loads data to DimCode dimension

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION
Execute SQL Task	Data Flow Task	STEP1-Update Code ID into Staging	Connects to database source and builds update query
Execute SQL Task	Execute SQL Task		Executes UPDATE query to load data and assign Surrogate Keys to Fact Staging Table

CONTROL FLOW NAME	TYPE OF TASK	DATA FLOW NAME	DESCRIPTION
Load Fact Socioeconomic	Data Flow Task	STEP1-Get Fact Staging Data	Connects to database source (Fact Staging Table)
Load Fact Socioeconomic	Data Flow Task	STEP2-Load Fact Table	Maps and moves SQL server data to Code Dimension and Loads data to Education.FactTable