Social Determinants of Emergency Department Utilization in Utah

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U.S. Census Bureau

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Background

In 2019, the U.S. Census Bureau entered into a partnership agreement with the Utah Department of Health (UDOH) with two aims:

- Aim 1: Examine social determinants of emergency department (ED) utilization in Utah in order to reduce preventable visits
- Aim 2: Evaluate the utility of ED encounter data for surveys for which the Census Bureau collects data, by making comparisons to the National Hospital Ambulatory Medical Care Survey (NHAMCS)

This presentation addresses Aim 1, examining social determinants of emergency department (ED) utilization in Utah

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Goals

- Understand person and household characteristics associated with preventable ED visits to inform policy, improve health outcomes, and increase cost-effectiveness of emergency care in Utah
- Increase utility of existing survey data, create new estimates related to social determinants of ED utilization, and validate survey content
- Determine which, if any, individual- and household-level Social Determinants of Health (SDOH) are significantly associated with preventable ED visits in Utah
- Compare our findings with existing literature

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Enhancing Health Data (EHealth) Program

- Utilizes existing survey and administrative records data and engages with new stakeholders to acquire health-related records
- Goal is to improve the quality and availability of statistical information to better understand and advance population health
- Potential to reduce respondent burden and data collection costs while increasing the quality and utility of existing data
- The COVID-19 pandemic has highlighted the relevance of statistics from these types of data partnerships to help answer crucial questions

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Source Data

- 2013-2017 Emergency Encounters Data from Utah's Department of Health (UDOH ED)
  - Visit-level dataset
- 2013 through 2017 1-Year American Community Survey (ACS) restricted microdata from U.S. Census Bureau (not 5-year ACS product)
  - Person- and household-level dataset
  - Roughly 1-2% of Utah population sampled per year
- We link UDOH ED and ACS using internal person-level linkage keys, Protected Identification Keys (PIKs)

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Linkage Summary

- UDOH ED visit file (2013-2017)
  - 3.6 million UDOH visit records, from 1.4 million unique persons, i.e., 2.5 visits per person
  - 3.5 million visits with matched PIK, i.e., 97 percent PIK rate
- ACS Utah person file (2013 through 2017, not 5-year ACS product)
  - 375,000 person records (about 75,000 person records per year)
  - 353,000 persons with matched PIK, i.e., 94 percent PIK rate
- Linked UDOH-ACS file
  - 230,000 matched visits, i.e., 7 percent of the PIKed UDOH visits
  - 98,000 matched patients, i.e., 7 percent of the PIKed UDOH patients
- Many of the linked UDOH ED-ACS records borrow data from other years in the 2013-2017 period (e.g., links between 2014 UDOH data and 2016 ACS data)

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Classification of ED Visits

- We use the New York University (NYU) ED Algorithm to classify visits
  - Billings et al., 2000a, 2000b, 2000c
- The NYU ED Algorithm uses International Classification of Diseases (ICD) codes to classify ED visits into nine categories (four main categories and five others)
- To determine if a UDOH ED visit was preventable, we apply the Algorithm to the visit's primary diagnosis code, including for the four main categories:
  - Nonpreventable Emergency Care: Care Needed – Not Preventable ("true" emergency)
  - Preventable Emergency Care: Care Needed – Preventable
    Primary Care Treatable
    Non-Emergent
- For ICD codes associated with multiple Algorithm categories, we assign the visits to the Algorithm's highest probability category, and we randomize for ties of 50%

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Social Determinants of Health (SDOH) Framework

- Theorizes that an individual's health is impacted by conditions of the environments in which one works, lives, and plays (WHO, 2008)
- Consistent with the *Healthy People 2020* framework (CDC, 2010), SDOH characteristics span five domains:
  - Economic Stability
  - Education
  - Social & Community Context
  - Health & Healthcare
  - Neighborhood & Built Environment
- We select ACS measures from each of the 5 SDOH dimensions:
  - 19 specific characteristics

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Social Determinants of Health (SDOH) Variables

Economic Stability	Education	Social & Community Context	Health & Healthcare	Neighborhood & Built Environment
• Employment • Household Income Decile • Household Size • Poverty Status (family) • SNAP Participation	• English Speaking Ability • Educational Attainment	• Age • Internet Access • Marital Status • Nativity • Race/origin • Sex • Veteran Status	• Disability Status • Health Insurance Coverage • Public Coverage	• Vehicle Access • Housing Tenure

Methodology

- For each SDOH category and each of the 4 ED visit categories, we compute the following figures:
  - Average number of ED visits per 1,000 people
  - Percentage of ED visits across the 4 ED categories
- Study bivariate relationships between SDOH categories and ED use
- Study results from logistic regressions (stepwise, LASSO) to confirm observed relationships in the presence of control variables
- Study characteristics of Utah ED patients relative to those of the overall Utah population

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Data Confidentiality and Disclosure Avoidance

- Confidential data cannot be disclosed or published in any way that permits identification of a particular individual or an entity
- Maintaining confidentiality of these data is guaranteed under Title 13 of the U.S. Code Section 9 and the Privacy Act of 1974
- This project was approved by UDOH Institutional Review Board (IRB) and executives, by Utah Health Data Committee at an open, public meeting, and by State of Utah executives
- Formal review and approval was received from the Census Bureau's Disclosure Review Board (DRB) before release of this and any other results or products
- The released data contain no personally identifiable information, nor any information that can be made personally identifiable when combined with other publicly-available resources
- The UDOH *Data Suppression and Data Aggregation Guidelines,* as well as additional Census Bureau DRB criteria, have been met

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Main Social Determinants of Preventable Emergency Care Visits

- On average, Utah ED patients from more vulnerable populations tend to have more ED visits (many of which are preventable visits) than do other Utah ED patients

Group 1	***vs.***	***Group 2***
Individuals in **lower income deciles**	…had **more preventable emergency care visits** than…	individuals in **higher income deciles**
Individuals who were **unemployed**		individuals who were **employed**
Individuals with **less educational attainment**		individuals with **more educational attainment**
Individuals **with SNAP** participation		individuals **without SNAP** participation
Individuals living in **renter-occupied housing**		individuals living in **owner-occupied housing**
Individuals with **one or more disabilities**		individuals with **no disabilities**
Individuals who were **divorced/separated/widowed**		individuals who were **married** or **never married**
Women		**men**

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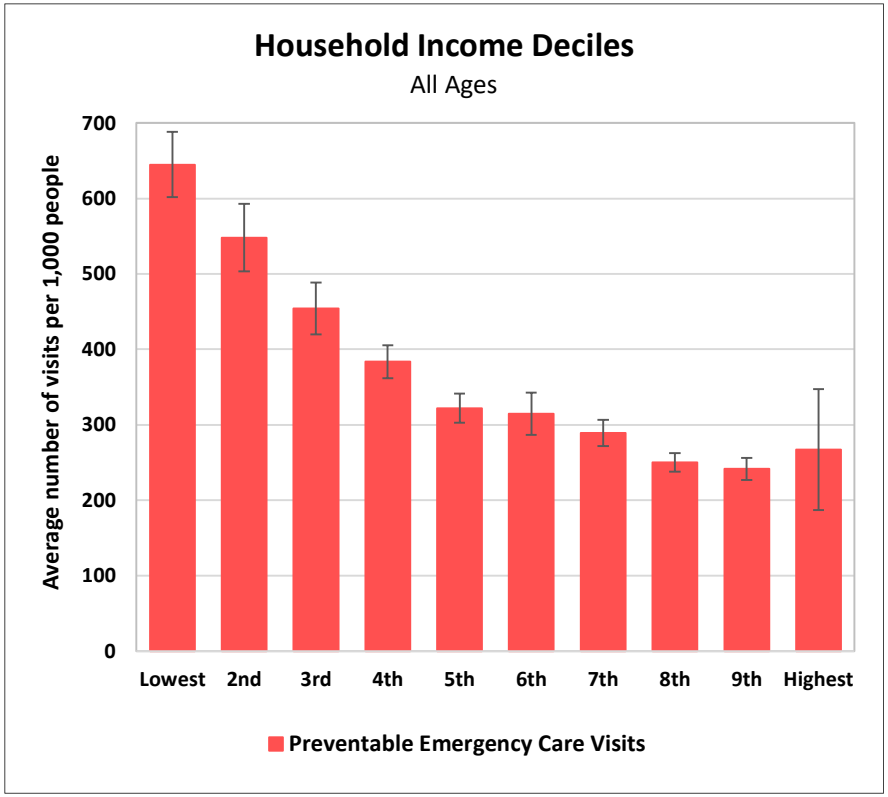
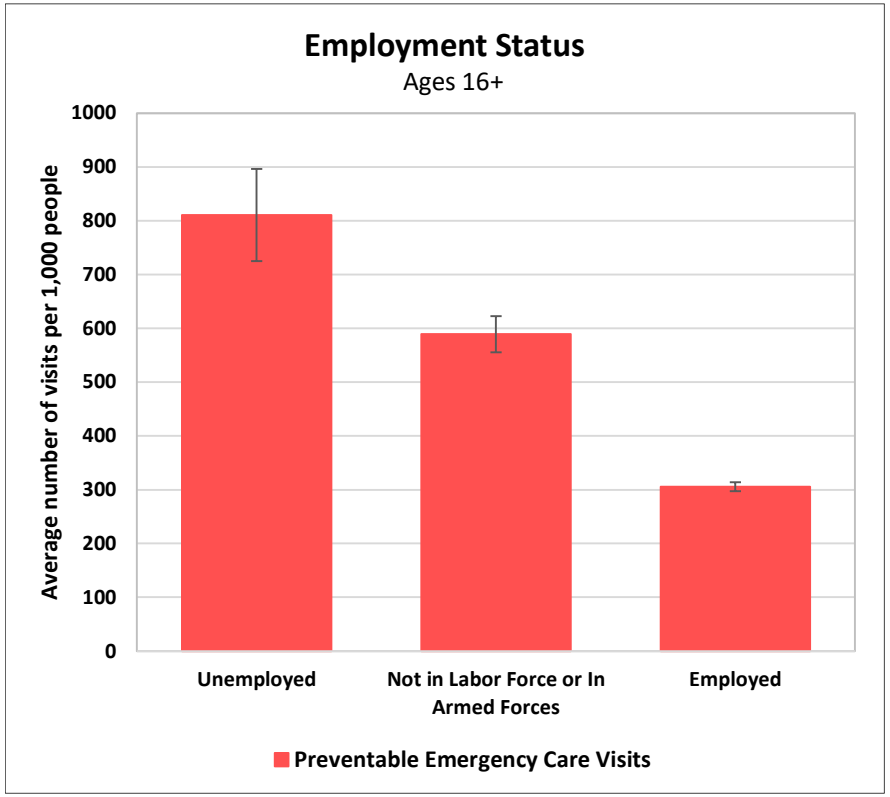
Avg. # of Preventable Emergency Care Visits Per 1,000 People (1)





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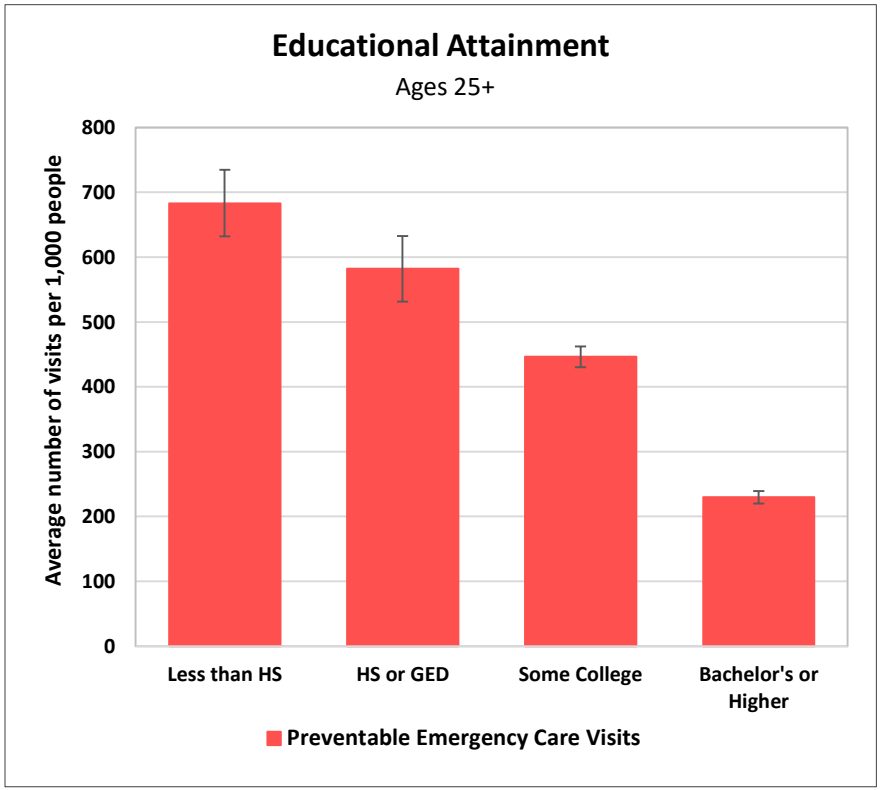
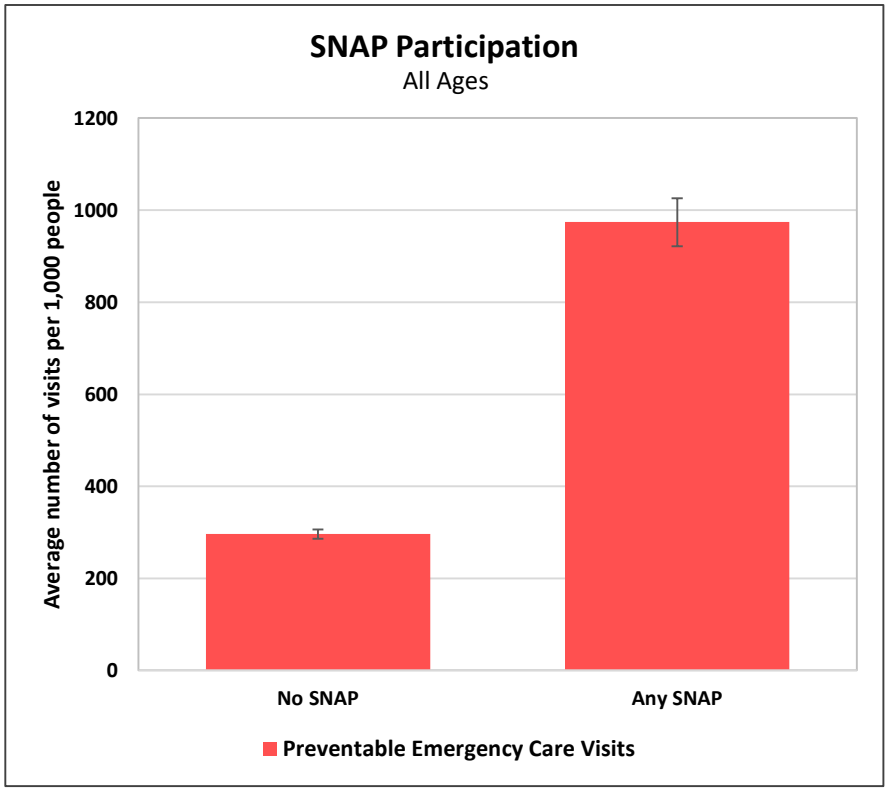
Source: Utah Department of Health (UDOH) (2018), Utah Healthcare Facility Limited Use Data Sets, Emergency Department Encounter Data, 2013-2017 (2018). U.S. Census Bureau (2018), 2013, 2014, 2015, 2016, and 2017 American Community Survey (ACS), for Individual 1-Year Estimates (2018).

Avg. # of Preventable Emergency Care Visits Per 1,000 People (2)





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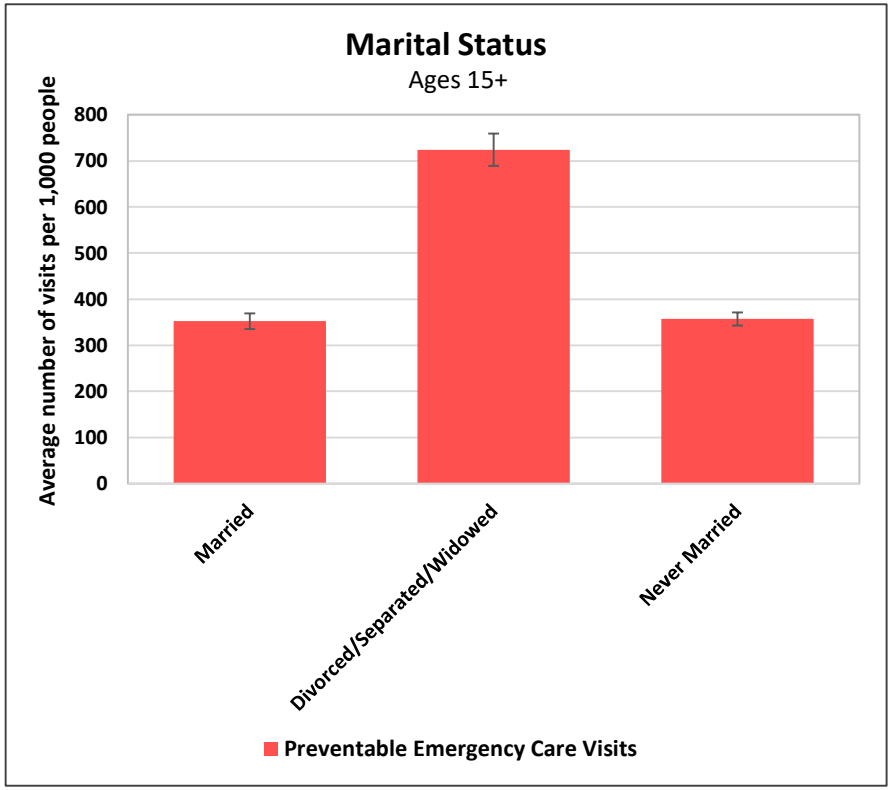
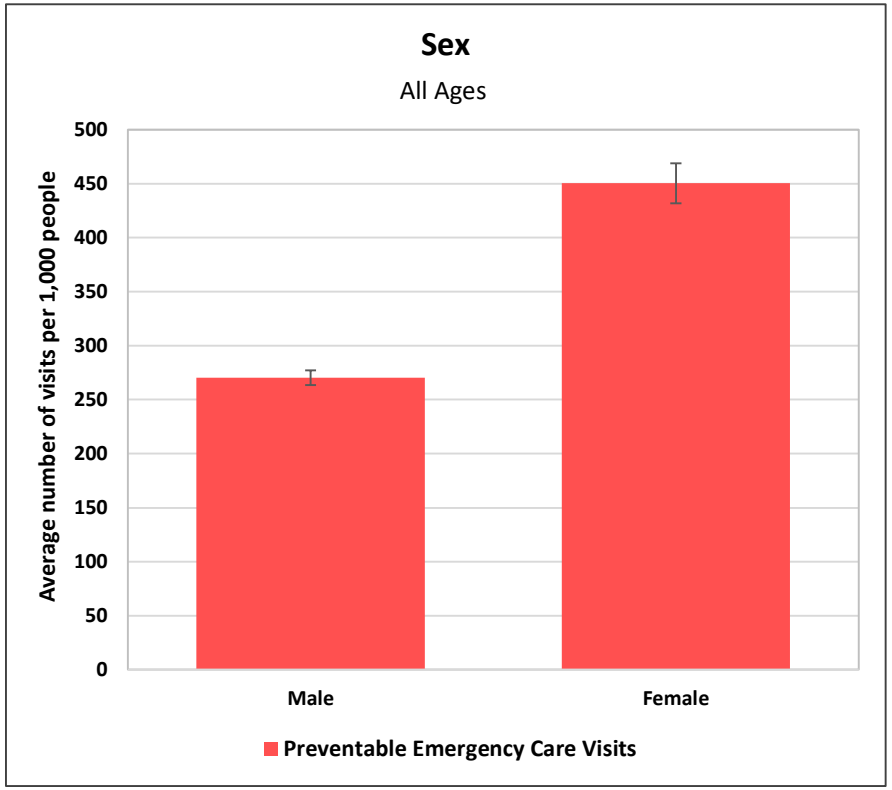
Avg. # of Preventable Emergency Care Visits Per 1,000 People (3)





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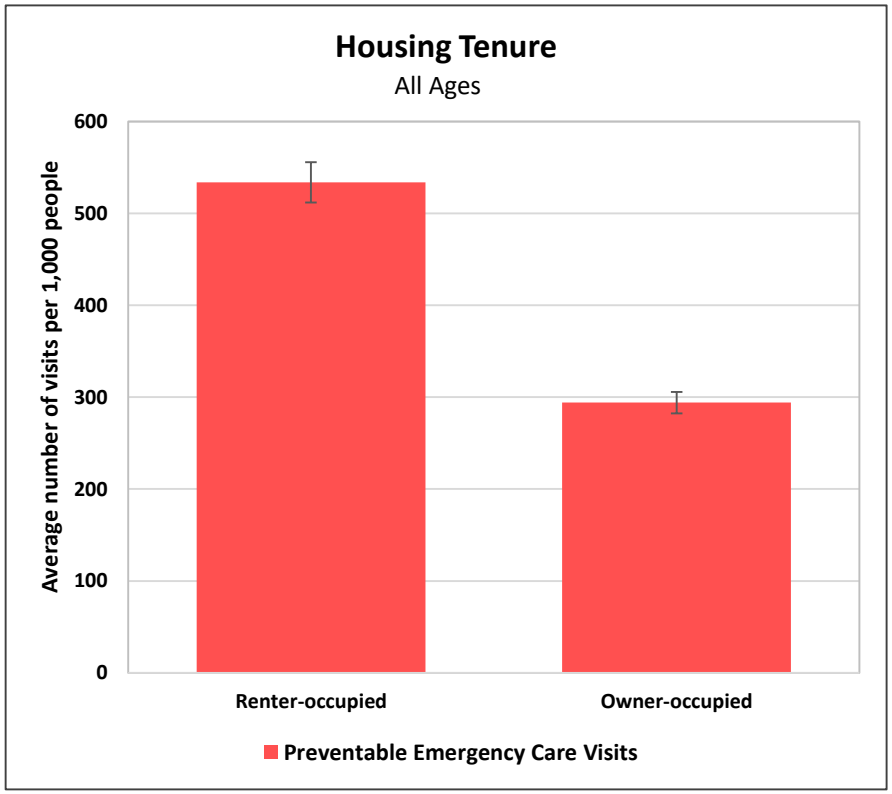
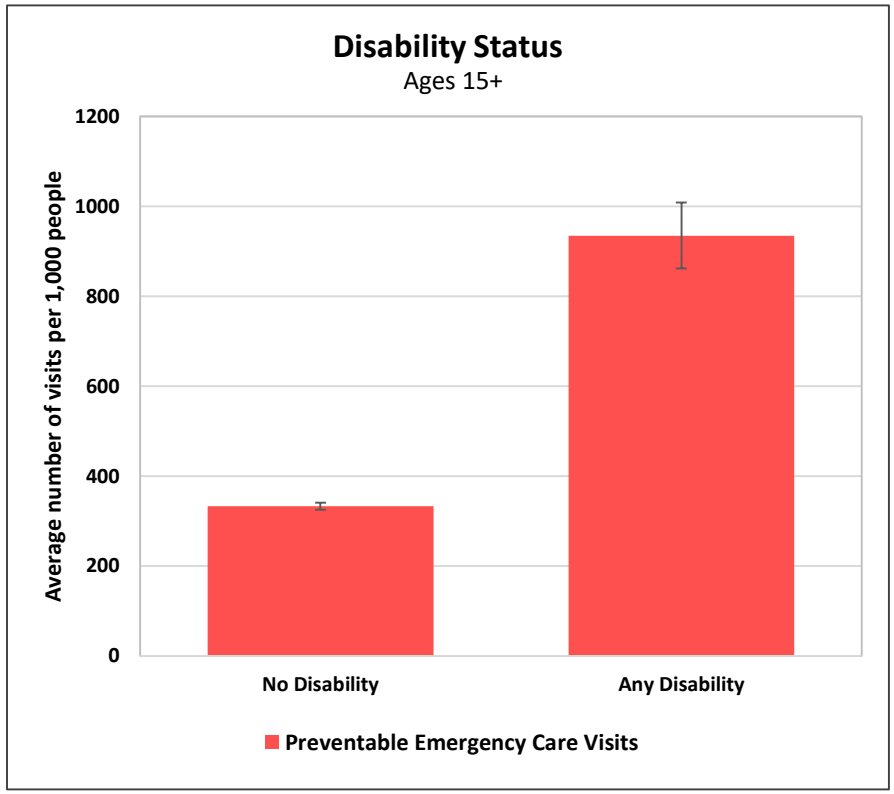
Avg. # of Preventable Emergency Care Visits Per 1,000 People (4)





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Estimates Among Four Populations

- United States (300+ million people)
- State of Utah (roughly 3 million people)
- People in Utah that had one or more ED visit during 2013-2017 (estimate of roughly 1 million people)
- People in Utah that had one or more *preventable* ED visit during 2013-2017 (estimate of roughly 500,000 people)

Note: Not all observed differences are statistically significant

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Comparing Characteristics Among Populations

- On average, Utah ED patients (especially those with a preventable visit) tend to have vulnerable characteristics more often than does the overall Utah population

Utah preventable-ED patients, on average, have a…	higher **poverty rate**	***…than does the overall Utah population***
	higher **unemployment** rate	
	lower **educational attainment**	
	higher rate of **public health coverage**	
	higher share that **lacks a vehicle**	
	higher rate of **disability**	
	higher share that lacks **Internet access**	
	higher percent **female**	

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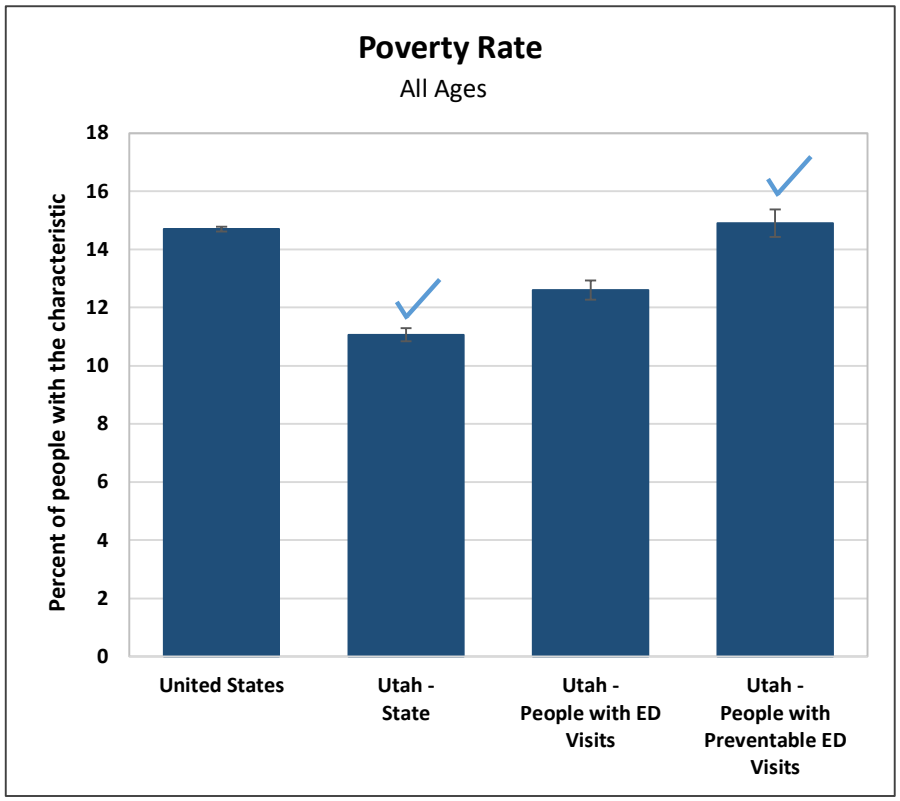
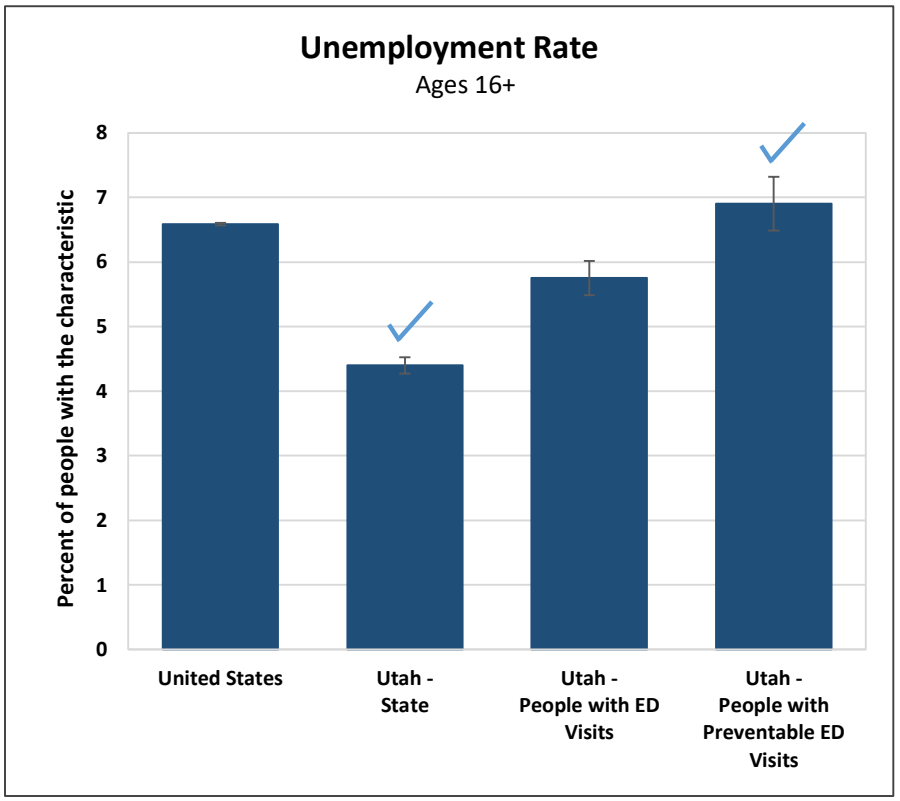
Percentage with Characteristic(s) in Each Population (1)





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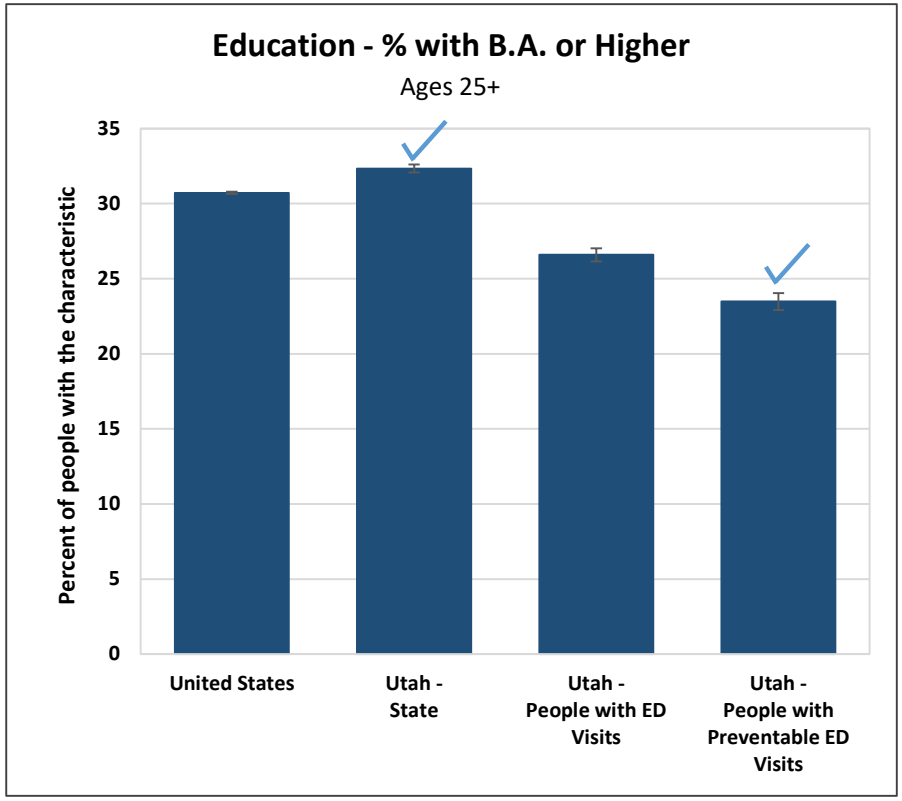
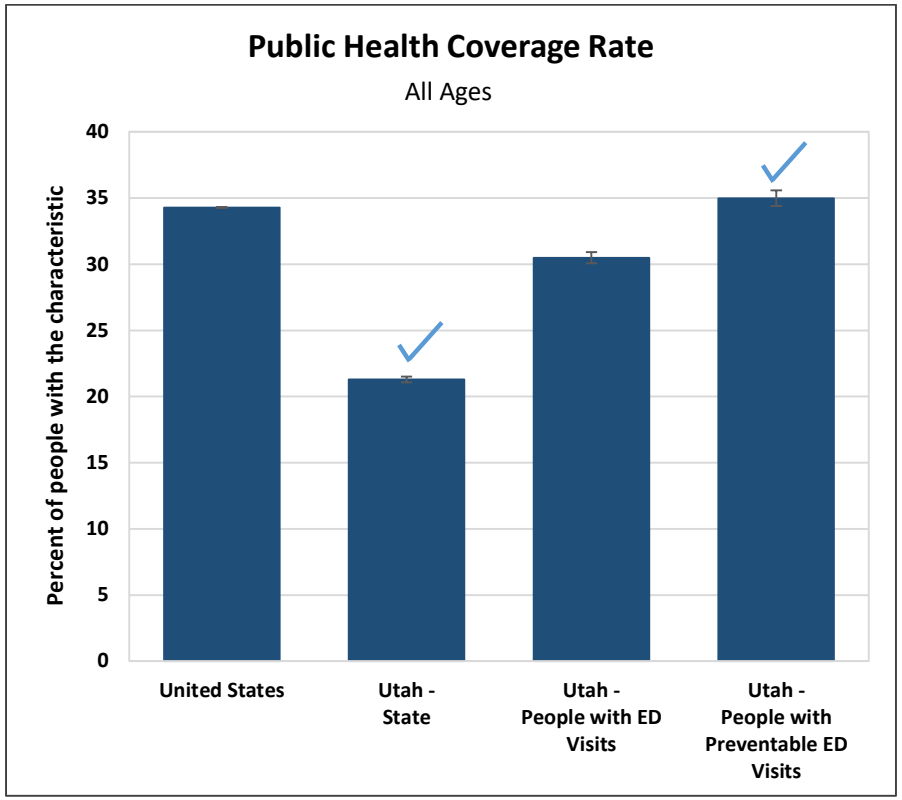
Percentage with Characteristic(s) in Each Population (2)





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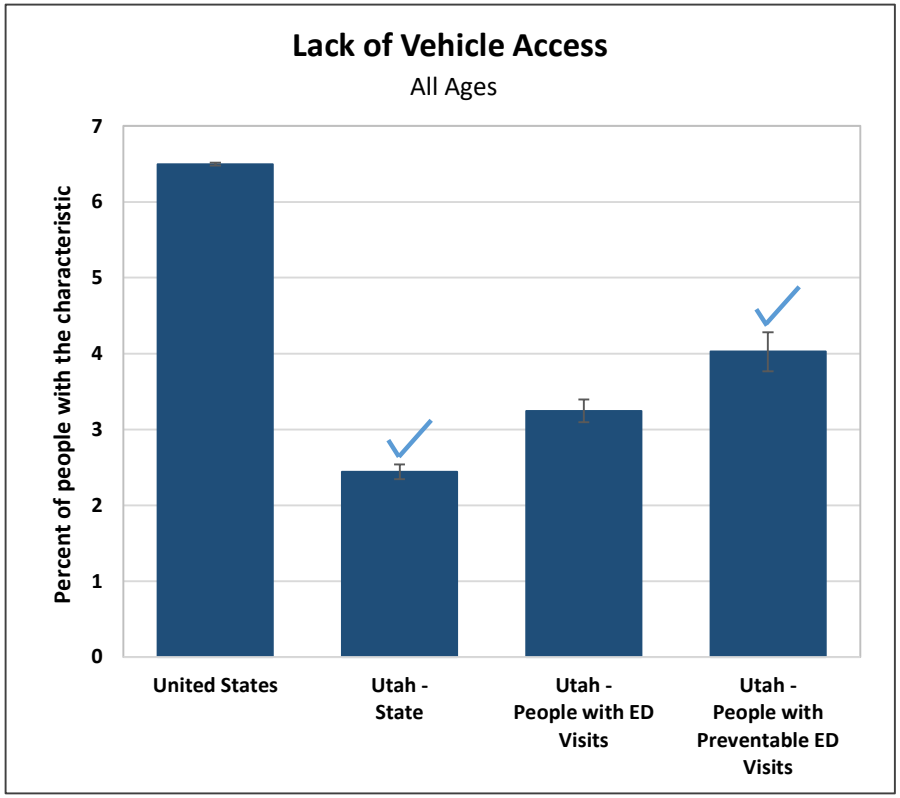

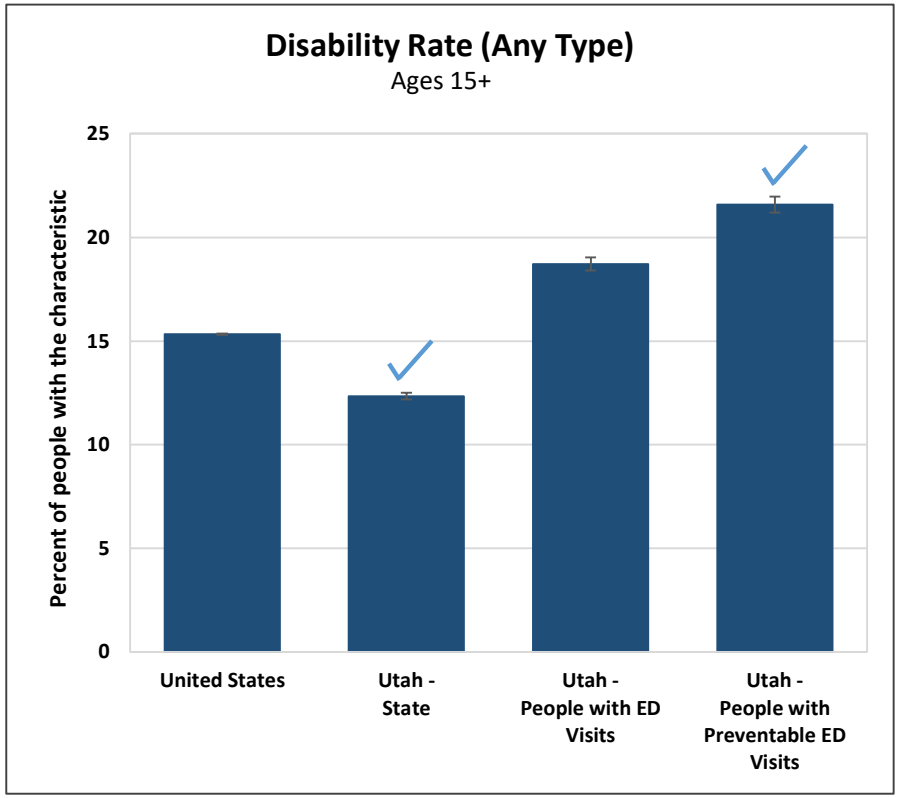

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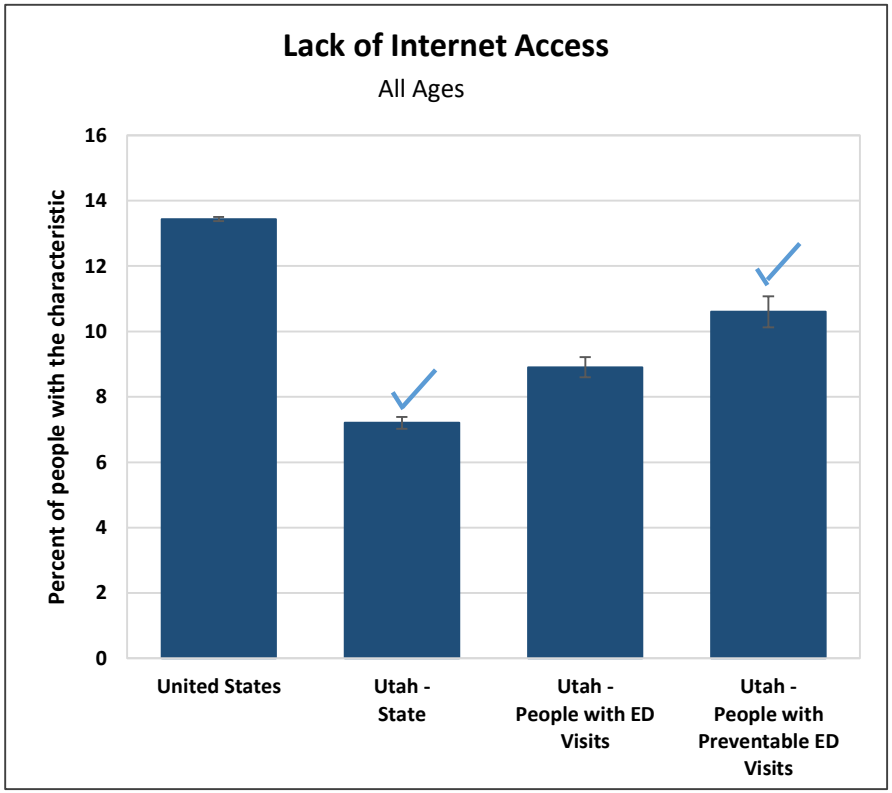

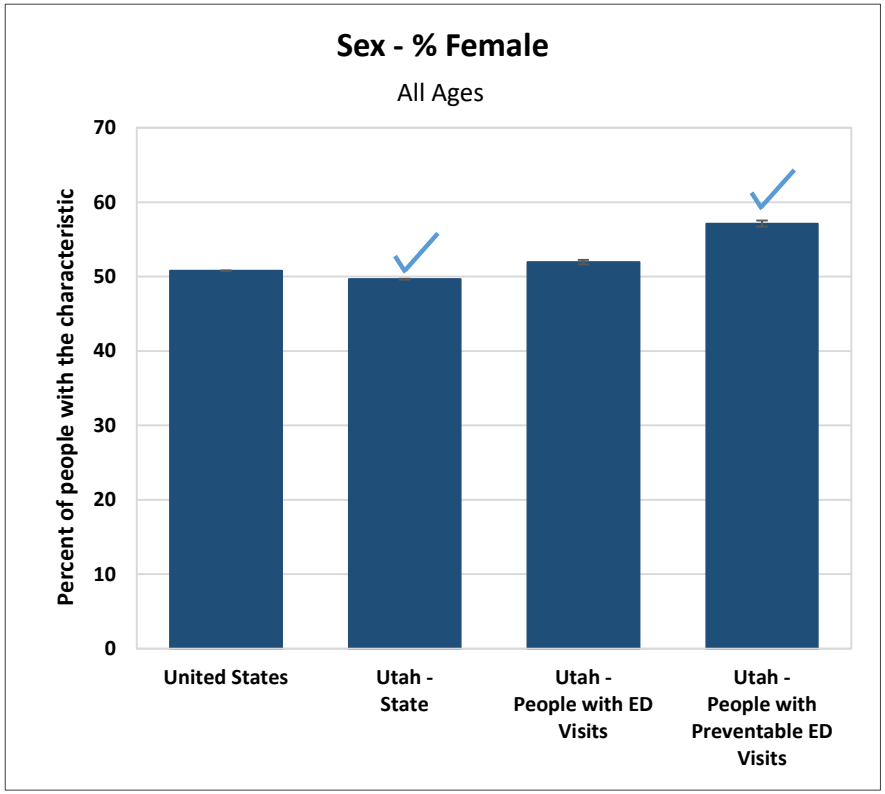

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Results By Year, By Age Category

- Examination by linkage year
  - For example, 2013 UDOH visits linked only with 2013 ACS, 2014 with 2014, and so forth
  - Results are very similar vs. all years, though with sample size reduced and MOEs raised
- Examination by age category
  - Three age categories: Under 19, Ages 19-64, Ages 65+
  - Results for Ages 19-64 are very similar vs. All Ages, though sample size is reduced
  - Results for Under 19 and for Ages 65+ show some differences relative to All Ages
- Examination under logistic regression models
  - Control for all 19 SDOH at once, with county effects, seasonality and day-of-week factors
  - All of these SDOH covariates are highly statistically significant
  - The original bivariate relationships between SDOH and ED visits hold up well

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Note: MOE = margin of error

Conclusion

- Strong associations within the combined ACS and UDOH data set
- We studied the number of preventable ED visits (per 1,000 people) by:
  - Household income | Employment | Educational attainment | SNAP participation | Home ownership | Disability status | Marital status | Sex | and many others
- Among four populations (United States, Utah state, Utah ED patients, and Utah preventable-ED patients), we compared rates of:
  - Poverty | Unemployment | B.A. degree | Public health coverage | Lack of vehicle access | Disability | Lack of Internet access | Female | and many others
- Strong associations among SDOH and preventable ED visits in Utah

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Data Partnership Made This Research Possible

- Creation and use of unique and valuable dataset
  - Utah's ED visit data linked, by patient, to Census Bureau's ACS person-level data on SDOH
  - Supports *individual* level analysis in contrast to aggregate geographic analysis
- Benefits to Data Partners
  - Utah Department of Health
    - Learn which SDOH are most important for preventable ED visit frequency
    - Can inform new strategies and methods for reducing preventable emergency care, to potentially realize ED cost savings and reduce provider burden
  - U.S. Census Bureau
    - Create new estimates leveraging existing data on SDOH, in ED setting, expanding research related to healthcare utilization and outcomes, contributing to mission
    - Can help validate ACS content and seed ideas for health-related survey question(s)

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Next Steps

- Development and release of an *interactive data dashboard*
- Further study robustness, utilize additional approved variables, and compare more with benchmarks from related literature
- Discussion with UDOH to potentially extend the existing analysis using additional variables/years/datasets
- The EHealth Program seeks continued communication and partnership, to fulfill health-related data needs
  - *Please contact us!*

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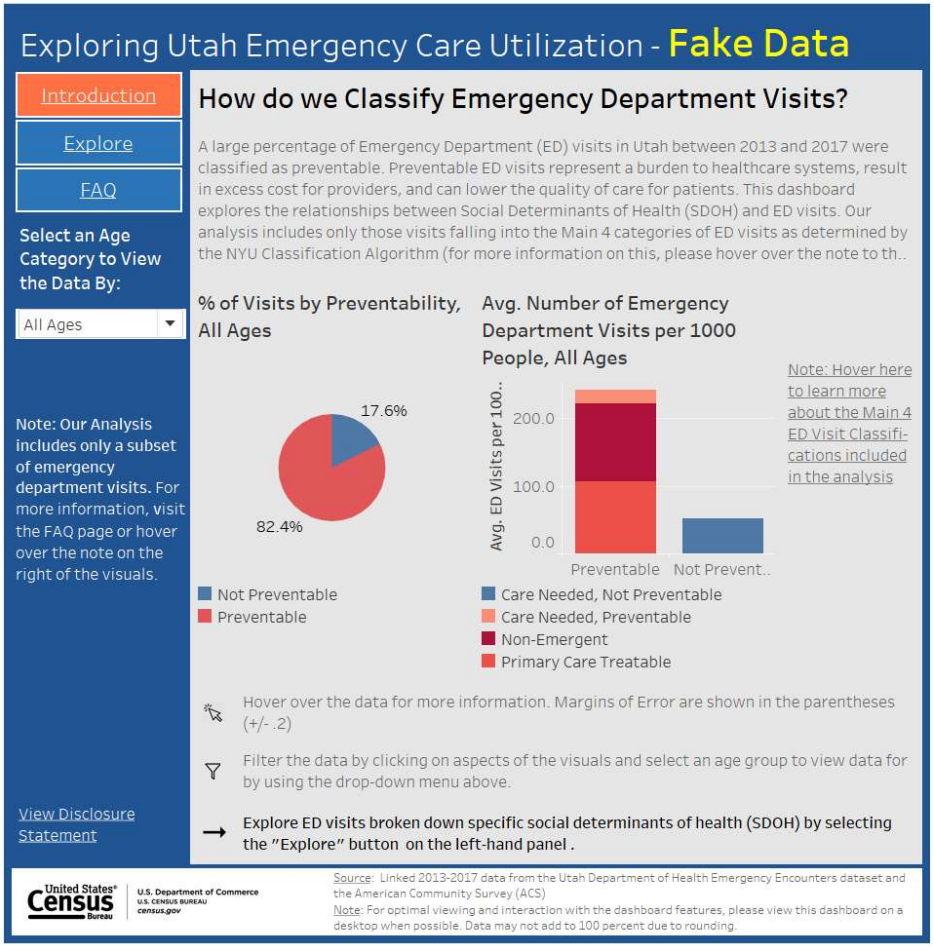
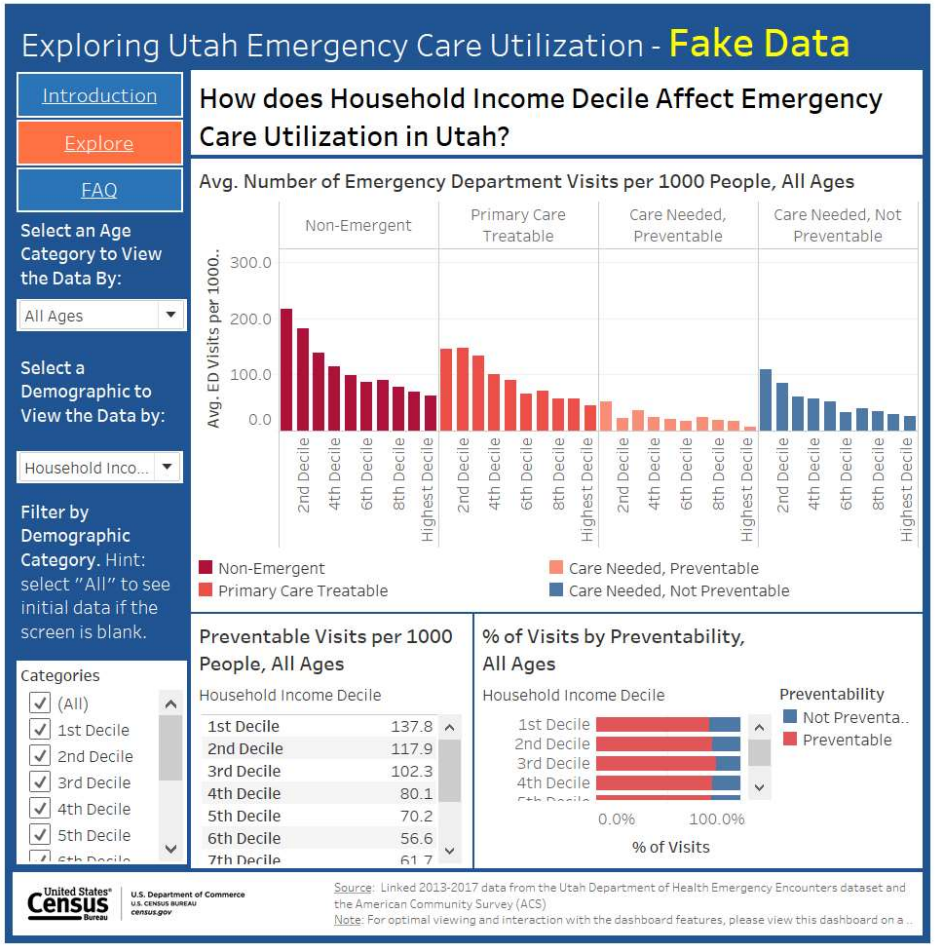
Dashboard Display – *Work in Progress*





Paper Link and EHealth Web Site

- For more information about this project and to access the research paper:
  - https://www.census.gov/programs-surveys/ehealth/information/evaluation-emergency-udoh.html
- For more information about other EHealth projects and to explore partnership opportunities:
  - https://www.census.gov/programs-surveys/ehealth.html

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Acronyms Used

- ACS – American Community Survey
- ED – Emergency Department
- ICD – International Classification of Diseases
- MOE – Margin of error
- NYU – New York University
- SNAP – Supplemental Nutrition Assistance Program
- SDOH – Social Determinants of Health
- UDOH – Utah Department of Health

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