



In with the New: a Shiny App for Exploring Summary Data Tables from the Medical Expenditure Panel Survey

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Disclaimer

The views expressed in this presentation are those of the author and no official endorsement by the Department of Health and Human Services, the Agency for Healthcare Research and Quality is intended or should be inferred.

How to build a Shiny app

Download R and Shiny

- ▶ From CRAN

Create ui / server components

- ▶ Using R functions

Deploy app

- ▶ On shinyapps.io

How to build a Shiny app

**GOVERNMENT
EDITION**

Download R and Shiny

- ▶ ~~From CRAN~~ **Need to submit a ticket to IT**

Create ui / server components

- ▶ ~~Using R functions~~ **Not 508 compliant**

Deploy app

- ▶ ~~On shinyapps.io~~ **Need more security**

Motivation: MEPS

Medical Expenditure Panel Survey



Annual data from 1996-2014

Nationally representative

Examples:

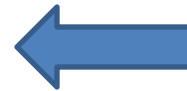
- Number of health care events by age group
- Percent of people that are uninsured
- Total expenditures for prescription medicines

Motivation: MEPS

Data dissemination

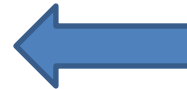


Stat briefs + publications



We do the work

1996-2014 public use files



You do the work

Motivation: MEPS

Data dissemination



Stat briefs + publications



We do the work

Summary data tables



A little of both

1996-2014 public use files



You do the work

Summary data tables (current)

Expenditures per person by health care service

All event types

Prescription medicines

Dental services*

Other medical equipment*

Hospital inpatient*

Emergency room

Hospital outpatient*

Office-based services*

Home health services*

26 tables / year x 19 years
= **494 tables**

* Contains sub-categories

Summary data tables (current)

Table 1: Total Health Services-Median and Mean Expenses per Person With Expense and Distribution of Expenses by Source of Payment: United States, 2014

Population Characteristic	Population (in thousands)	Percent with expense	Per person with an expense		Total Expenses (in millions)	Percent distribution of total expenses by source of payment				
			Median	Mean		Out of pocket	Private insurance ^a	Medicare	Medicaid	Other ^b
Total	318,440	85.1	1,373	5,531	149,936.5	12.4	39.3	28.4	11.5	8.3
Age in years										
Under 65	270,479	83.1	1,040	4,430	99,605.9	12.9	51.9	10.2	15.7	9.3
Under 5	19,912	90.7	599	2,588	46,742	5.8	60.7	0.1*	25.8	7.6
5-17	53,888	86.1	632	2,294	106,395	14.9	53.9	0.3*	27.4	3.4
18-44	112,965	76.4	893	3,522	303,930	14.8	53.1	5.0	19.3	7.8
45-64	83,714	88.5	2,165	7,274	538,992	12.0	50.0	16.0	10.5	11.4
65 and over	47,961	96.4	4,875	10,890	503,306	11.5	14.5	64.4	3.1	6.5
Sex										
Male	155,866	80.9	1,138	5,427	68,456.1	12.0	39.1	28.2	9.2	11.5
Female	162,574	89.1	1,606	5,622	81,480.4	12.8	39.5	28.6	13.5	5.6

Shiny app: Version 1

UI

```
selectInput("year", label="Data Year", choices=2014:1996)
```

Data Year

2014

```
selectInput("event", label="Event Type", choices=event_list)
```

Event Type

Emergency Room (ER)

```
tableOutput("meps")
```

Summary Statistics, by Sex, Inpatient Events, 2014

Sex	Total Population	Percent with expense	Mean Expense**	Total Expenses** (in millions)
Male	155,866,348	5.3	22,986	188,851
Female	162,574,075	7.8	15,167	193,081

SERVER

```
output$meps <-  
  renderTable(meps_tables %>% filter(Year == input$year, event == input$event))
```

Shiny app: Version 1

MEPS Medical Expenditure Panel Survey

Data Year

2014

Event Type

Emergency Room (ER)

Primary Category

Sex

Secondary Category

(none)

Customize Display

☐ Show Standard Errors


Table

Plots

Code

Select statistics to view:

Summary Statistics

 Download Table

Summary Statistics, by Sex, Emergency Room Visits, 2014

Sex	Total Population	Percent with expense	Mean Expense**	Total Expenses** (in millions)
Male	155,866,348	12.3	1,568	30,046
Female	162,574,075	14.4	1,504	35,316

** Inflation adjusted to 2014 dollars, [based on GDP](#)

Source: Center for Financing, Access and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2014

Web Accessibility

**GOVERNMENT
EDITION**

GSA Section508.gov

GSA Government-wide Section 508 Accessibility Program



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Section 508 Law and Related Laws and Policies

Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794 (d))

In 1998, Congress amended the Rehabilitation Act of 1973 to require Federal agencies to make their electronic and information technology (EIT) accessible to people with disabilities. The law ([29 U.S.C. § 794 \(d\)](#)) applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. Under Section 508, agencies must give disabled employees and members of the public access to information that is comparable to access available to others. The United States Access Board [discusses the Section 508 law](#) and its responsibility for developing accessibility standards for EIT to incorporate into regulations that govern Federal procurement practices.

Web Accessibility

Who is affected?

How do they access web content?

Visually impaired

blind
colorblind
low vision

Screen reader (html)
Non-color cues
Zoom

Hearing impaired

deaf
hard of hearing

Closed caption

Motor disabilities

Keyboard only

Web Accessibility: HTML

Data Year

2014 ▼

2014

2013

2012

2011

2010

Data Year

2014 ▲

2014

2013

2012

2011

2010

Web Accessibility: HTML

Data Year

```
<select id="year">
  <option value="2014" selected>
    2014
  </option>
  <option value="2013">2013</option>
  <option value="2012">2012</option>
  <option value="2011">2011</option>
  <option value="2010">2010</option>
</select>
```

Data Year

```
<select id="year">
  <option value="2014" selected="selected">
    2014
  </option>
</select>
<div class="selectize-control">
  ...
  <div data-value="2013">2013</div>
  <div data-value="2012">2012</div>
  <div data-value="2011">2011</div>
  <div data-value="2010">2010</div>
</div>
<script
  type="application/json"
  data-for="year"
  data-nonempty="">{}
</script>
```

How to build a Shiny app

**GOVERNMENT
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Create ui / server components

- ▶ ~~Using R functions~~ **Not 508 compliant**
- ▶ Create custom functions (508 compliant)

How to build a Shiny app

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Create ui / server components

- ▶ ~~Using R functions~~ **Not 508 compliant**
- ▶ Create custom functions (508 compliant)
- ▶ Use custom HTML Template

Shiny Default: fluidPage()

```
<!DOCTYPE html>
<html>
  <head>...</head>
  <body>...</body>
</html>
```

508 compliant: htmlTemplate()

```
<!DOCTYPE html>
<html lang = "en">
  <head>...</head>
  <body>...</body>
</html>
```

How to build a Shiny app

**GOVERNMENT
EDITION**

Deploy App

- ▶ On shinyapps.io
- ▶ Get your contractor to do it!
- ▶ Using Shiny Server (need SSL / https)
 - FedRamp compliance



How to build a Shiny app

**GOVERNMENT
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Create ui / server components

- ▶ Create custom functions (508 compliance)
- ▶ Use custom HTML Template

Deploy App

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How to build a Shiny app

**GOVERNMENT
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Create ui / server components

- ▶ Create custom functions (508 compliance)
- ▶ Use custom HTML Template

Deploy App

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Finishing Touches

- ▶ Government-approved Cascading Style Sheets (CSS)

How to build a Shiny app

**GOVERNMENT
EDITION**

U.S. Web Design Standards

[Download code and design files](#)[View on GitHub](#)[UI components](#)[Page templates](#)[Getting started](#)[Design principles](#)[What's new](#)

Getting started

[For developers](#)[For designers](#)[Performance guidelines](#)[Code guidelines](#)[Video tutorials](#)[Implementations](#)[Showcase](#)

Getting started

The U.S. Web Design Standards provide design guidelines and code to help you quickly create trustworthy, accessible, and consistent digital government services.

Role-based guides

Developers

Get started with our code base one of two ways: downloading the code as a zip file, or installing with npm.

Designers

Whether you're creating simple wireframes or detailed visual design comps, we've got you covered with the design resources you need.

How to build a Shiny app

**GOVERNMENT
EDITION**

UI COMPONENTS

Buttons

Use buttons to signal actions.

PRIMARY BUTTONS



Code

```
<h6>Primary Buttons</h6>
<div class="button_wrapper">
  <button>Default</button>
  <button class="usa-button-active">Active</button>
  <button class="usa-button-hover">Hover</button>
</div>
<div class="button_wrapper">
  <button class="usa-button-primary-alt">Default</button>
  <button class="usa-button-primary-alt usa-button-active">Active</button>
  <button class="usa-button-primary-alt usa-button-hover">Hover</button>
</div>
```

Version 3

demo

https://ahrq-meps.com/shiny/meps_summary_tables/mepstrends/hc_tables/hc1_use/

Updated Version

Use, Expenditures, and Population Characteristics

The MEPS online summary tables provide an interactive platform allowing users to quickly access statistics on health care utilization and expenditures. Some of the types of data available here include: mean and median expenditures per person, total number of healthcare events and average spending per event type. Data can be grouped by event type (such as prescription medicines or dental services), by source of payment (such as Medicare or Medicaid), or by demographic characteristics (such as age, race or sex).

Select statistic:

Number of people ▼

☐ Show Standard Errors

Select data view:

☒ Trends over time

☐ Cross-sectional

Year: to:

1996 ▼

2014 ▼

Group by:

(none) ▼

 Table

 Plot

 Code




Number of people in thousands, United States, 1996-2014

Year	Number of people in thousands
2014	318,440.4
2013	315,722.0
2012	313,489.9
2011	311,125.8
2010	308,574.0
2009	306,660.6

GitHub

https://github.com/e-mitchell/meps_summary_tables_v3

 This repository Search Pull requests Issues Marketplace Explore

e-mitchell / meps_summary_tables_v3

Unwatch 1Star 0Fork 2

<> Code

Issues 0

Pull requests 0

Projects 0

Wiki

Settings

Insights

Preliminary build for MEPS summary tables Shiny app

Edit

Add topics

255 commits

2 branches

0 releases

3 contributors

Branch: master


New pull request

Create new file

Upload files

Find file

Clone or download

 e-mitchell committed on GitHub Merge pull request #4 from dancy0824/master Latest commit a62005a 3 days ago

build	Changing csvs Negative or Poor to Negative or poor	11 days ago
mepstrends	Merge pull request #4 from dancy0824/master	3 days ago
.gitignore	Importing jquery to index.html	4 days ago
README.md	Update README.md	25 days ago

How to build a Shiny app

BASIC

Create ui / server

- ▶ Using R functions

Deploy app

- ▶ On shinyapps.io

GOVERNMENT EDITION

Create ui / server

- ▶ Custom functions (508 compliant)
- ▶ Custom HTML Template (lang='en')

Deploy app

- ▶ On shinyapps.io
- ▶ Get your contractor to do it!
- ▶ Using Shiny Server (need SSL / https)

Finishing Touches

- ▶ Government-approved CSS
 - U.S. Web Design Standards

Resources

Web Accessibility (508 compliance): webaim.org

US Web Design Standards: standards.usa.gov/

Shiny HTML templates: shiny.rstudio.com/articles/templates.html

Shiny HTML tags: shiny.rstudio.com/articles/tag-glossary.html

HTML/CSS/Javascript: coursera.org/specializations/web-design

Shiny Server on Digital Ocean:

deanattali.com/2015/05/09/setup-rstudio-shiny-server-digital-ocean/

SSL/https: digitalocean.com/community/tutorials/how-to-secure-nginx-with-let-s-encrypt-on-ubuntu-16-04

Password Authentication : digitalocean.com/community/tutorials/how-to-set-up-password-authentication-with-nginx-on-ubuntu-14-04

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