

# Home Health Care

**Anirudh Pillai**

MS, Data Science  
Indiana University  
Bloomington

**Saloni Sharma**

MS, Data Science  
Indiana University  
Bloomington

**Neha Bisht**

MS, Computer Science  
Indiana University  
Bloomington

## ABSTRACT

In this paper we are trying to analyze, utilize the Home health data provided by data.gov so that we can provide a clear picture to health care agencies on their performance and also utilize the analysis to encourage more people to utilize the home health care services since it is no less than the services provide at hospitals, even though it is available for cheaper rates compared to hospitals.

## OBJECTIVE

The aim of the paper is to use the Home Health Care analyze RDF data using Java Reasoner and query it using Sparql queries. Finally, visualize the data using tableau. This will help us understand the Home Health Data in more detail.

## 1. INTRODUCTION

Home health care is a wide range of health care services that can be given in your home for an illness or injury. Affording home health care is usually less expensive, is more convenient than and just as effective as care you get in a hospital or any other skilled nursing facility like SNF.

Examples of skilled home health services include:

- Wound care for pressure sores or a surgical wound
- Patient and caregiver education
- Intravenous or nutrition therapy
- Injections
- Monitoring serious illness and unstable health status

The goal of home health care is to treat an illness or injury. Home health care helps you get better, regain your independence, and become as self-sufficient as possible.

Examples of what the home health staff does:

- Check what you're eating and drinking.
- Check your blood pressure, temperature, heart rate, and breathing.
- Check that you're taking your prescription and other drugs and any treatments correctly.
- Ask if you're having pain.
- Check your safety in the home.
- Teach you about your care so you can take care of yourself.
- Coordinate your care. This means they must communicate regularly with you, your doctor, and anyone else who gives you care.

## 2. DATASET

### 2.1 DATA COLLECTION

**Dataset Link:** <https://catalog.data.gov/dataset/home-health-care-agencies-c1765>

### 2.2 DATA FORMAT

The data is in RDF format.

## 2.3 DATA PARSING

- We used R to fetch data and transform it.
- We used Java to do reasoning on the dataset to build models.
- We wrote various Sparql queries to query the RDF dataset.
- Visualized the dataset in Tableau.

### FEATURES:

- **State:**  
Name of state and territories
- **Quality of Patient Care (Star Rating):**  
Rating given based on 5
- **how\_often\_the\_home\_health\_team\_began\_their\_patients\_care\_in\_a\_timely\_manner :**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_taught\_patients\_or\_their\_family\_caregivers\_about\_their\_drugs:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_checked\_patients\_risk\_of\_falling:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_checked\_patients\_for\_depression:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_determined\_whether\_patients\_received\_a\_flu\_shot\_for\_the\_current\_flu\_season:** Rating out of 100.
- **how\_often\_the\_home\_health\_team\_determined\_whether\_their\_patients\_received\_a\_pneumococcal\_vaccine\_pneumonia\_shot\_:**  
Rating out of 100
- **with\_diabetes\_how\_often\_the\_home\_health\_team\_got\_doctor\_s\_orders\_gave\_foot\_care\_and\_taught\_patients\_about\_foot\_care\_:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_checked\_patients\_for\_pain:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_treated\_their\_patients\_pain:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_treated\_heart\_failure\_weakening\_of\_the\_heart\_patients\_symptoms:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_took\_doctor\_ordered\_action\_to\_prevent\_pressure\_sores\_bed\_sores\_:**  
Rating out of 100
- **how\_often\_the\_home\_health\_team\_included\_treatments\_to\_prevent\_pressure\_sores\_bed\_sores\_in\_plan\_of\_care:** Rating out of 100
- **how\_often\_the\_home\_health\_team\_checked\_patients\_for\_the\_risk\_of\_developing\_pressure\_sores\_bed\_sores:**  
Rating out of 100
- **how\_often\_patients\_got\_better\_at\_walking\_or\_moving\_around:**  
Rating out of 100
- **how\_often\_patients\_got\_better\_at\_getting\_in\_and\_out\_of\_bed:**  
Rating out of 100
- **how\_often\_patients\_got\_better\_at\_bathing:**  
Rating out of 100
- **how\_often\_patients\_had\_less\_pain\_when\_moving\_around:**  
Rating out of 100
- **how\_often\_patients\_breathing\_improved:**  
Rating out of 100
- **how\_often\_patients\_wounds\_improved\_or\_healed\_after\_an\_operation:**  
Rating out of 100
- **how\_often\_patients\_got\_better\_at\_taking\_their\_drugs\_correctly\_by\_mouth:**  
Rating out of 100
- **how\_often\_home\_health\_patients\_had\_to\_be\_admitted\_to\_the\_hospital:**  
Rating out of 100
- **how\_often\_patients\_receiving\_home\_health\_care\_needed\_urgent\_unplanned\_care\_in\_the\_er\_without\_being\_admitted:**  
Rating out of 100

## 2.4 DATA PREPROCESSING

Real-world data is often incomplete, inconsistent, and/or lacking in certain behaviors or trends, and is

likely to contain many errors. Data preprocessing is a very important step which help resolve such issues.

Following are the steps we are going to perform to make it ready for analysis.

- Removing missing values.
- Remove those instances where helpfulness rating is zero.
- Remove outliers using deviation mean rating.
- Will consider removing stop words.

We used R to preprocess the data based on above steps.

### 3. METHODS

#### Programming Language:

Java, R and SparQL

#### Queries:

Below are some of the SparQL queries out of the total 21 queries we wrote along with the outcomes of the queries:

#### Query: Finds Average Star Rating for All states and territories

PREFIX ds: <<http://data.medicare.gov/resource/tee5-ixt5/>>

```
SELECT ?x ?state ?quality_of_patient_care_star_rating
WHERE
{
  ?x ds:state ?state .
  ?x ds:quality_of_patient_care_star_rating ?quality_of_patient_care_star_r
}
```

**Output: arq1**

x	state	quality_of_patient_care_star_rating
ds:1	"AK"	"2.5"
ds:18	"HI"	"3.5"
ds:29	"MT"	"3.8"
ds:47	"TX"	"3.8"
ds:9	"DE"	"3.5"
ds:52	"MA"	"3.8"
ds:13	"HI"	"3.8"
ds:32	"ME"	"3.5"
ds:15	"SD"	"3.5"
ds:3	"AK"	"3.8"
ds:11	"MA"	"3.5"
ds:40	"OR"	"3.8"
ds:34	"UT"	"3.5"
ds:18	"KS"	"3.5"
ds:2	"AL"	"3.5"
ds:50	"VT"	"2.5"
ds:46	"TN"	"3.5"
ds:12	"OR"	"Not Available"
ds:5	"CA"	"3.5"
ds:7	"CT"	"3.8"
ds:30	"NC"	"3.8"
ds:8	"DC"	"3.8"
ds:25	"NM"	"3.8"
ds:55	"WA"	"3.8"
ds:17	"TX"	"3.8"
ds:49	"VA"	"3.5"
ds:22	"ND"	"3.5"
ds:35	"NY"	"3.8"
ds:39	"OK"	"3.8"
ds:48	"UT"	"3.5"
ds:36	"WV"	"3.8"
ds:26	"WY"	"3.5"
ds:41	"PA"	"3.5"
ds:21	"MA"	"3.8"
ds:54	"WY"	"3.5"
ds:37	"NY"	"3.8"
ds:28	"MS"	"3.5"
ds:24	"HI"	"3.5"

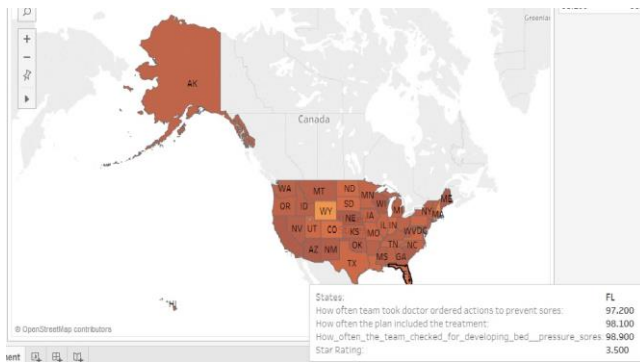
#### Query: Finds all the states that have star rating greater than or equal to 3.5.

PREFIX ds: <<http://data.medicare.gov/resource/tee5-ixt5/>>

```
SELECT ?state ?star_rating
WHERE
{
  ?x ds:quality_of_patient_care_star_rating ?star_rating .
  FILTER(?star_rating >= '3.5') .
  ?x ds:state ?state .
}
```

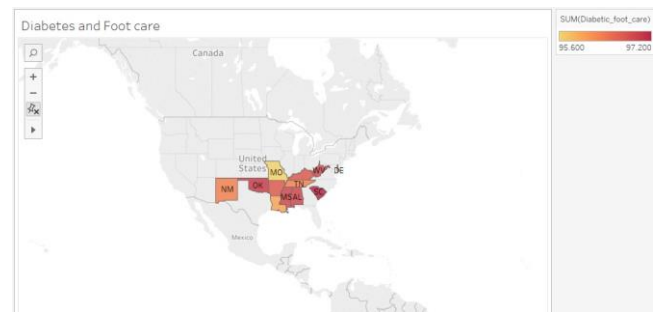
**Output: arq3**





**Fig2:-** Heat map depicting Pre-treatment care across US

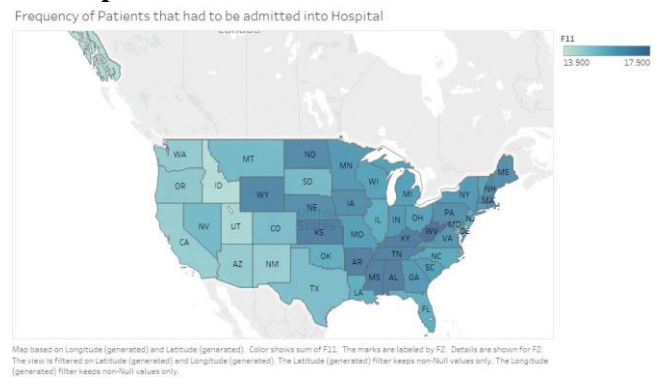
Wisconsin is rated lowest in terms of Pre-treatment care. Other states are doing fairly well.



**Fig4:-** Top 10 Diabetes and Foot affected states

Heat map shows US States where diabetes and foot sores are more prevalent. Mostly all southern states.

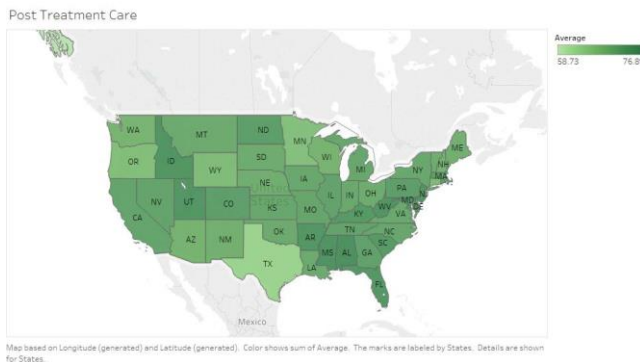
## Frequency of Patients that had to be admitted to Hospital



**Fig5:-** Frequency of Patients that had to be admitted to Hospital

States like Idaho, Utah have very less patients under home care being admitted to hospital.

## Post-Treatment Care



**Fig3:-** Post-Treatment Care in US

Figure above shows Pre-treatment care in Unites states. Texas and Alaska are rated very poor and needs improvements.

## Diabetes and Foot-care

## 5. INDIVIDUAL CONTRIBUTIONS

### 5.1 ANIRUDH PILLAI

- Acquired Data from data.gov
- Transformed data into dataframe using R
- Converted data into rdf for Tableau.
- Created Visualization in Tableau.
- Helped in Creating report and presentation.

### 5.2 SALONI SHARMA

- Formulated SPARQL Queries.

- Running various SPARQL Queries and helped in Visualization and Java Reasoner too.
- Wrote JAVA code to ensure efficient information retrieval.
- Helped in Preparing and presenting PPT.
- Helped in preparing final report.

### 5.3 NEHA BISHT

- Helped write R code that transformed the rdf data.
- Came up with innovative ideas for visualization in tableau and writing SPARQL queries.
- Wrote Java Reasoner code to build models.
- Helped in Preparing and presenting PPT.
- Helped in preparing final report.

## 6. CONCLUSION AND FUTURE SCOPE

Through our analysis we uncovered following:

- i) Texas and Alaska have poor home health care and quality of patient care hence they need to work on hiring quality doctors, nurse and improving healthcare.
- ii) Post- treatment is equally important as Pre-treatment.
- iii) Idaho and Utah have less patients that are admitted to hospital.
- iv) Depression and Bed sores are correlated and main reasons affecting home health care efficiency.

We can investigate further if we can get population and number of agencies and strength of staff to determine underperforming states and good performing states.

## 7. REFERENCES

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<http://www.woundcarecenters.org/article/living-with-wounds/how-diabetes-affects-wound-healing>