Health-Related Quality of Life
2010

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Introduction

Health-related quality of life (HRQOL) is a construct created by the Center for Disease Control (CDC) to "monitor progress in achieving the nation's health objectives."[4] HRQOL has three definitions depending on the level of interest: individual, community, or scientific literature. This paper focuses on the scientific literature definition of HRQOL: "an individual's or group's perceived physical and mental health over time."[4] Table 1 shows the definitions of HRQOL for each level.

Table 1: Definitions of HRQOL by Level

HRQOL Level	Definition[4]
Individual	"physical and mental health perceptions (e.g., energy level, mood) and their correlates – including health risks and conditions, functional status, social support, and socioeconomic status."
Community	"community-level resources, conditions, policies, and practices that influence a population's health perceptions and functional status."
Scientific Literature	"an individual's or group's perceived physical and mental health over time."

Data for physical and mental health is collected using a series of questions called Healthy Days Measures (HDM). HDM questions are designed to allow an individual to report his or her HRQOL as it relates to his or her perception of mentally or physically healthy. The questions included in Healthy Days Measures are shown in Table 2, below. [3]

Table 2: Healthy Days Measures as Defined by the CDC

Question Summary	Healthy Days Measures Question[3]
General Health	"Would you say that in general your health is excellent, very good, good, fair, or poor?"
Physical Health	"Now thinking about your physical health, which includes physical illness and injury, how many days during the past 30 days was your physical health not good?"
Mental Health	"Now thinking about your mental health, which includes stress, depression, and problems with emotions, how many days during the past 30 days was your mental health not good?"
Activity Limitation	"During the past 30 days, approximately how may days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?"

In this paper, responses to the HDM physical health question and the HDM mental health question were spatially visualized. The results were compared for different age ranges and sexes.

Data and Methods

Health-Related Quality of Life Data

Responses to the HDM questions are obtained as part of the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a national telephone survey sponsored by the CDC that collects a wide range of health-related data. HDM data from the BRFSS is summarized by the CDC's Division of Population Health as part of the HRQOL project. The HRQOL project produces a dataset that contains the percentage of individuals per sample group that reported fourteen or more physically unhealthy or mentally unhealthy days in the past 30 days.[2] Figure 1 summarizes the process for obtaining HRQOL data.

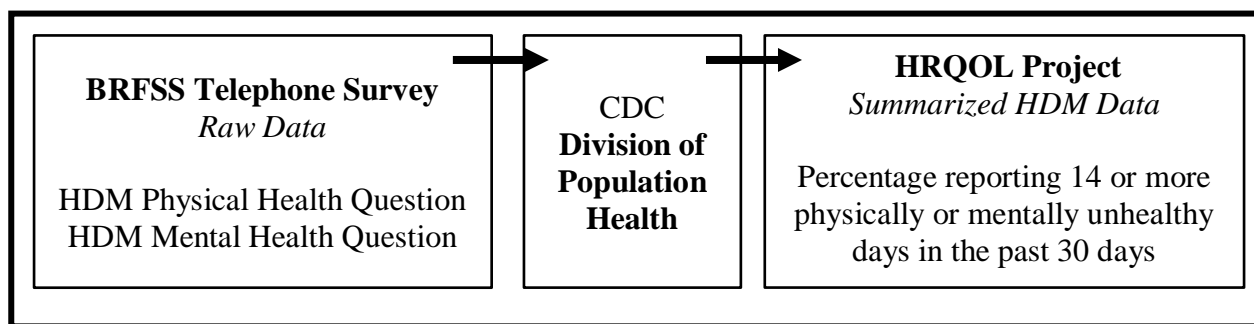| BRFSS Telephone Survey *Raw Data* HDM Physical Health Question HDM Mental Health Question	→ CDC **Division of Population Health** →	HRQOL Project *Summarized HDM Data* Percentage reporting 14 or more physically or mentally unhealthy days in the past 30 days

Figure 1: Process for obtaining HRQOL data

For the remainder of the report, the term Frequent Mental Distress (FMD) will be used to describe fourteen or more mentally unhealthy days in the past thirty days.[1] Frequent physical distress (FPD) will be used to describe fourteen or more physically unhealthy days in the past thirty days.

ArcGIS was used to spatially visualize the data using choropleth maps. The HRQOL dataset was downloaded in CSV format and imported to ArcGIS as a dBASE table. A shapefile of the contiguous United States (provided by the US Census Bureau) was used to allow spatial visualization.

Analysis of HQROL Data by Age Range

The series of operations described below was performed twice: once for the physical health question, and once for the mental health question.

The select by attribute tool was used to select the desired survey question from the year 2010. Then, three separate selections were made for the age ranges 18 to 24 years, 45 to 54 years, and 65 to 74 years. Each selection was then exported as a separate dBASE table.

To spatially visualize the data, the dBASE table for each age range was joined to a shapefile of the contiguous United States and exported as a separate shapefile. The state abbreviation field was used as the common field for the join operation.

The data was then formatted as choropleth maps using equal interval classification. Figure 2 summarizes the operations performed on the HRQOL dataset to visualize mental health and physical health based on age range.
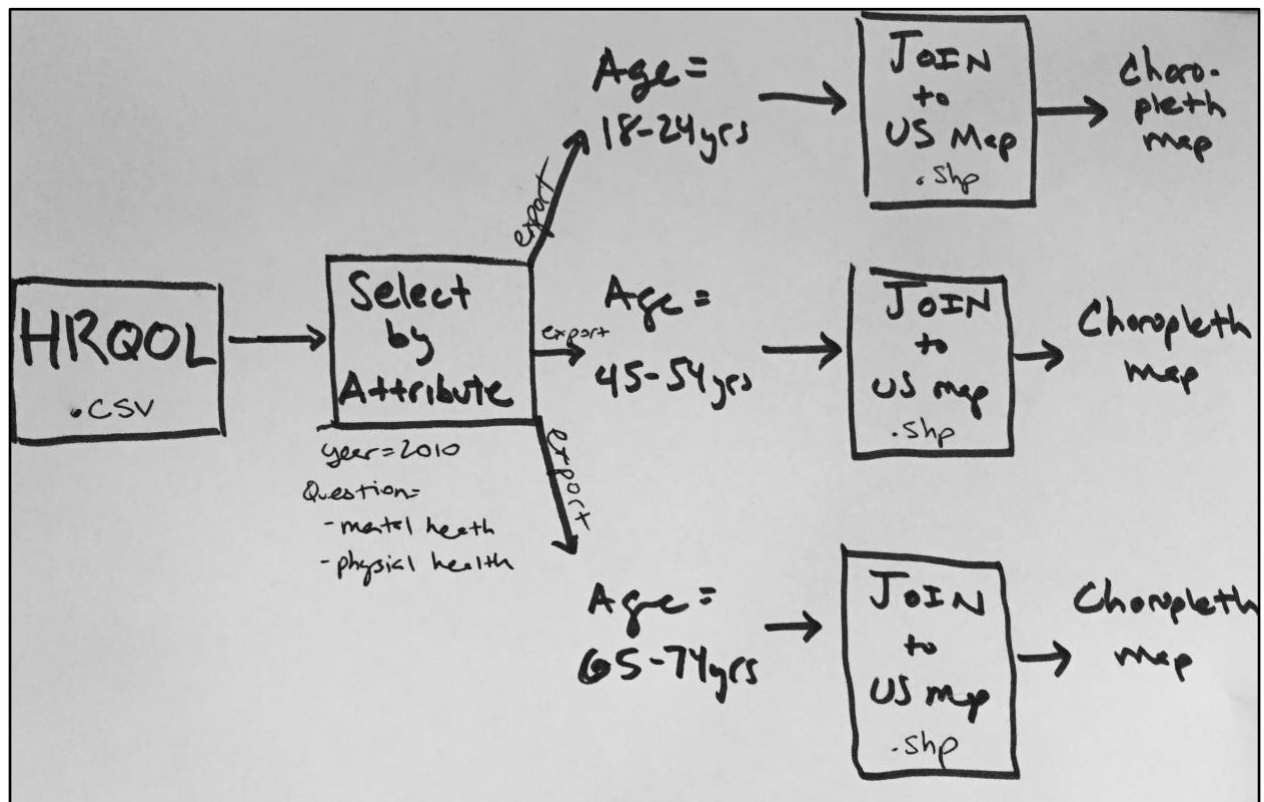

Figure 2: Summary of operations for visualizing HRQOL data by age range

Analysis of HRQOL Data by Sex

A similar series of operations was used to visualize HRQOL data by sex. Again, the series of operations was performed twice: once for the HDM physical health question, and once the HDM mental health question.

The select by attribute tool was used to select the desired survey question from the year 2010. Then, two separate selections were made for each sex: male and female. Each selection was then exported as a separate dBASE table.

The dBASE table for each sex was joined to a shapefile of the contiguous United States and exported as a separate shapefile. The state abbreviation field was used as the common field for the join operation.

The data was then formatted as choropleth maps using equal interval classification. Figure 3 summarizes the operations performed on the HRQOL dataset to visualize mental health and physical health based on sex.
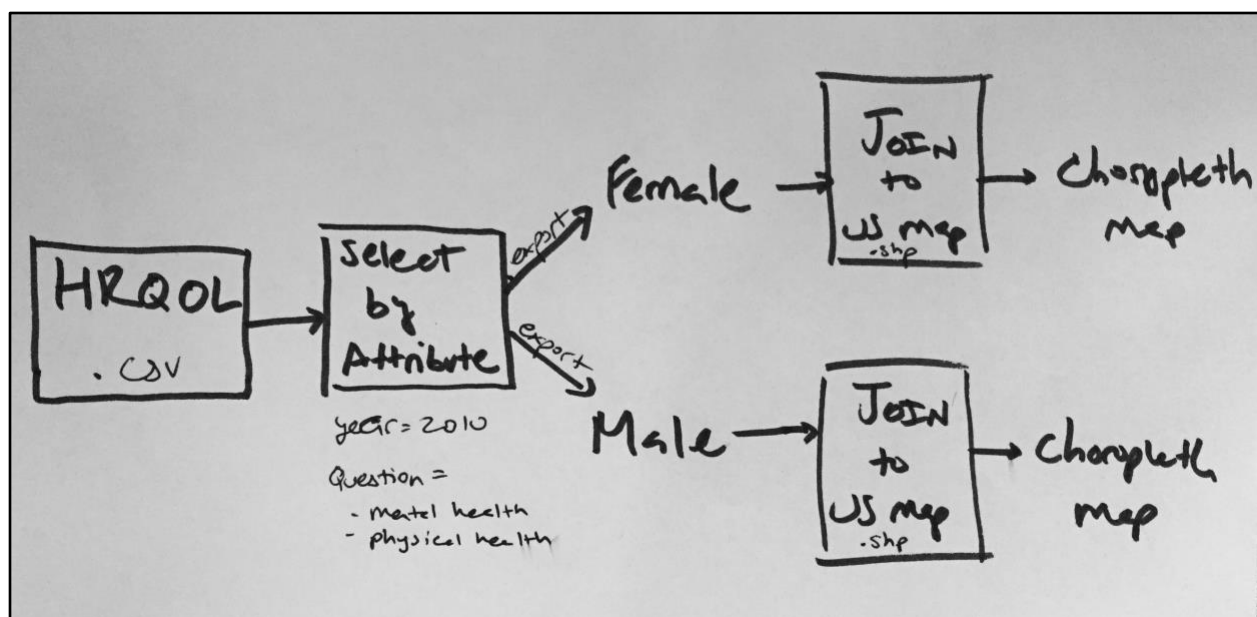
Figure 3: Summary of operations for visualizing HRQOL data by sex

Results

Mental Health by Age Range

The choropleth maps representing frequent mental distress (FMD) by age range are shown in Figure 4. Darker colors represent higher percentages of FMD.
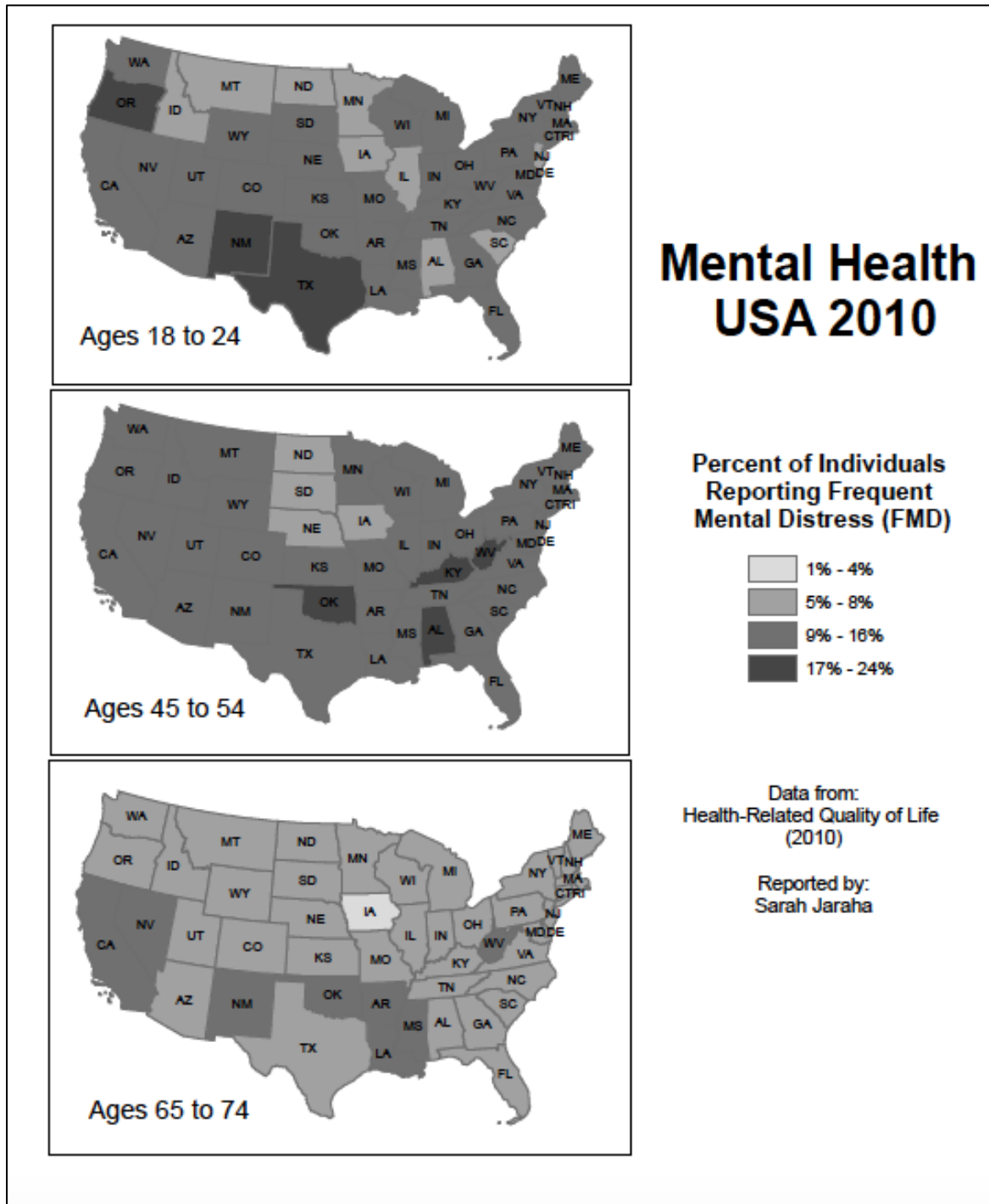
Figure 4: Choropleth maps showing US mental health by age range

The highest percentage of FMD was in West Virginia for the 45 to 54 year age range. The lowest percentage of FMD was in Iowa for the 65 to 74 year age range. Table 3 summarizes the highest and lowest percentages of FMD for each age range.

Table 3: Highest and Lowest Percentages of FMD by Age Range

Age Range	Highest Percentage of FMD	State	Lowest Percentage of FMD	State
18-24	17.1 %	New Mexico	5.2 %	Iowa
45-54	19.5 %	West Virginia	7.3 %	North Dakota
65-74	13.4 %	West Virginia	3.6 %	Iowa

West Virginia appears twice with the highest percentage of FMD. Iowa appears twice with the lowest percentage of FMD.

Mental Health by Sex

The choropleth maps representing FMD by sex are shown in Figure 5. Darker colors represent higher percentages of FMD.
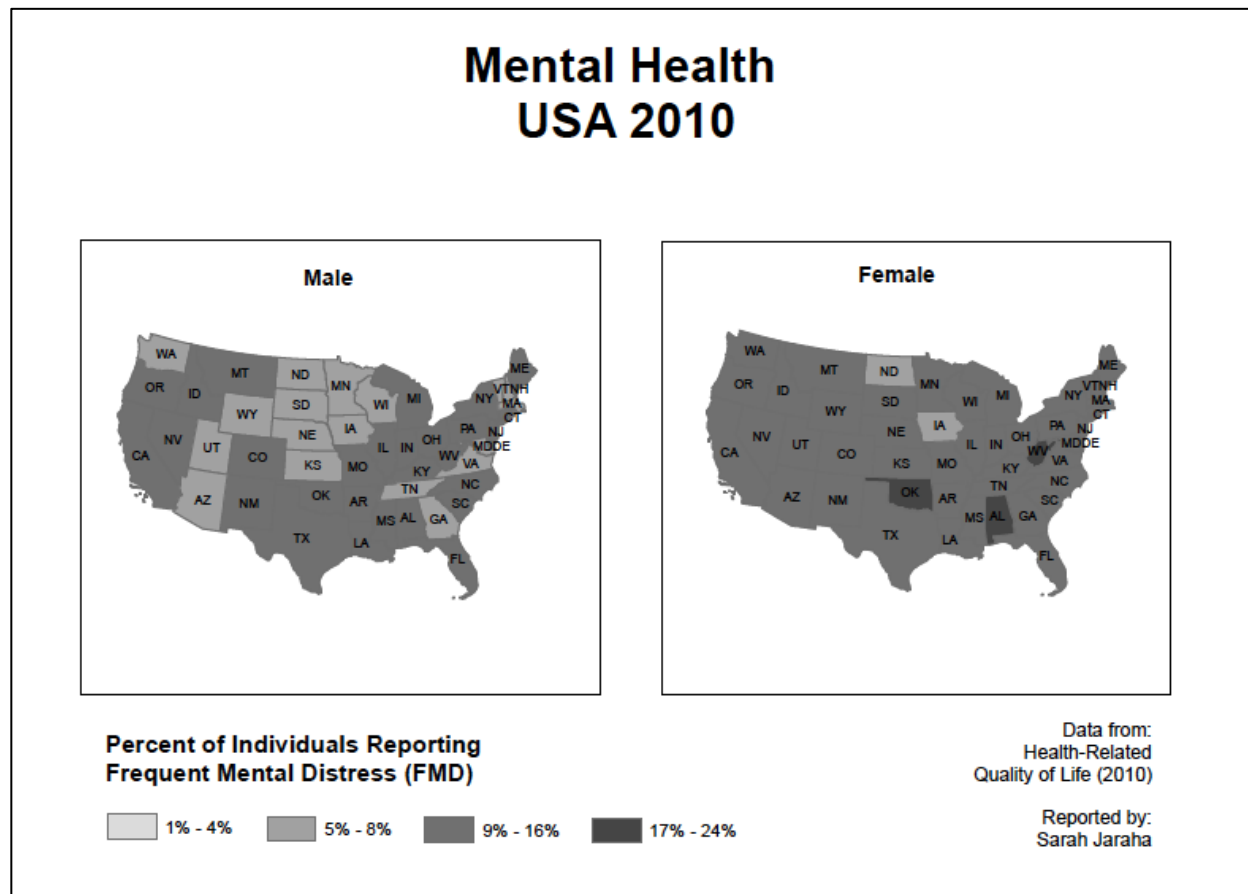

Figure 5: Choropleth maps showing US mental health by sex

The highest percentage of FMD was in Alabama for females. The lowest percentage of FMD was in North and South Dakota for males. Table 4 summarizes the highest and lowest percentages of FMD for each sex.

Table 4: Highest and Lowest Percentages of FMD by Sex

Sex	Highest Percentage of FMD	State	Lowest Percentage of FMD	State
Male	13.9 %	West Virginia	5.4 %	North and South Dakota
Female	16.5 %	Alabama	7.9 %	North and South Dakota

       States with the highest percentages of reported FMD vary. North and South Dakota have the lowest percentages of reported FMD for females and males.

Physical Health by Age Range

       The choropleth maps representing FPD by age range are shown in Figure 6. Darker colors represent higher percentages of FPD.
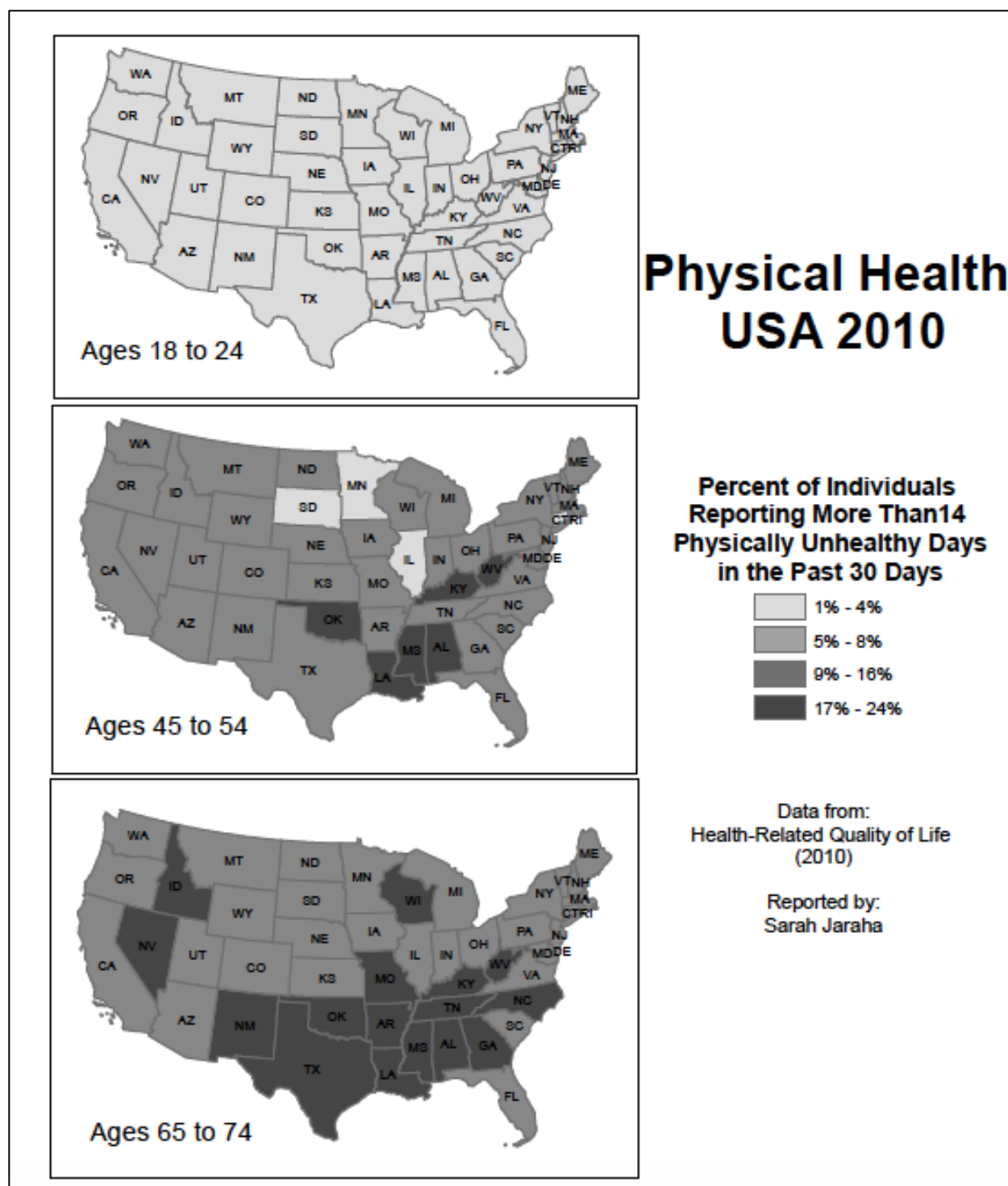
Figure 6: Choropleth maps showing US physical health by age range

The highest percentage of FPD was in West Virginia for the 45 to 54 year age range. The lowest percentage of FPD was in Missouri for the 18-24 year age range. Table 5 summarizes the highest and lowest percentages of FPD for each age range.

Table 5: Highest and Lowest Percentages of FPD by Age Range

Age Range	Highest Percentage of FPD	State	Lowest Percentage of FPD	State
18-24	8.4 %	Maine	0.7 %	Missouri
45-54	19.0 %	West Virginia	7.0 %	Connecticut
65-74	23.7 %	West Virginia	11.6 %	Minnesota

West Virginia appears twice with the highest percentage of FPD. The states with the lowest percentages of FPD vary.

Physical Health by Sex

The choropleth maps representing FPD by sex are shown in Figure 7. Darker colors represent higher percentages of FPD.
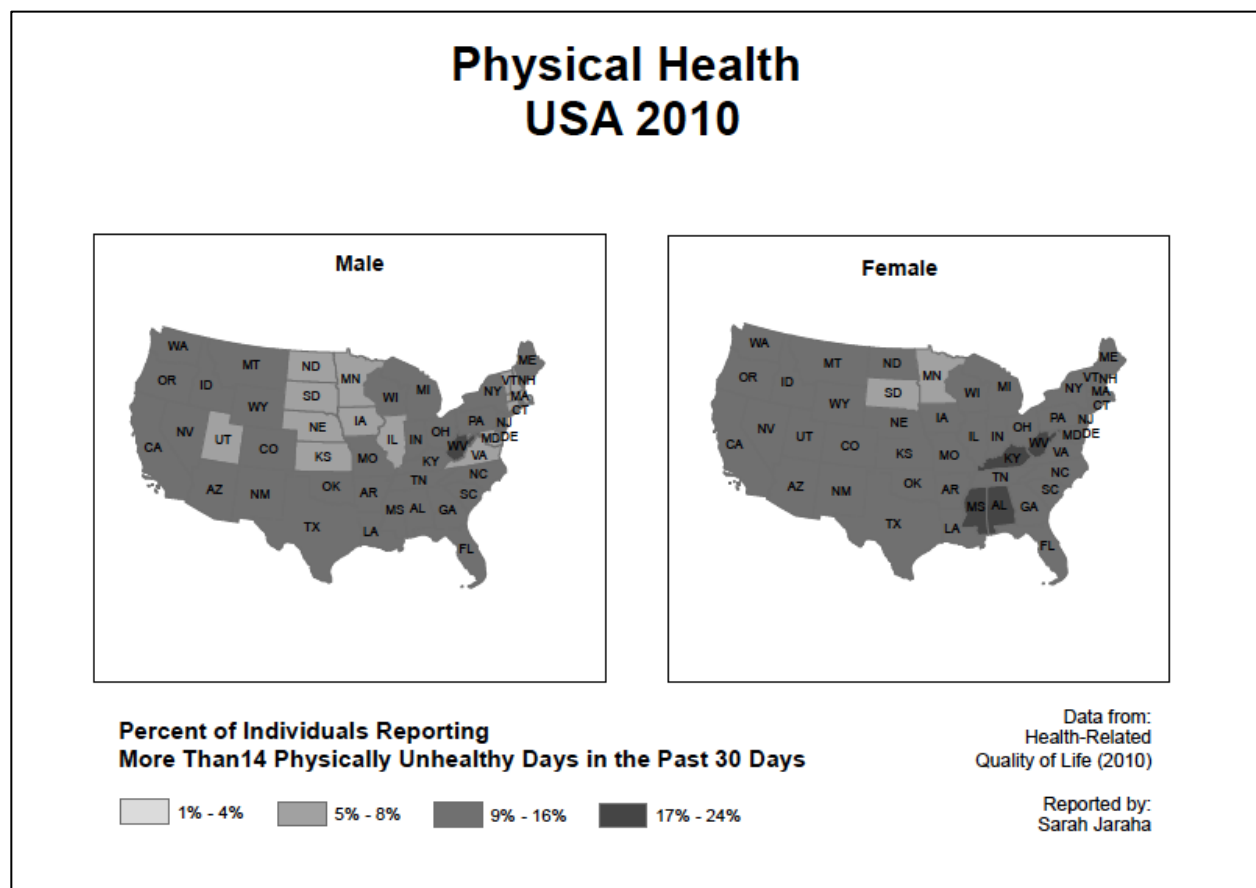

Figure 7: Choropleth maps showing US physical health by sex

The highest percentage of FPD was in West Virginia for females. The lowest percentage of FPD was in Connecticut for males. Table 6 summarizes the highest and lowest percentages of FPD for each sex.

Table 6: Highest and Lowest Percentages of FPD by Sex

Sex	Highest Percentage of FPD	State	Lowest Percentage of FPD	State
Male	16.8 %	West Virginia	6.6 %	Connecticut
Female	17.0 %	West Virginia	7.9 %	Minnesota

West Virginia has the highest percentages of FPD for females and males. States with the lowest percentages of FPD vary.

Trends

The 18-24 age range has the highest overall percentages of FMD, and the lowest overall percentages of FPD. Conversely, the 65-74 age range has the lowest overall percentages of reported FMD, and the highest overall percentages of FPD.

Females have higher overall percentages of FMD and FPD than males. However, percentages do not vary significantly between sexes.

West Virginia appeared frequently with the highest percentages of FMD and FPD.

Discussion

There is a known connection between mental and physical health.[5] This is opposed by the results showing that the 18-24 age range has highest and lowest overall percentages of FMD and FPD, while the 65-74 age range has the lowest and highest overall percentages of FMD and FPD, respectively. However, the results from West Virginia support the connection between mental and physical health (West Virginia shows high percentages of FMD as well as high percentages of FPD).

This contrast may suggest that there are factors affecting an individual's perception of mentally and physically healthy. An analysis of HRQOL on the community level could provide insight into potential factors. The introduction of concrete measurements such as nutrient intake, level of activity, and work habits may provide insight into an individual's perception of mentally and physically unhealthy.

Citations

1) "Frequently Asked Questions." Health-Related Quality of Life, Centers for Disease Control and Prevention, 26 May 2016, www.cdc.gov/hrqol/faqs.htm#10.

2) "Behavioral Risk Factor Data: Health-Related Quality of Life (HRQOL)." Center for Disease Control and Prevention, 3 June 2015.

3) "Methods and Measures." Health-Related Quality of Life (HRQOL), Centers for Disease Control and Prevention, 27 May 2016, www.cdc.gov/hrqol/methods.htm.

4) "HRQOL Concepts." Health-Related Quality of Life (HRQOL), Centers for Disease Control and Prevention, 31 May 2016, www.cdc.gov/hrqol/concept.htm.

5) Ohrnberger, Julius, et al. "The Relationship between Physical and Mental Health: A Mediation Analysis." Social Science and Medicine, Dec. 2017.