

# Analytics of Patients and Consumers Survey

## TECHNICAL REPORT

### 1. Overview

This is a data analysis exercise for the Medicare Current Beneficiary Survey MCBS. The objective is to assess:

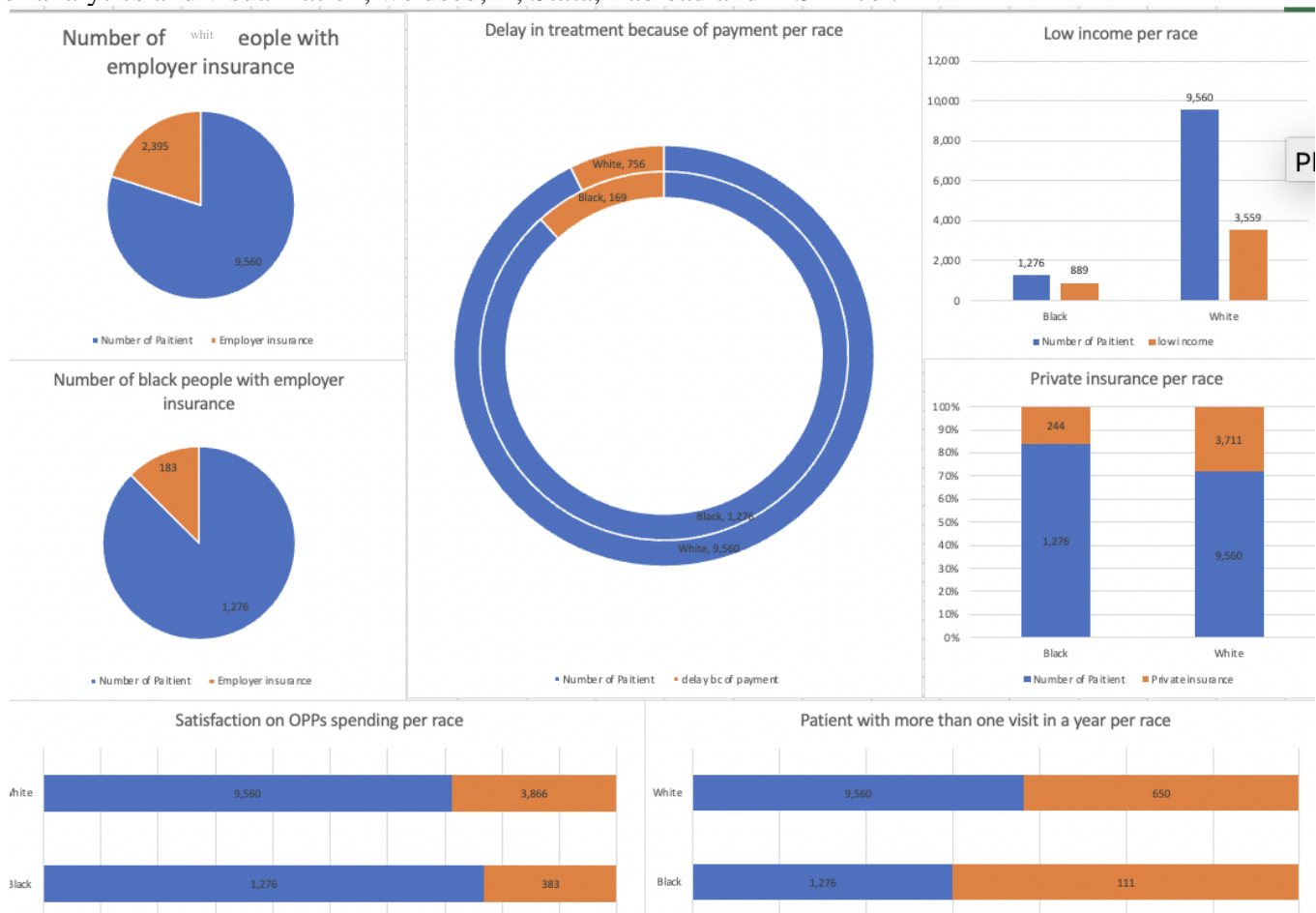
- 1) The racial disparities in ability to pay for care
- 2) The gender differences in healthcare utilization
- 3) The relationship between education and health
- 4) Test the hypothesis if anxiety and depression are related
- 5) The role of gender in the relationship between anxiety and depression
- 6) The relationship between loneliness and health
- 7) The relationship between loneliness and risk of depression

### 2. Methodology

Data is retrieved from the publicly available de-identified version of the MCBS, 2016 release. This data is collected from the Office of Enterprise Data and Analytics (OEDA) of the Centers for Medicare & Medicaid Services (CMS).

The sample size is 12,852 Medicare beneficiaries.

For analytics and visualization, we used, R, Stata, Tableau and MS Excel.



**Figure 1. Racial disparities in healthcare utilization and payment**

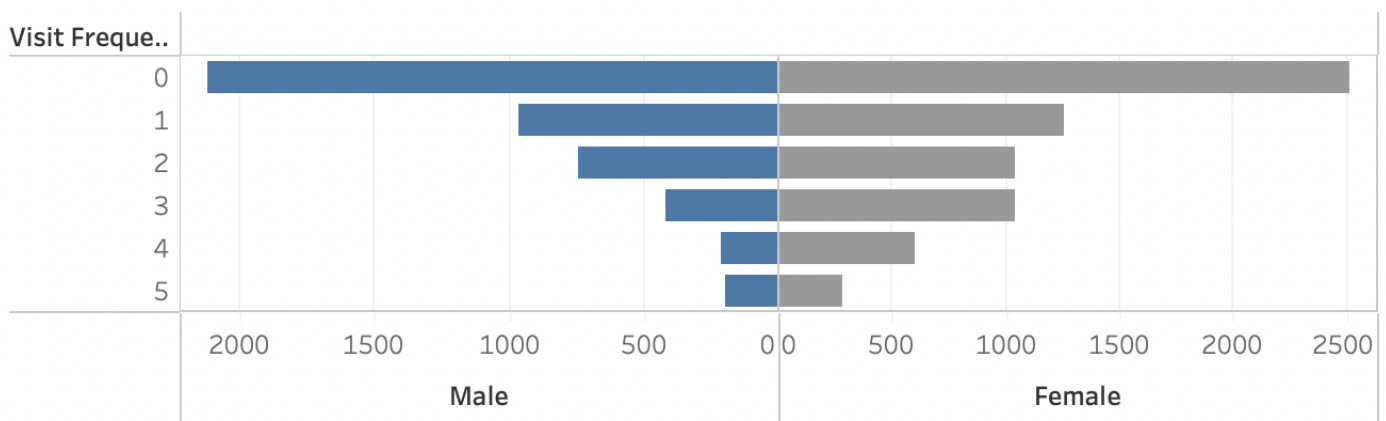
## Section 2: Gender differentials in healthcare utilization

Only individuals above 65 years are included in this study. We analyzed the data to compare the gender differentials in healthcare utilization between males and females to test the hypothesis that women have a better health seeking behavior than men. On running the analysis, it is found that there is a significant difference in healthcare visits between men and women, with women utilizing services more with increased visits. This gives an indication to reject the hypothesis that women utilize healthcare more than men due to their physiology and reproductive function because the healthcare utilization pattern continues even past the childbearing age and the difference is significant to men.

Visit Frequency	Male	Female
5	200	277
4	216	604
3	419	1044
2	746	1044
1	962	1258
0	2116	2508

Table 2. Visit Frequency and Gender

Figure 2. Visit Frequency and Gender



```
##
## Fisher's Exact Test for Count Data
##
## data:  con_df
## p-value = 1.415e-06
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.7655909 0.8943089
## sample estimates:
## odds ratio
##  0.827503
```

### Section 3: Relationship between education and obesity

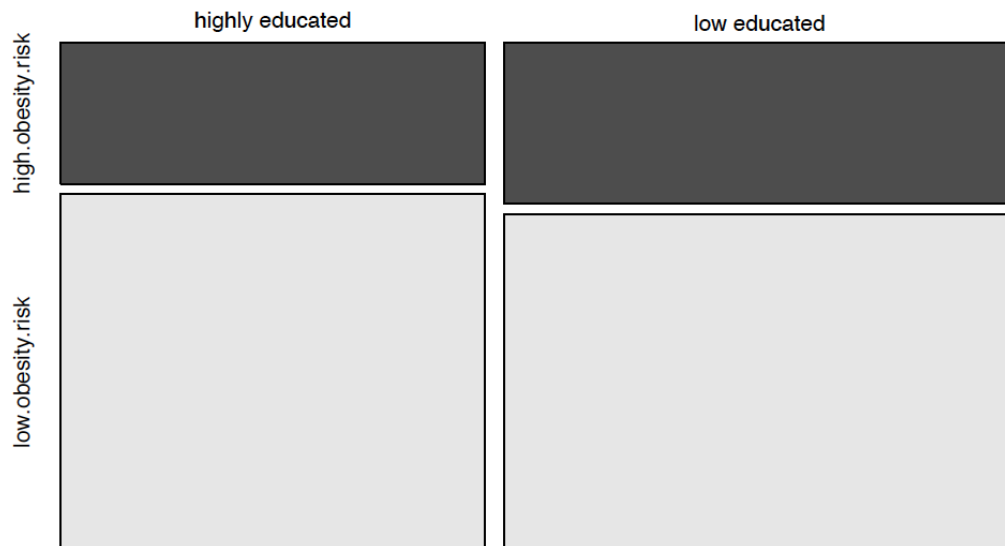
We conducted an analysis on the relationship between education and obesity by using the education level variable in relation to the obesity level. Obese and highly or extreme obese is defined as those who have a BMI of over 40 kg/m<sup>2</sup>. Highly educated is defined as those that had college education, those who did not receive college education are considered low educated category. Analysis of the data shows that there is a significant difference in obesity depending on the level of education. With the highly educated having lower obesity levels.

	High Obesity Risk	Low Obesity Risk
Highly Educated	1607	4045
Low Educated	2208	4599

Table 3. Obesity Risk and Education

p-value<0.001

Figure 3. Obesity Risk and Education



### Section 4: Are obesity and anxiety/depression related?

When analyzing the data, the depression rate of people who are not obese is 23% and for people who are obese, the depression is significantly higher 35% (p<0.001). It means that the obesity and depression is related. People who are obese are more likely to have anxiety and depression.

The fisher test show that the depression rate is in fact statistically different between the two groups.

	not obese(1+2+3)	obese(4+5)
depression rate	0.23621409	0.35834208

Table 4. Depression Rate for Obesity and non-Obesity people

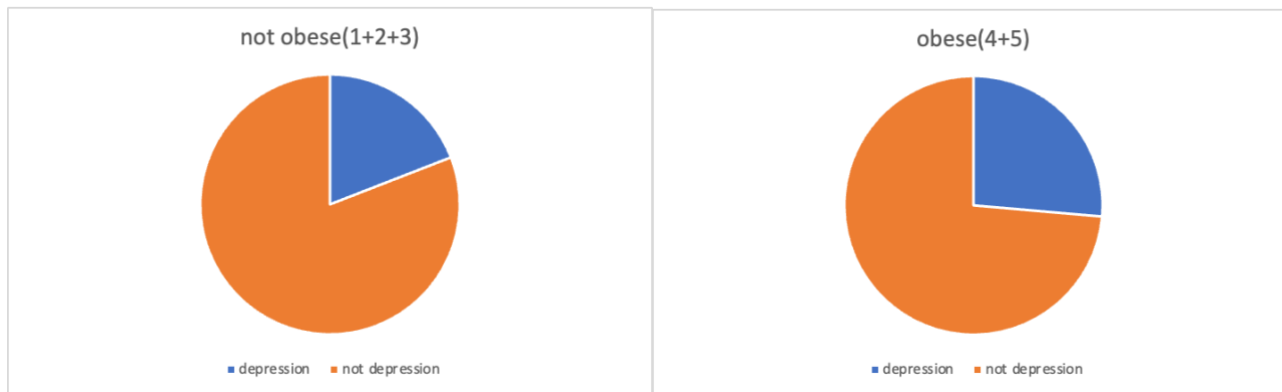


Figure 4. Obesity and Depression Status

depr	obes		Total
	0	1	
0	6,593	2,446	9,039
1	2,039	1,366	3,405
Total	8,632	3,812	12,444

Fisher's exact = 0.000  
1-sided Fisher's exact = 0.000

Table 5. Fisher Test result for Obesity and Depression

## Section 5: Time to make an educated guess and test it!

Before analyzing the data, my a-priori assumption is that females are more likely to be depressed due to their obesity than men. Because they pay more attention to their looks. Furthermore, female is more likely to get offensive judgment from others if they are not within a beauty range that is dictated by media and the current zeitgeist. However, it is with caution to consider the previous because people over 65 years tend to lose weight with aging instead of gain it (Patten et al., 2011).

The result of the data analysis verifies the prediction. Women's depression rate due to the obesity is 38% which is much higher than men's depression rate 29%. In addition, the rate of depression of women who are not obese is higher than men. There is a significant difference between men and women in terms of obesity and depression ( $p < 0.001$ ). The total depression rate for women is higher than men.

MAN		
	not obese(1+2+3)	obese(4+5)
depression rate	0.19402242	0.2922619

Table 6. Depression Rate for Obesity and non-Obesity Men

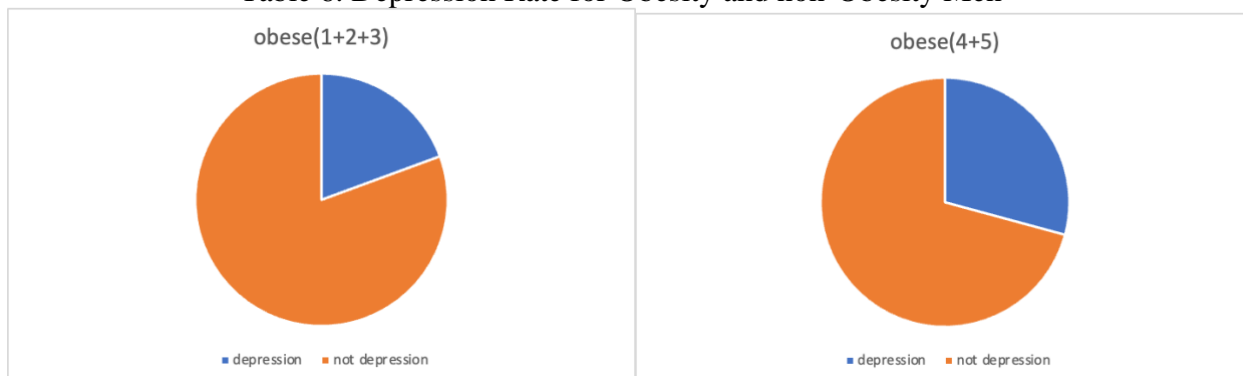


Figure 5. Obesity and Depression Status for Men

WOMAN		
	not obese(1+2+3)	obese(4+5)
depression rate	0.27290448	0.3869606

Table 7. Depression Rate for Obesity and non-Obesity Women

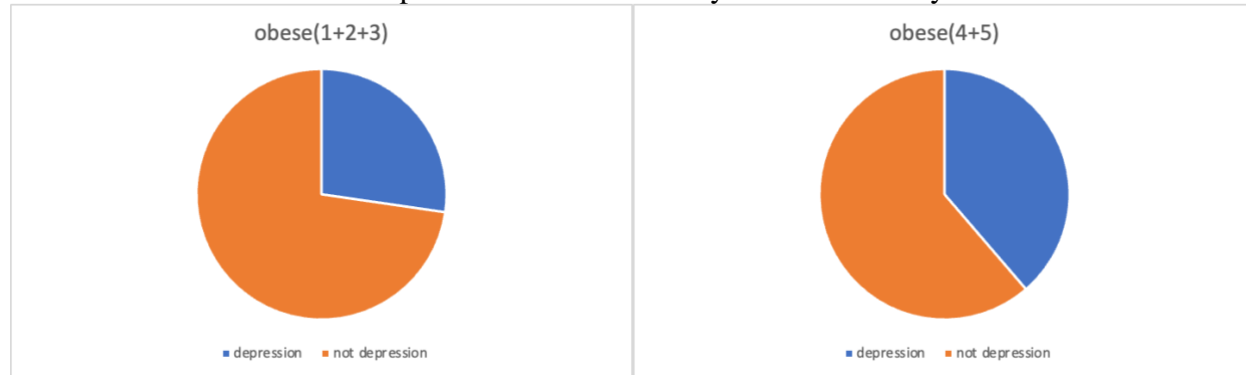


Figure 6. Obesity and Depression Status for Women

## Section 6: Loneliness and health status

On analyzing the data, 16% of the beneficiaries that have families reported poor health perception while 21% of beneficiaries living alone reported poor health perception. loneliness and health status have been found to be highly correlated ( $p < 0.001$ ). People who are living alone report significantly lower health perception and happiness about than those who are not living alone. This indicates that individuals that are not surrounded by a family have a lower state of health and happiness and This is in line with literature which clearly relates many health risks related to being lonely, especially in the western nations (Wakefield et al., 2020).

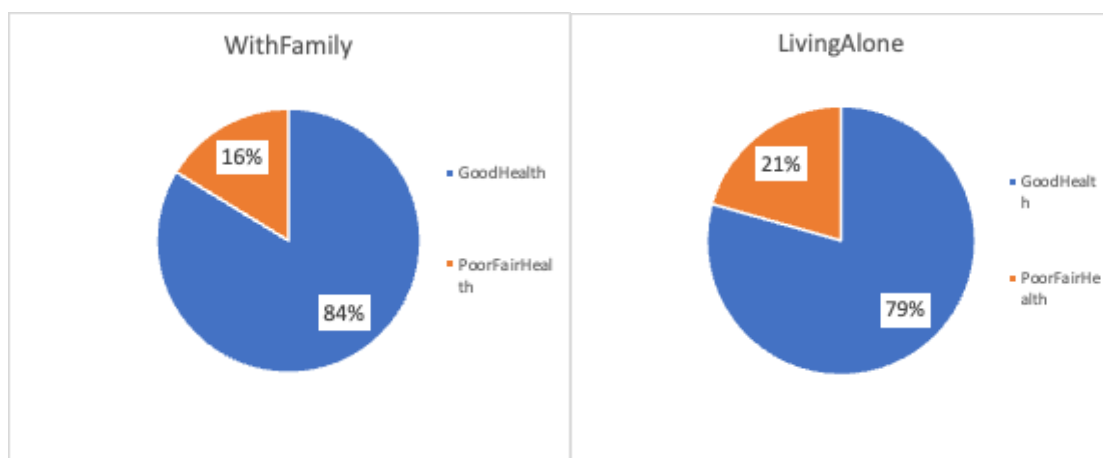


Figure 6. Loneliness and Health Status.

Row Labels	WithFamily	LivingAlone	Grand Total
GoodHealth	4589	4028	8617
PoorFairHealth	892	1045	1937
Grand Total	5481	5073	10554

Table 8. Loneliness and Health Status P value&lt;0.001

**N.B.** Missing values have been excluded for the variable DEM\_MARSTA, HLT\_GENHELTH or HLT\_OCDEPRSS.

## Section 7: Loneliness and risk of depression

Only individuals above 65 years are included in this study. On analyzing the data, loneliness and risk of depression have been found to be highly correlated ( $p < 0.001$ ). This indicates that individuals that are not surrounded by a family are more prone to depression. This is in line with literature which clearly relates many health risks related to being lonely, especially in the western nations (Wakefield et al., 2020).

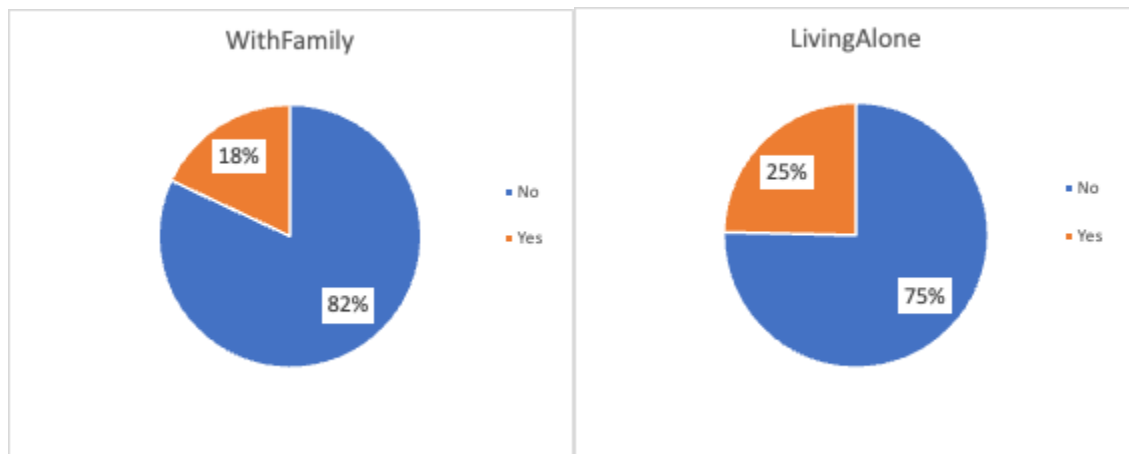


Figure 7. Loneliness and depression risk

Row Labels	WithFamily	LivingAlone	Grand Total
No	4493	3823	8316
Yes	988	1250	2238
Grand Total	5481	5073	10554

Table 9. Loneliness and Depression Risk  
P value < 0.001

**N.B.** Missing values have been excluded for the variable DEM\_MARSTA, HLT\_GENHELTH or HLT\_OCDEPRSS.

## 3. References

Patten, S. B., Williams, J. V. A., Lavorato, D. H., Khaled, S., & Bulloch, A. G. M. (2011). Weight gain in relation to major depression and antidepressant medication use. *Journal of Affective Disorders*, 134(1–3), 288–293. <https://doi.org/10.1016/j.jad.2011.06.027>

Wakefield, J. R. H., Bowe, M., Kellezi, B., Butcher, A., & Groeger, J. A. (2020). Longitudinal associations between family identification, loneliness, depression, and sleep quality. *British Journal of Health Psychology*, 25(1), 1–16. <https://doi.org/10.1111/bjhp.12391>

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