EVALUATION OF ACCESSIBILITY OF MEDICARE INSURANCE SERVICE AND ITS EFFECTIVENESS.

A case study of the U.S.A. Medicare Program

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Business Problem

Context

"Medicare is the United States health **insurance program** for **persons 65 years and over** and for persons younger than 65 years with a qualifying disability.

Every year, the Center of Medicare & Medical Services (CMS) carries out a survey to collect data from the beneficiaries of the Medicare Insurance Program focusing on the demographic characteristics, health status, access to care, insurance coverage, out-of-pocket expenses, financial resources, and potential family support."

Business Problem

Goal

Evaluate how effective the Medicare service is and how well the beneficiaries have access to the insurance benefits across all income groups

Research questions

1 Are there distinct differences in the **insurance coverage plan** based on income group and other socio-demographic characteristics?

2 Are there significant differences in the **level of satisfaction** based on income group and other socio-demographic characteristics?

3 Based on the income group and other socio-demographic characteristics, are there differences in the **Medicare advantage supplement**?

About the data

14,167
Observations

231
Variables

Variables of Interest

Demographic

Gender	Race	Income

Insurance Coverage

Covers RX Drugs	Covers nursing at home	Covers Vision	Covers dental	Enrolled in Medicare Advantage

Satisfaction

Medicare at night/Weekends	Easy get to Dr. from home	Out-Of-Pocket costs	Medicare at the same location

Medicare Advantage

Medicare Adv plan covers dental	Medicare Adv plan covers eye exams	Medicare Adv plan covers nursing at home

Project Timeline

Deliverables

Project Proposal	Data Cleaning	Data Exploration Pt 1	Data Exploration Pt 2	Analysis Question 1	Analysis Question 2	Analysis Question 3	Data Visualization	Final Report pdf file	Presentation ppt file

00 01 02 03 04 05 06 07 08 09

Week 1 — Week 2 — Week 3 — Week 4 — Week 5 — Week 6 — Week 7 — Week 8 — Week 9 — Week 10

Oct **Nov** **Dec**

Data Analysis

Tools

R in R studio

Tableau

TECHNIQUES

Data Exploration

Probabilities

Inference

Differences in the **Insurance Coverage** and **Level of Satisfaction** with Medicare Services between **income groups** and other demographic characteristics
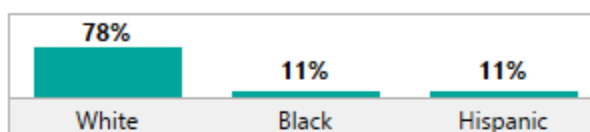
Demographic

14,167 Users

46% Males **54%** Females

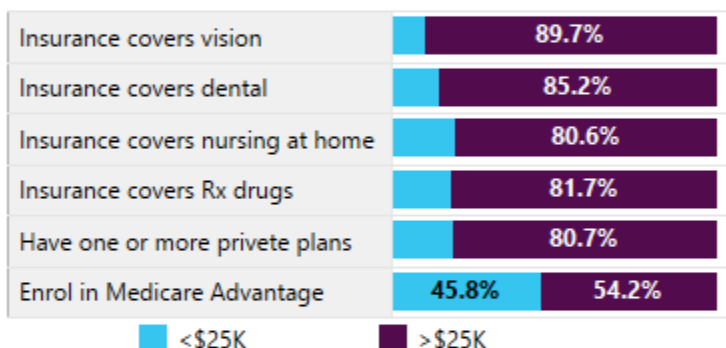**60%** earns more than $25K **40%** earns less than $25K
Income Group

Race

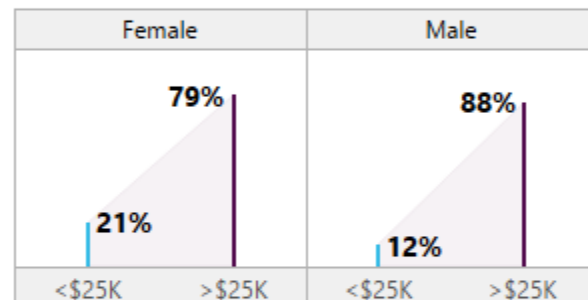| White	Black	Hispanic
78%	11%	11%

Insurance Coverage

Coverage distribution by Income Group
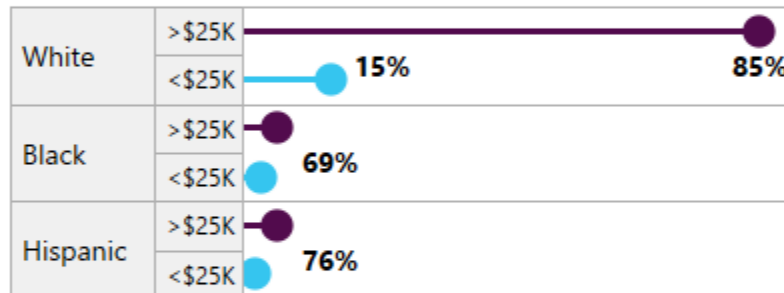In almost all categories, users with income greater than $25K have more than **80%** of the sharing.

	<$25K	>$25K
Insurance covers vision		89.7%
Insurance covers dental		85.2%
Insurance covers nursing at home		80.6%
Insurance covers Rx drugs		81.7%
Have one or more privete plans		80.7%
Enrol in Medicare Advantage	45.8%	54.2%

■ <$25K   ■ >$25K

Coverage distribution by Gender
Both Females and Males who earn more than $25k have more coverage in their Insurance than those who earn less
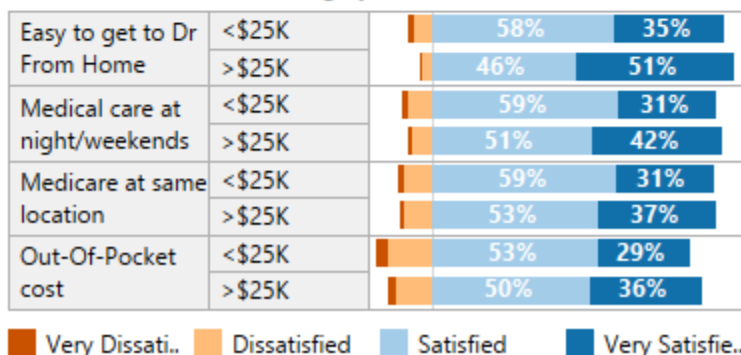
Female	Male
21% (<$25K) → 79% (>$25K)	12% (<$25K) → 88% (>$25K)

Coverage distribution by Race
In all races, users who earn more than $25K have more coverage in their insurance

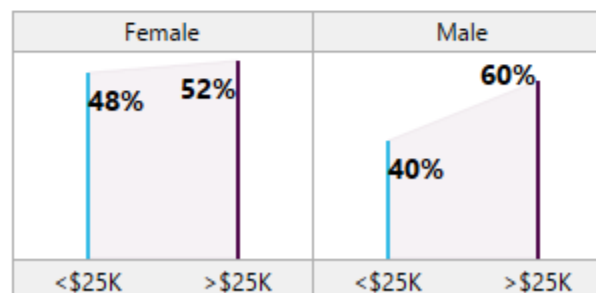|		
White	>$25K	85%
White	<$25K	15%
Black	>$25K	
Black	<$25K	69%
Hispanic	>$25K	
Hispanic	<$25K	76%

Satisfaction

Medicare Services Satisfaction by Income Group
The satisfaction is very high for all categories in both income groups. The Out-of-Pocket is the category with a lower level of satisfaction.
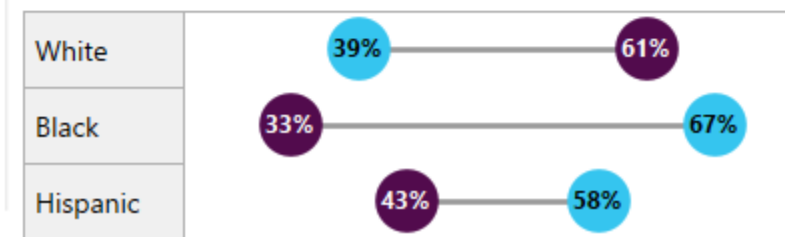
		Satisfied	Very Satisfied
Easy to get to Dr From Home	<$25K	58%	35%
	>$25K	46%	51%
Medical care at night/weekends	<$25K	59%	31%
	>$25K	51%	42%
Medicare at same location	<$25K	59%	31%
	>$25K	53%	37%
Out-Of-Pocket cost	<$25K	53%	29%
	>$25K	50%	36%

■ Very Dissati..   ■ Dissatisfied   ■ Satisfied   ■ Very Satisfie..

Which gender is more dissatisfied with the Out-Of-Pocket Costs?

Female	Male
48% (<$25K) → 52% (>$25K)	40% (<$25K) → 60% (>$25K)

Females with an income of less than $25 are more dissatisfied. Males with an income of more than $25 are more dissatisfied.
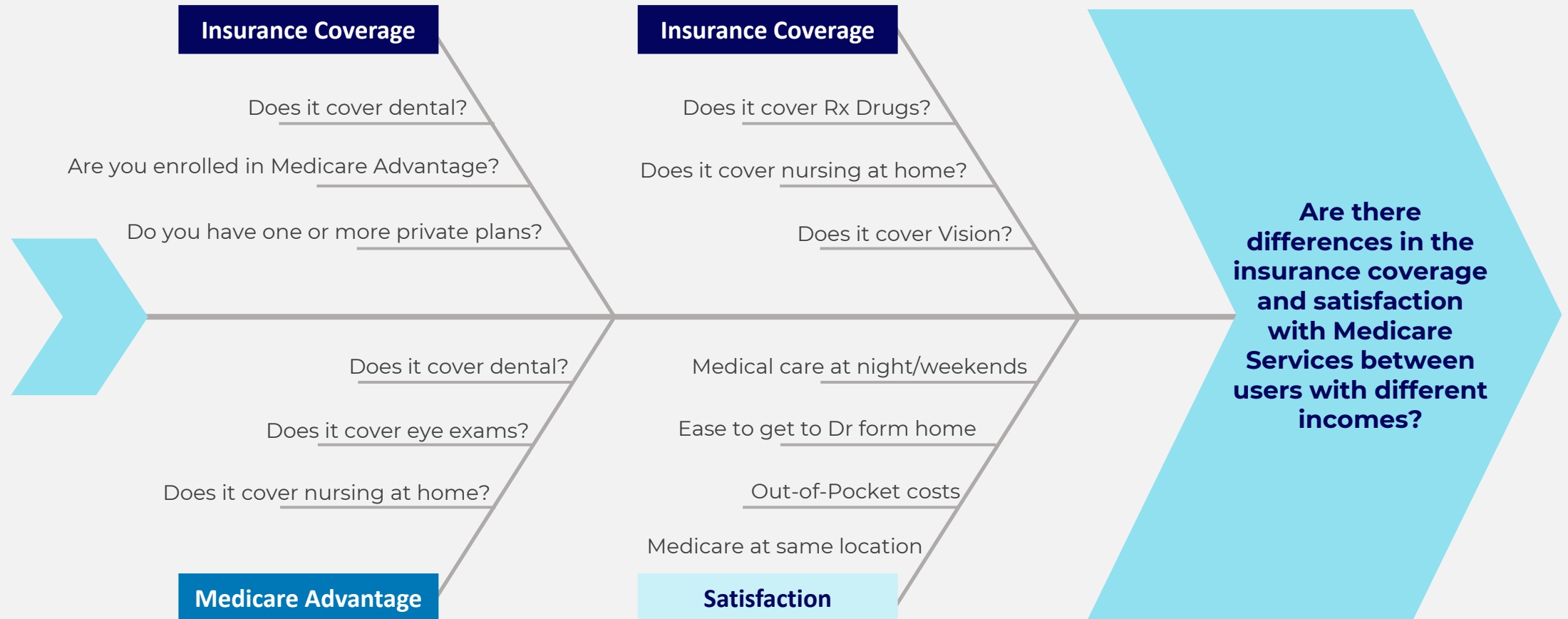
Which race is more dissatisfied with the Out-Of-Pocket Costs?

61% of white users who earn **more than $25K** are dissatisfied with OOP, while **67%** and **58%** of Black and Hispanic users who make **less than $25K** are dissatisfied with OOP.

White	39%	61%
Black	33%	67%
Hispanic	43%	58%

Fishbone Analysis

Insurance Coverage

Does it cover dental?

Are you enrolled in Medicare Advantage?

Do you have one or more private plans?

Insurance Coverage

Does it cover Rx Drugs?

Does it cover nursing at home?

Does it cover Vision?

Does it cover dental?

Does it cover eye exams?

Does it cover nursing at home?

Medicare Advantage

Medical care at night/weekends

Ease to get to Dr form home

Out-of-Pocket costs

Medicare at same location

Satisfaction

Are there differences in the insurance coverage and satisfaction with Medicare Services between users with different incomes?

Probabilities

Probabilities were calculated per each variable. The following is an example of how to read it.

When selecting three patients at random, what is the probability that the private plan of one of them covers RX Drugs?

For patients with **income less than $25K** the probability that the private plan of one out of three patients covers RX Drugs is **12%.**

Differences in Insurance Coverage by Income Group

Evaluated criterion	<$25K	>=$25K	Reject Null Hypotheses
Private plan covers Rx Drugs	12%	41%	Yes
Private plan nursing at home	6%	20%	Yes
Private plan covers Vision	0%	12%	Yes
Private plan covers Dental	9%	45%	Yes
Enrolled in Medicare Advantage	49%	54%	Yes
One or more private plans	25%	75%	Yes

Inference

Hypothesis testing were apply using inference of two proportions. The following is an example of how the hypothesis were defined:

Hnull: Proportion of patients that private plan covers RX Drugs with income less than $25K **is equal** to the proportion of patients which earn more than $25K

Halternative: Proportion of patients that private plan covers RX Drugs with income less than $25K **is different** to the proportion of patients which earn more than $25K

Are there distinct differences in the **insurance coverage plan** based on income group and other socio-demographic characteristics?

1

Differences in Insurance Coverage by Income Group and Gender

Evaluated criterion	Male			Female		
	<$25K	>=$25K	Reject Null Hypotheses	<$25K	>=$25K	Reject Null Hypotheses
Private plan covers Rx Drugs	22%	61%	Yes	25%	61%	Yes
Private plan nursing at home	9%	32%	Yes	17%	34%	Yes
Private plan covers Vision	3%	17%	Yes	3%	20%	Yes
Private plan covers Dental	20%	64%	Yes	22%	67%	Yes
Enrolled in Medicare Advantage	84%	76%	Yes	88%	77%	Yes
One or more private plans	45%	94%	Yes	58%	95%	Yes

Differences in Insurance Coverage by Income Group and Race

Evaluated criterion	Non-Hispanic White			Non-Hispanic Black			Hispanic		
	<$25K	>=$25K	Reject Null Hypotheses	<$25K	>=$25K	Reject Null Hypotheses	<$25K	>=$25K	Reject Null Hypotheses
Private plan covers Rx Drugs	30%	59%	Yes	20%	69%	Yes	14%	61%	Yes
Private plan nursing at home	17%	34%	Yes	9%	30%	Yes	3%	22%	Yes
Private plan covers Vision	3%	20%	Yes	3%	17%	Yes	3%	22%	Yes
Private plan covers Dental	25%	66%	Yes	20%	67%	Yes	14%	69%	Yes
Enrolled in Medicare Advantage	80%	75%	Yes	90%	86%	Yes	96%	87%	Yes
One or more private plans	66%	95%	Yes	32%	87%	Yes	25%	88%	Yes

Are there significant differences in the **level of satisfaction** based on income group and other socio-demographic characteristics?

2

Differences in satisfaction by Income Group

Evaluated criterion	<$25K	>=$25K	Reject Null Hypotheses?
Medicare at night/weekends	58%	74%	Yes
Easy to get to doctor from home	74%	92%	Yes
Out-Of-Pocket costs	67%	88%	Yes
Medicare at the same location	69%	84%	Yes

Differences in satisfaction by Income Group and Gender

Evaluated criterion	Male			Female		
	<$25K	>=$25K	Reject Null Hypotheses?	<$25K	>=$25K	Reject Null Hypotheses?
Medicare at night/weekends	95%	95%	Yes	94%	91%	Yes
Easy to get to doctor form home	100%	100%	Yes	100%	100%	Yes
Out-Of-Pocket costs	98%	100%	Yes	99%	100%	Yes
Medicare at the same location	99%	99%	Yes	99%	98%	**No**

Differences in satisfaction by Income Group and Race

Evaluated criterion	Non-Hispanic White			Non-Hispanic Black			Hispanic		
	<$25K	>=$25K	Reject Null Hypotheses?	<$25K	>=$25K	Reject Null Hypotheses?	<$25K	>=$25K	Reject Null Hypotheses?
Medicare at night/weekends	94%	93%	Yes	96%	96%	Yes	94%	94%	Yes
Easy to get to doctor form home	100%	100%	Yes	100%	100%	Yes	100%	100%	Yes
Out-Of-Pocket costs	99%	100%	Yes	98%	98%	Yes	99%	99%	Yes
Medicare at the same location	99%	99%	Yes	100%	100%	Yes	100%	100%	Yes

3 Based on the income group and other socio-demographic characteristics, are there differences in the Medicare advantage supplement?

Differences in Medicare Advantage by Income Group

Evaluated criterion	<$25K	>=$25K	Reject Null Hypotheses?
Mcare Adv covers dental	89%	90%	Yes
Mcare Adv covers eyes exam	92%	86%	Yes
Mcare Adv covers nursing home	36%	27%	Yes

Differences in Medicare Advantage by Income Group and Gender

Evaluated criterion	Male			Female		
	<$25K	>=$25K	Reject Null Hypotheses?	<$25K	>=$25K	Reject Null Hypotheses?
Mcare Adv covers dental	89%	90%	Yes	90%	90%	Yes
Mcare Adv covers eyes exam	92%	86%	Yes	90%	86%	Yes
Mcare Adv covers nursing home	34%	30%	Yes	36%	25%	Yes

Differences in Medicare Advantage by Income Group and Race

Evaluated criterion	Non-Hispanic White			Non-Hispanic Black			Hispanic		
	<$25K	>=$25K	Reject Null Hypotheses?	<$25K	>=$25K	Reject Null Hypotheses?	<$25K	>=$25K	Reject Null Hypotheses?
Mcare Adv covers dental	85%	90%	Yes	91%	90%	Yes	95%	91%	Yes
Mcare Adv covers eyes exam	88%	84%	Yes	93%	91%	Yes	98%	93%	Yes
Mcare Adv covers nursing home	30%	25%	Yes	43%	41%	Yes	43%	30%	Yes

Recommendations

It is recommended that the Government should invest more in the Healthcare Insurance Program; by investing more in the healthcare industry.

Provide more subsidies for high-income groups and free healthcare insurance for the low-income group as this will improve the accessibility to health insurance.

With this, the advocacy of the World Health Organization for universal health coverage for all, irrespective of the different income level, gender, race or other factors would be fully fulfilled.

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Pictures:
- shorturl.at/ijFS4
- shorturl.at/egtv0
- shorturl.at/cmsX6

Thank you