A study on the alleged case of discrimination

NoSQL/MongoDB

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The dataset involves a claim of discrimination based on ethnicity. The situation involved an alleged case of discrimination favoring White non-Hispanics over Hispanics in the allocation of funds to over 250,000 developmentally-disabled California Residents.

Background

Step 1: Design Mongo Collection

In [11]:
```
db= client['project']
collection= db['first']

df= pd.read_csv('./californiaDataSet.csv')
data= df.to_dict('records')
collection.insert_many(data)
```

Out[11]:
```
InsertManyResult([ObjectId('6619d8b0eb86fc47966602fb'), ObjectId('6619d8b0eb86fc47966602fc'), ObjectId('6619d8b0eb8
6fc47966602fd'), ObjectId('6619d8b0eb86fc47966602fe'), ObjectId('6619d8b0eb86fc47966602ff'), ObjectId('6619d8b0eb86
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7'), ObjectId('6619d8b0eb86fc4796660328'), ObjectId('6619d8b0eb86fc4796660329'), ObjectId('6619d8b0eb86fc479666032
a'), ObjectId('6619d8b0eb86fc479666032b'), ObjectId('6619d8b0eb86fc479666032c'), ObjectId('6619d8b0eb86fc479666032
d'), ObjectId('6619d8b0eb86fc479666032e'), ObjectId('6619d8b0eb86fc479666032f'), ObjectId('6619d8b0eb86fc479666033
0'), ObjectId('6619d8b0eb86fc4796660331'), ObjectId('6619d8b0eb86fc4796660332'), ObjectId('6619d8b0eb86fc479666033
```

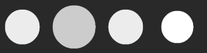

Step 2: Use Mongo Aggregation Pipeline

In [21]:

```
pipeline = [
    {# check if the person's ethinicity is white not hispanic or hispanic
        '$match': {
            'Ethnicity': {
                '$in': ['White not Hispanic', 'Hispanic']
            }
        }
    },
    {# group data by ethnicity then find descriptive statistics for both groups
        '$group': {
            '_id': '$Ethnicity',
            'average_expenditures': {
                '$avg': '$Expenditures'
            },
            'std_expenditures': {
                '$stdDevSamp': '$Expenditures'
            },
            'max_expenditures': {
                '$max': '$Expenditures'
            },
            'min_expenditures': {
                '$min': '$Expenditures'
            }
        }
    }
]
result = collection.aggregate(pipeline)
```

Step 2: Use Mongo Aggregation Pipeline

In [26]:
```
plotPipe = [
    {
        # Match documents where the Ethnicity field is either 'White not Hispanic' or 'Hispanic'
        '$match': {
            'Ethnicity': {
                '$in': ['White not Hispanic', 'Hispanic']
            }
        }
    }
]
result= list(collection.aggregate(plotPipe))
plotData= pd.DataFrame(result)
plotData.head()
```

Out[26]:

	_id	Id	Age Cohort	Age	Gender	Expenditures	Ethnicity
0	6619a038776ae5c590f19134	10210	13 to 17	17	Female	2113	White not Hispanic
1	6619a038776ae5c590f19135	10409	22 to 50	37	Male	41924	White not Hispanic
2	6619a038776ae5c590f19136	10486	0 to 5	3	Male	1454	Hispanic
3	6619a038776ae5c590f19137	10538	18 to 21	19	Female	6400	Hispanic
4	6619a038776ae5c590f19138	10568	13 to 17	13	Male	4412	White not Hispanic

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Data Analysis

- Descriptive Statistics
- Graph Visualizations
- T-test

Descriptive Statistics

White people receive $13,632 more than hispanics on average

```
result = collection.aggregate(pipeline)

# empty dict to means
ethAvg= {}

# iterate through docs and print out information
for document in result:
    print(f"Ethnicity: {document['_id']}")
    print(f"Mean: {document['average_expenditures']:.2f}")
    print(f"Standard Deviation: {document['std_expenditures']:.2f}")
    print(f"Min: {document['min_expenditures']:.2f}")
    print(f"Max: {document['max_expenditures']:.2f}")
    print()
    ethnicity= document['_id']
    avgExp= document['average_expenditures']
    ethAvg[ethnicity]= avgExp
diff= ethAvg['White not Hispanic'] - ethAvg['Hispanic']
print(f'White people receive ~${diff:0.2f} more than hispanics on average.')
```

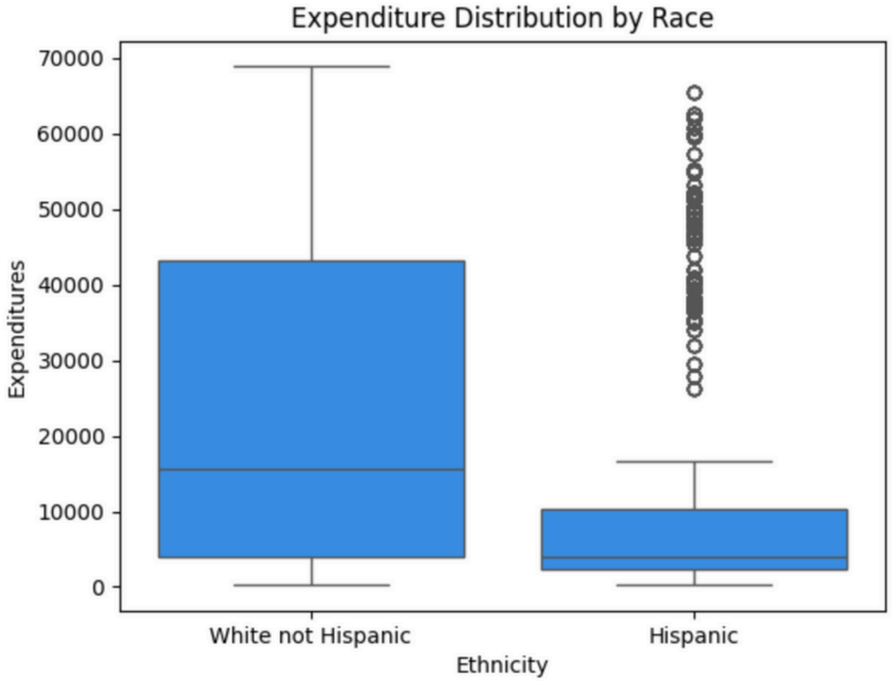
White not Hispanic

- Mean: 24697.55
- Standard Deviation: 20582.34
- Min: 340.00
- Max: 68890.00

Hispanic

- Mean: 11065.57
- Standard Deviation: 15612.01
- Min: 222.00
- Max: 65581.00

Expenditures by Ethnicity

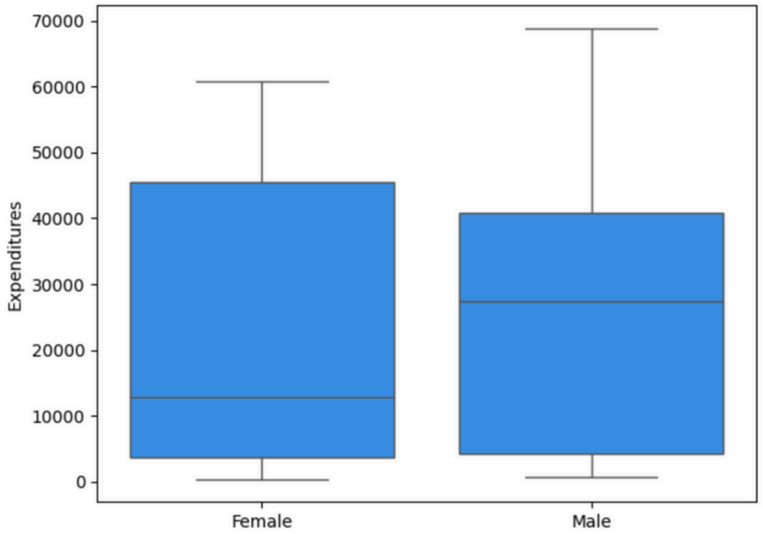


Significant disparity in the allocation of funds.

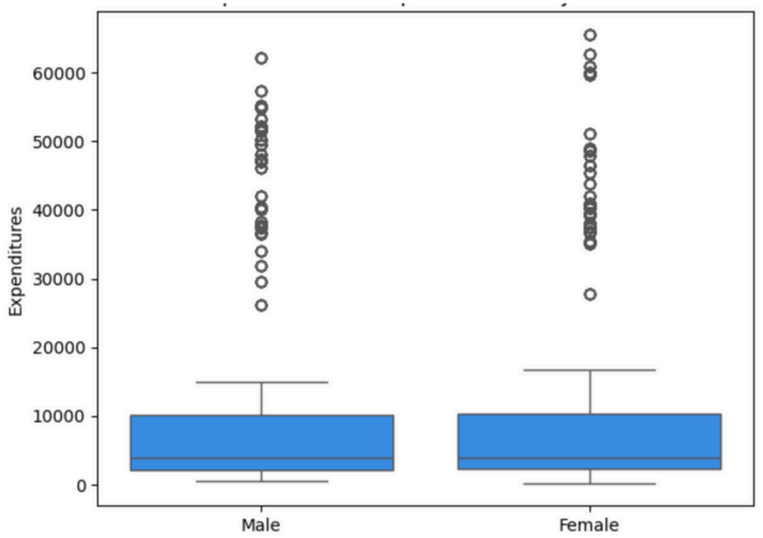
On average, **White non-Hispanic recipients receiving substantially higher** amounts compared to Hispanic recipients.

Expenditures by Gender

Expenditures on White, non-Hispanic



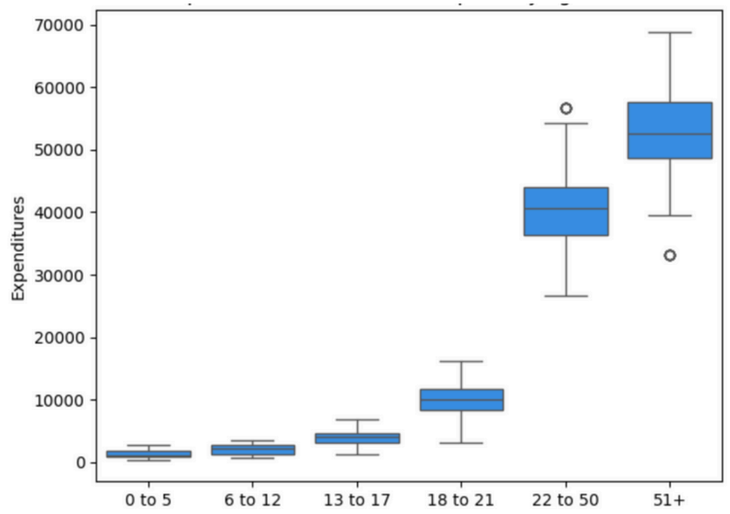
Expenditures on Hispanic



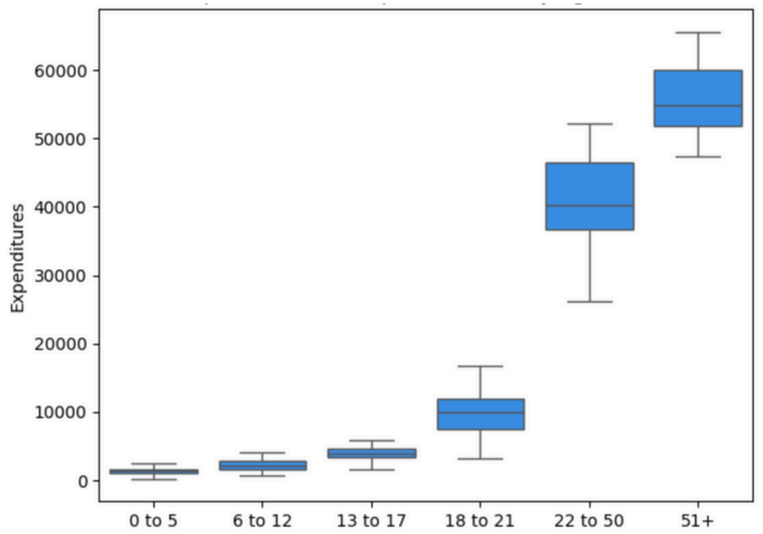
- The median expenditures for both White, non-Hispanic females and males are higher than Hispanic.
- White, non-Hispanic males tend to receive higher funds than the females
- Hispanic females and males tend to show less disparity
- Hispanic expenditures contain more outliers, suggesting variability among the highest spenders in the category
- White, non-Hispanic data appears to be more centrally distributed with fewer extreme values, suggesting more consistent approach to fund allocation among such demographic

Expenditures by Age Cohort

Expenditures on White, non-Hispanic



Expenditures on Hispanic



- Both groups show increasing median expenditures with age, peaking at the 51+ cohort.
- In both groups, the 18 to 21 and 22 to 50 cohorts show a marked increase in variability and median expenditures compared to younger age groups, which may reflect increased financial independence and responsibilities.
- The 51+ cohorts for both groups exhibit the highest variability and expenditures, which might be due to healthcare costs, retirement planning, or other age-related expenses.
- The White, non-Hispanic cohort shows outliers in the older age groups (18 to 21 and 51+), suggesting there are individuals in the White, non-Hispanic group with exceptionally high expenditures that are not as common in the Hispanic group.

T-test

T-Tests

- Comparing both whole populations
- Comparing by age and gender

In [47]:
```
# Query to retrieve age cohort, gender, expenditures, and ethnicity for "White not Hispanic" individuals
white_filter = {'Ethnicity': 'White not Hispanic'}
white_query_result = collection.find(white_filter, {'Age Cohort': 1, 'Gender': 1, 'Expenditures': 1, 'Ethnicity': 1,

# Convert the query results to a pandas DataFrame
white_df = pd.DataFrame(list(white_query_result))

# Query to retrieve age cohort, gender, expenditures, and ethnicity for "Hispanic" individuals
hispanic_filter = {'Ethnicity': 'Hispanic'}
hispanic_query_result = collection.find(hispanic_filter, {'Age Cohort': 1, 'Gender': 1, 'Expenditures': 1, 'Ethnicit

# Convert the query results to a pandas DataFrame
hispanic_df = pd.DataFrame(list(hispanic_query_result))
```

In [23]:
```
whiteExp = collection.find({'Ethnicity': 'White not Hispanic'}, {'Expenditures': 1, '_id': 0})

hispExp = collection.find({'Ethnicity': 'Hispanic'}, {'Expenditures': 1, '_id': 0})

whiteList = [doc['Expenditures'] for doc in whiteExp]
hispList = [doc['Expenditures'] for doc in hispExp]

whiteSeries = pd.Series(whiteList)
hispSeries = pd.Series(hispList)

from scipy import stats

tStat, pVal= stats.ttest_ind(whiteSeries, hispSeries, alternative='greater', equal_var=False)
if pVal < 0.05:
    print(f"White people received more money on average.")
    print(f'P-Value: {pVal}')
```

```
White people received more money on average.
P-Value: 3.525267812150838e-157
```

Conclusion

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1. Overall, **Hispanic individuals face discrimination.**

2. When gender is strictly controlled for, **both Hispanic males and females experience discrimination** compared to their white counterparts.

3. When age is strictly controlled for, none of the age groups face discrimination.

4. When both age and gender are controlled for, **discrimination is observed only within the 51+ Male category.**

5. Even after removing the 51+ age category, discrimination against the Hispanic population as a whole persists.