PATTERNS AND PREDICTORS OF CLOTHING EXPENDITURE IN U.S. HOUSEHOLDS

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INTRODUCTION

The objective of this report is to analyze how U.S. household clothing expenditures changed between 2019 and 2023 and to identify the demographic and economic factors that influence this spending. Understanding these patterns is important because clothing is a basic necessity that responds to changes in income, family structure, age, and broader economic conditions. This type of analysis can help retailers anticipate consumer demand, assist policymakers in understanding how households respond to economic shocks, and provide insight into how demographic trends shape spending. By focusing on clothing expenditure, the report examines a category that is relevant to both businesses and the general public, especially during periods of economic disruption and recovery.

This report uses data from the Consumer Expenditure Survey (CES), collected annually by the U.S. Bureau of Labor Statistics (BLS). (U.S. Bureau of Labor Statistics, n.d.) .The CES provides detailed information on household spending, income, and demographics, making it a credible and widely used dataset for economic analysis. The data used cover the years 2019–2023 and were filtered to include only typical consumer units, excluding missing or inconsistent observations to ensure reliable comparisons. Although the CES contains many variables, this project focuses on the subset related to clothing expenditures and key household characteristics.

The data show that clothing expenditure increases with household income and family size, declines among older age groups, and varies across racial and ethnic categories. Income rose steadily after 2021, and clothing expenditures reflect these changes. Several demographic factors appear closely linked to spending patterns, which are further explored through descriptive graphs and regression analysis.

The findings from this analysis can help apparel retailers target specific demographic groups and plan inventory more effectively. Policymakers may also use the results to understand how different households adjust spending during events such as the COVID-19 pandemic or periods of high inflation. Nonprofit organizations can apply these insights to better identify populations with limited ability to meet essential clothing needs.

Table 1: Summary Statistics

year Variable	2019 Mean	2020 Mean	2021 Mean	2022 Mean	2023 Mean
housing	5470	5700	6048	6453	6846
food	2158	2158	2364	2710	2931
transportation	2283	2095	2255	2638	2881
health	1246	1285	1311	1405	1505
entertainment	637	614	723	751	804
education	289	292	264		
clothing	239	207			
retpenpins	1796	1849	1947	2128	2345
utilities	1012	1041	1052	1105	1164
foodhome	1427	1567	1647	1839	1790
foodaway	730	590	717	872	1142
vehiclefuel	512	401	490	743	
medicalcare	350	334	370	417	468
homefurnishing	429	449	588	551	520
travel	516	300	396	630	749

Table 1 summarizes mean household expenditures across major categories from 2019 to 2023. Several patterns clearly reflect the impact of the COVID-19 pandemic. In 2020, spending fell sharply in categories tied to mobility and social activity, such as transportation, travel, vehicle fuel, and clothing, consistent with nationwide lockdowns and reduced movement. Food-away also declined noticeably in 2020, while spending on food at home increased as households shifted consumption toward in-home meals. (U.S. Bureau of Labor Statistics, n.d.). Other categories, including housing, utilities, and medical care, show steady increases over the period, reflecting ongoing trends unaffected or even reinforced by the pandemic.

These changes illustrate how the pandemic reshaped consumer priorities, and the following analysis explores these expenditure patterns in more detail.

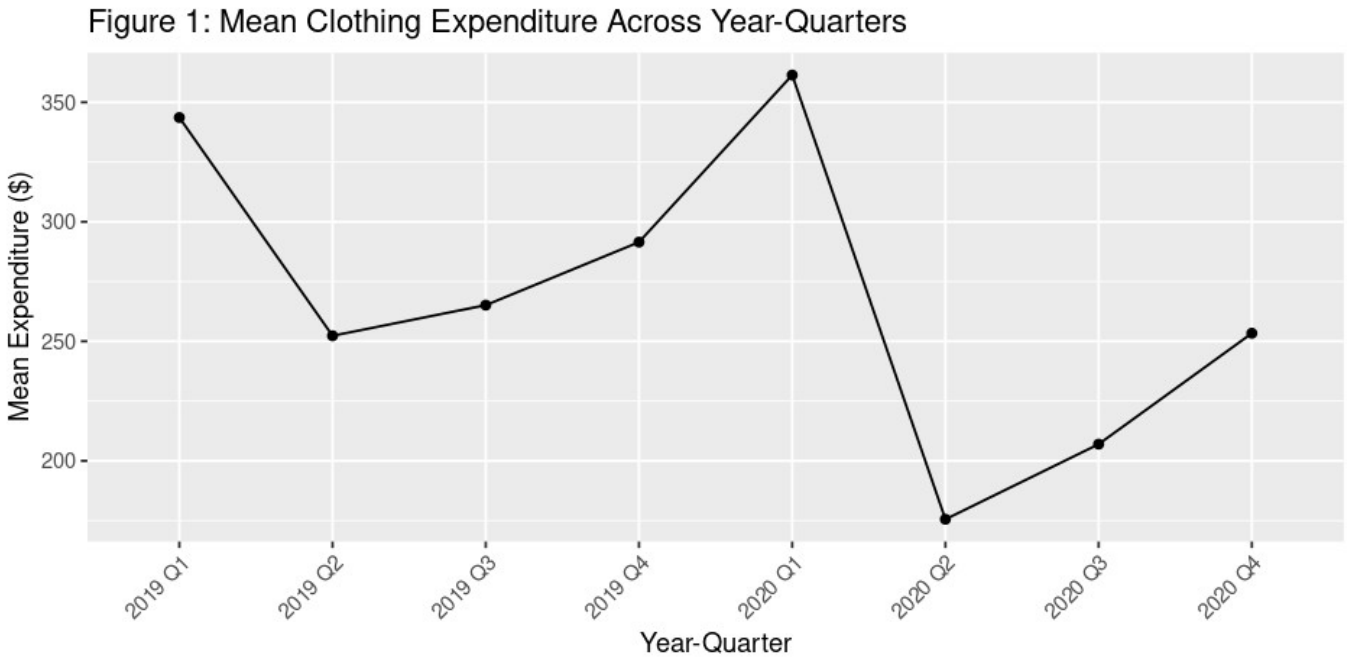
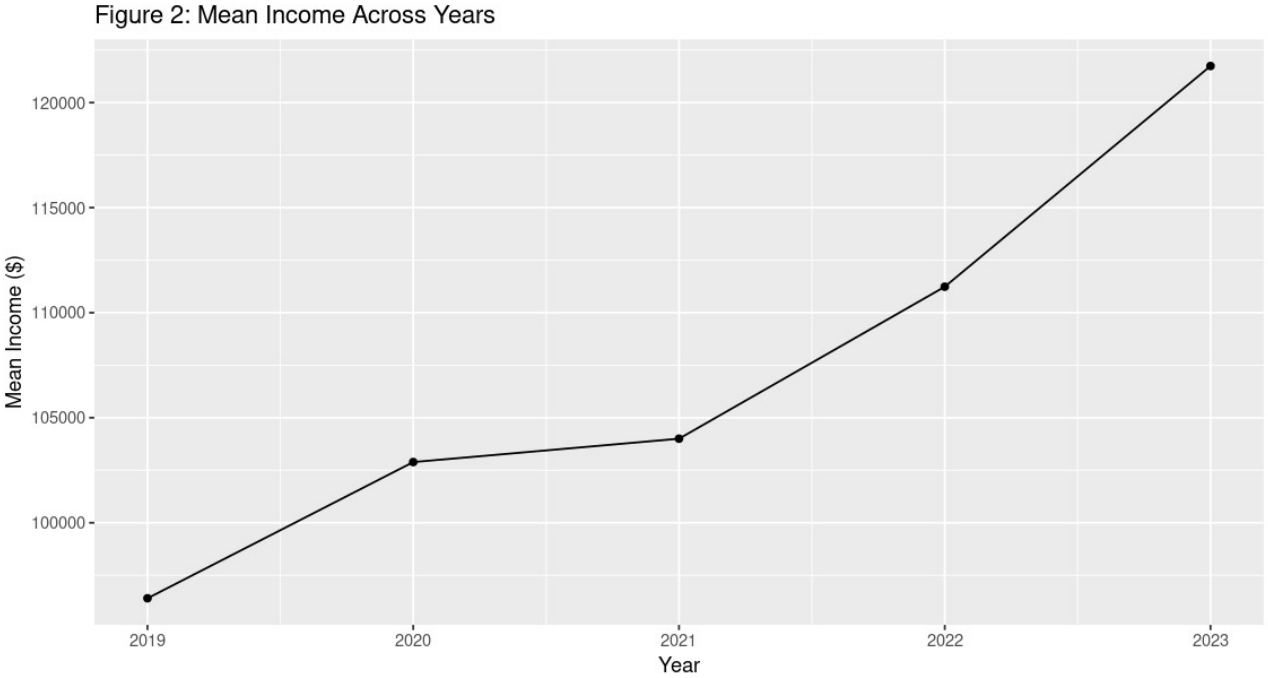


Figure 1 shows a sharp drop in clothing expenditure during the middle quarters of 2020. This decline reflects the major shift in consumer behaviour caused by the COVID-19 pandemic. As people stayed home, workplaces closed, and social activities paused, demand for apparel fell dramatically. Households redirected spending toward essentials, home goods, and savings, while purchases tied to going out, commuting, and in-person work decreased. These nationwide shifts in consumer activity explain the sudden fall in clothing expenditure in 2020 and the gradual recovery as restrictions eased and economic conditions improved. (Barua, 2021)

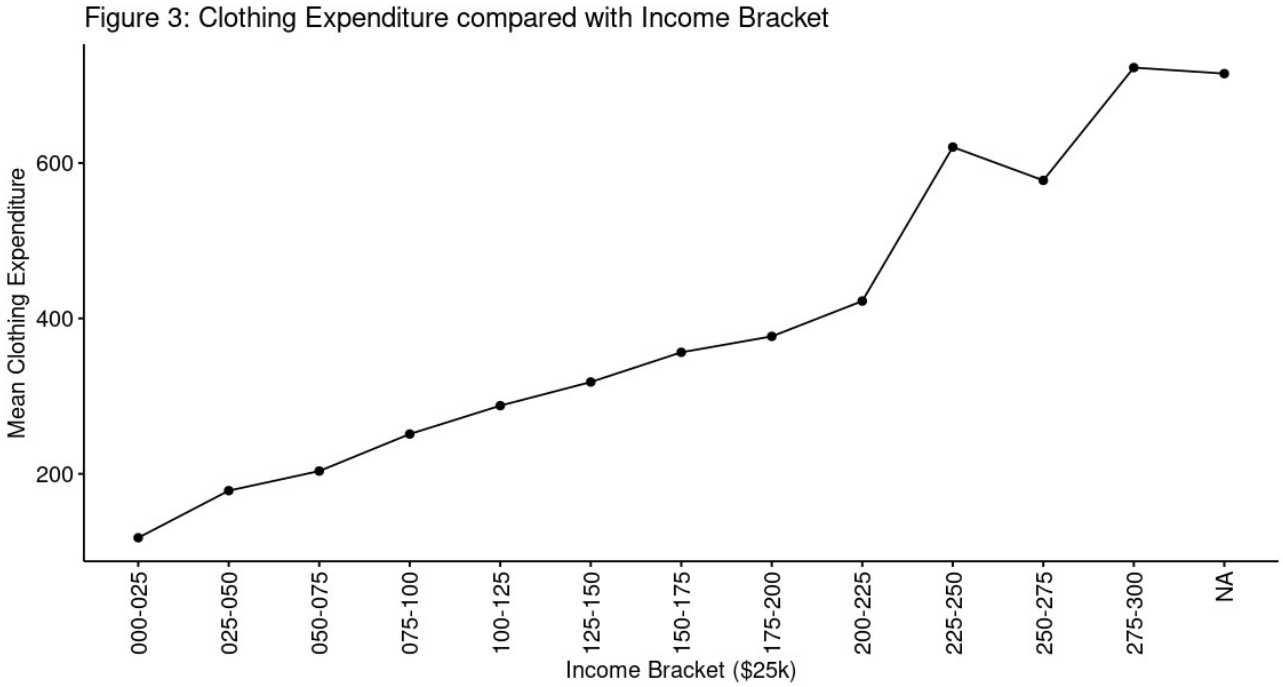


Source: U.S. Bureau of Labor Statistics (n.d.), Consumer Expenditure Survey: Public-use microdata

Figure 2 shows a steady and substantial increase in mean household income from 2019 to 2023. Income rises each year, but the pace of growth accelerates after 2021:

- Between 2019 and 2020, income increased moderately.
- 2021 shows only a slight increase, suggesting relatively stable income during the peak COVID-19 disruption.
- From 2021 to 2022, income jumps more sharply.
- The largest increase occurs between 2022 and 2023, with mean income reaching its highest level in the period.

Overall, the trend indicates that household income grew consistently and more rapidly in the post-pandemic years, possibly reflecting economic recovery, wage adjustments, or inflation-driven increases in nominal income.



Source: U.S. Bureau of Labor Statistics (n.d.), Consumer Expenditure Survey: Public-use microdata

Figure 3 shows a strong positive relationship between household income and mean clothing expenditure**.** As income brackets increase, mean spending on clothing rises steadily and consistently:

- Households in the lowest income brackets spend between $100–$200 on clothing, on average.
- Clothing expenditure increases gradually through the middle-income brackets, reaching around $300–$400**.**
- A noticeable acceleration in spending occurs after the $200–225k bracket, where clothing expenditure rises sharply.
- The highest income groups spend the most, exceeding $600–$700 on average.

Overall, the graph indicates that higher-income households allocate more money to clothing. The smooth upward slope suggests that clothing expenditure is normal and income-elastic**:** as income increases, spending increases more than proportionally, especially at higher income levels.

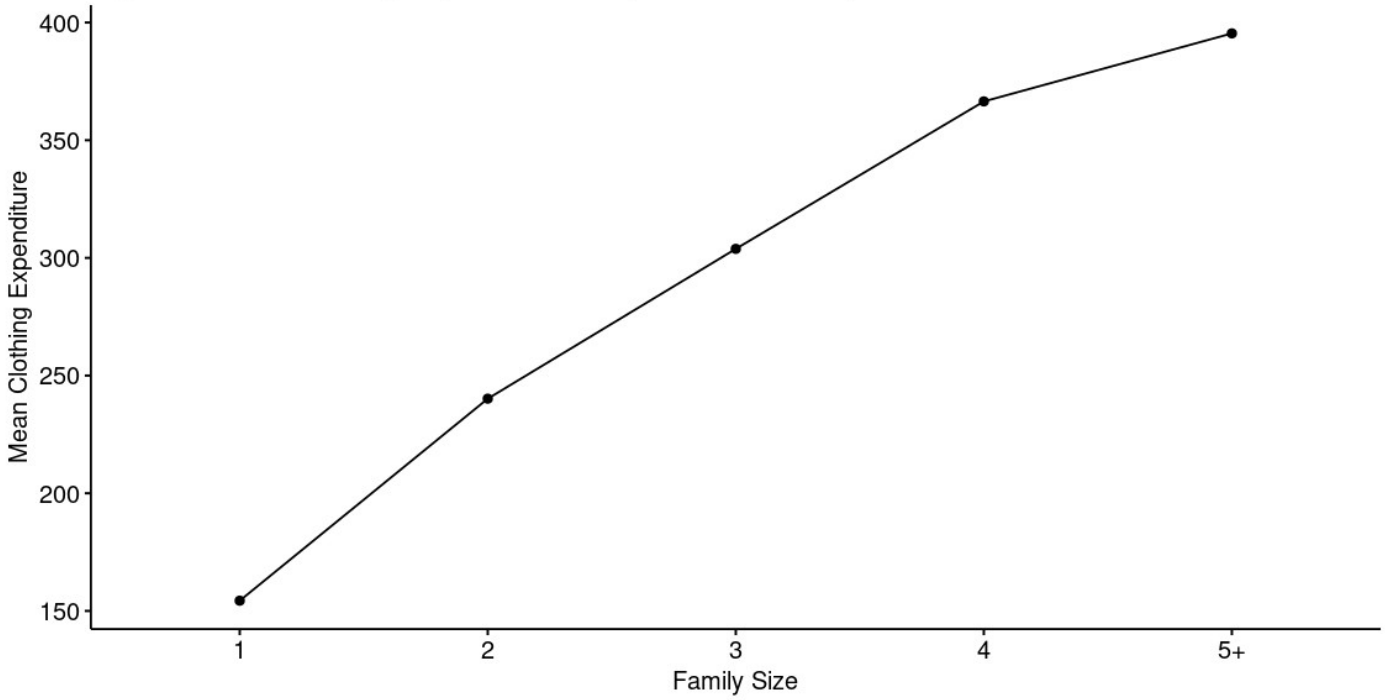
The last category labelled “NA” likely represents observations with missing income bracket information and should typically be excluded from interpretation.

Source: U.S. Bureau of Labor Statistics (n.d.), Consumer Expenditure Survey: Public-use microdata.

Figure 4 shows a clear variation in mean clothing expenditures across age groups, following a rise-and-decline pattern that aligns with national spending trends reported by the U.S. Bureau of Labor Statistics (BLS). Clothing expenditures increase from ages 25–34 and peak in the 35–44 age group, which aligns with BLS findings showing the highest clothing spending ($1,960 annually) among individuals aged 35–44 (Foster, 2015). The figure then shows a gradual decline in spending among the 45–54 group, followed by a sharp decrease for individuals aged 55–64. This downward shift is consistent with BLS data, which reports clothing spending dropping to $1,563 for individuals aged 55–64 and continuing to decline among older age groups.[2]

The BLS explains that clothing is often tied to work-related needs and therefore decreases when individuals retire. Older age groups (65–74 and 75+), who have the fewest earners per household, spend significantly less on apparel, reflecting reduced work requirements and lower budget shares allocated to clothing. Previous BLS research further supports this pattern, showing that age itself is negatively associated with clothing expenditures even after controlling for income and family size, and that being retired has an independent negative effect on clothing spending. Overall, the trend in Figure 4 aligns closely with national consumer expenditure data, reinforcing the role of age and employment status in shaping clothing consumption patterns.

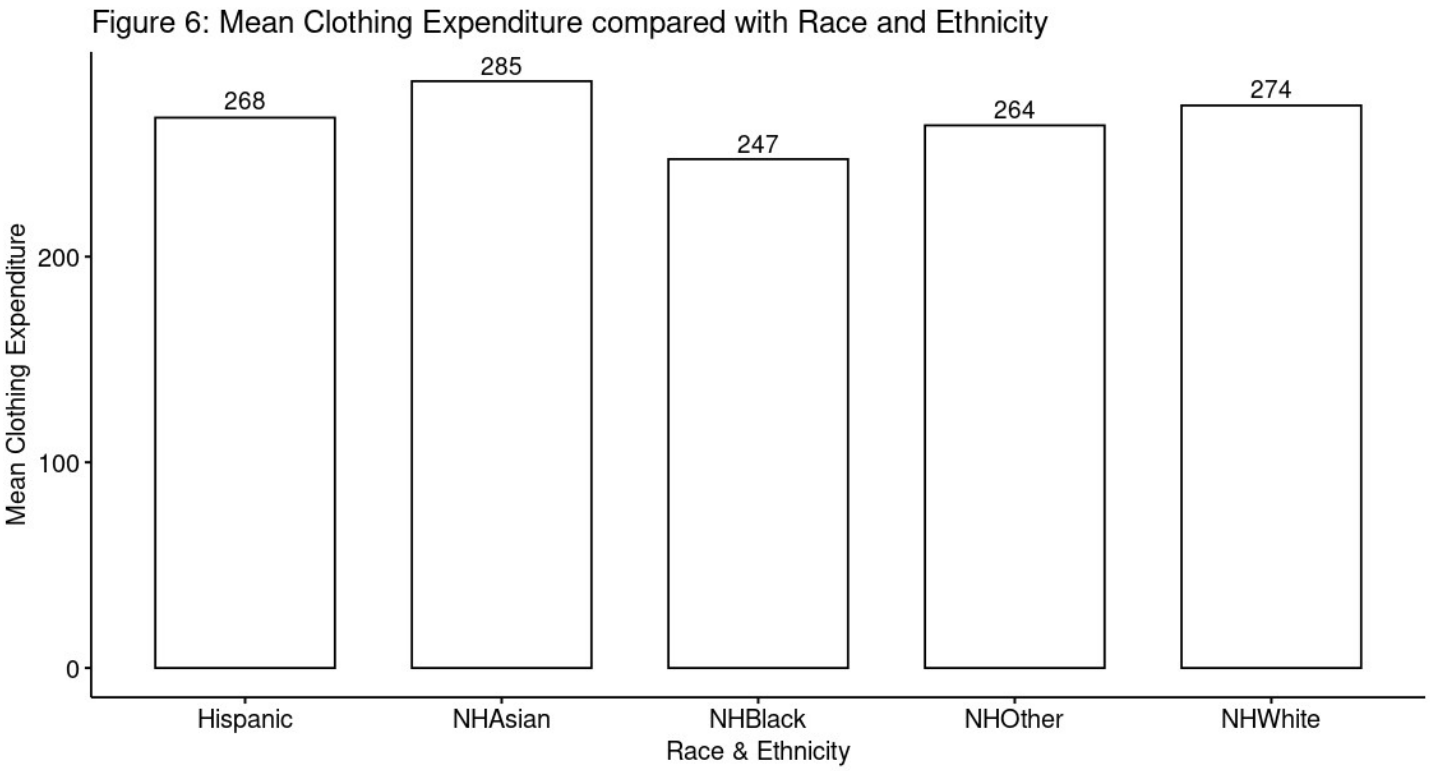
Figure 5: Mean Clothing Expenditure compared with Family Size



Source: U.S. Bureau of Labor Statistics (n.d.), Consumer Expenditure Survey: Public-use microdata.

Figure 5 shows a strong positive relation. The pattern is clearly upward-sloping as families become larger, their total clothing spending increases. Families with one person spend the least on clothing. Spending rises substantially for two-person families and continues to increase for families with three and four people. The highest expenditures occur in the 5+ group, which likely reflects the greater number of individuals needing apparel in larger households.

With this, we can indicate that family size is a very meaningful determinant of clothing expenditure, making it an important variable when analysing consumer and spending patterns



Source: U.S. Bureau of Labor Statistics (n.d.), Consumer Expenditure Survey: Public-use microdata.

Figure 6 compares mean clothing expenditures across racial and ethnic groups and shows clear differences among households. Non-Hispanic Asian families spend the most on clothing, followed by Non-Hispanic White and Hispanic households, while Non-Hispanic Black households spend the least. These variations suggest that race and ethnicity capture meaningful differences in income, household structure, and cultural spending patterns. Including this variable is important given current demographic trends: the U.S. immigrant population grew by about 1.6 million people in 2023, increasing the racial and ethnic diversity of households. As the population becomes more diverse, understanding spending differences across groups becomes useful for businesses, policymakers, and nonprofits seeking to identify consumer needs and economic disparities. (Pew Research Center, 2024)

```
Residuals:
    Min      1Q  Median      3Q     Max
-5.6867 -0.6869  0.0705  0.7316  5.4977

Coefficients:
                           Estimate Std. Error t value Pr(>|t|)
(Intercept)                2.316060   0.090171  25.685  < 2e-16 ***
log(income)                0.242637   0.008467  28.658  < 2e-16 ***
agegroup_ref35-44          0.030689   0.023563   1.302 0.192784
agegroup_ref45-54         -0.040781   0.023763  -1.716 0.086147 .
agegroup_ref55-64         -0.159138   0.023464  -6.782 1.22e-11 ***
famsizecap2                0.238870   0.023577  10.131  < 2e-16 ***
famsizecap3                0.432376   0.026386  16.387  < 2e-16 ***
famsizecap4                0.594043   0.027541  21.570  < 2e-16 ***
famsizecap5+               0.703436   0.029709  23.678  < 2e-16 ***
raceethnicity_refNHAsian  -0.097009   0.038005  -2.553 0.010701 *
raceethnicity_refNHBlack   0.081060   0.032058   2.529 0.011461 *
raceethnicity_refNHOther  -0.040616   0.055796  -0.728 0.466667
raceethnicity_refNHWhite  -0.089968   0.023159  -3.885 0.000103 ***
factor(year)2020          -0.074993   0.016224  -4.622 3.82e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.098 on 18416 degrees of freedom
Multiple R-squared:  0.1283,    Adjusted R-squared:  0.1276
F-statistic: 208.4 on 13 and 18416 DF,  p-value: < 2.2e-16
```

At the 5% significance level, income, family size, several race/ethnicity categories, the 55–64 age group, and the year 2020 are statistically significant. Income has a **positive** association with clothing expenditure. Family size also shows a **positive** relationship across all categories, indicating higher spending as households grow. For age, only the 55–64 group shows a **decrease** relative to the baseline. In terms of race and ethnicity, NH Asian and NH White households spend **less**, while NH Black households spend **more**, compared to Hispanic households. NH Other shows no meaningful difference.

The income elasticity of clothing expenditure is **0.2426**, meaning that a 1% increase in income leads to only a 0.24% increase in clothing spending. This indicates that clothing is a **necessity good**, with spending rising less than proportionally to income.

For the year effects, the coefficient for **2020** is negative and statistically significant, showing that clothing expenditure **declined** during the COVID-19 pandemic, holding other variables constant. This decline aligns with nationwide reductions in apparel purchases due to stay-at-home policies, reduced social activity, and increased economic uncertainty.

REFERENCES

Barua, A. (2021, June 28). *A spring in consumers' steps: Americans prepare to get back to their spending ways*. Deloitte Insights. https://www.deloitte.com/us/en/insights/topics/economy/us-economic-forecast/us-consumer-spending-after-covid.html

Foster, A. C. (2015). *Consumer expenditures vary by age.* U.S. Bureau of Labor Statistics. https://www.bls.gov/opub/btn/volume-4/consumer-expenditures-vary-by-age.htm

Pew Research Center. (2024, September 27). *U.S. immigrant population in 2023 saw largest increase in more than 20 years.* https://www.pewresearch.org/short-reads/2024/09/27/u-s-immigrant-population-in-2023-saw-largest-increase-in-more-than-20-years/

U.S. Bureau of Labor Statistics. (n.d.). *Consumer Expenditure Survey: Public-use microdata*. Retrieved June 9, 2023, from https://www.bls.gov/cex/pumd_data.htm

R CODE:

```
## This project is about analysing how the expenditures were affected by the COVID in 2020 and the inflation in 2022-2023. How clothing expenditures are affected by income and family demographics.


#append two tada set into CE1923

CE1923<-rbind(CE2023,CE19)

table(EGR1823$saleyear)


#filter data in income and age of the head of the family

CE2<- subset(CE1923, income<3000000 & income>0 & age_ref<65 & age_ref>24)


#mean income and education by gender

library(vtable)

st(CE1923,
vars=c("housing","food","transportation","health","entertainment","education","clothing","retpenpins","utilities","foodhome","foodaway","vehiclefuel","medicalcare","homefurnishing","travel"), summ=c("mean(x)"), group="year", factor.numeric =TRUE,title = "Table 1: Summary Statistics")


#summary table comparing expenditure across years

library(dplyr)

summary_table <- CE2 %>%
  group_by(year) %>%
  summarize(
    mean_expenditure = mean(clothing, na.rm = TRUE),
    median_expenditure = median(clothing, na.rm = TRUE),
    sd_expenditure = sd(clothing, na.rm = TRUE),
    n = n()
  )


summary_table


# graph 1 means of clothing expenditures across year-quarters

library(dplyr)

library(ggplot2)


CE2 <- CE2 %>%
```

```
  mutate(year_quarter = paste0(year, " Q", quarter))

# Compute means
expenditure_yq <- CE2 %>%
  group_by(year_quarter) %>%
  summarize(mean_exp = mean(clothing, na.rm = TRUE))

expenditure_yq_clean <- expenditure_yq %>% filter(!is.na(mean_exp))

ggplot(expenditure_yq_clean, aes(x = year_quarter, y = mean_exp, group = 1)) +
  geom_line() +
  geom_point() +
  labs(
    title = "Figure 1: Mean Clothing Expenditure Across Year-Quarters",
    x = "Year-Quarter",
    y = "Mean Expenditure ($)"
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))



#graph 2 means of income across years
income_year <- CE2 %>%
  group_by(year) %>%
  summarize(mean_income = mean(income, na.rm = TRUE))

ggplot(income_year, aes(x = year, y = mean_income)) +
  geom_line() +
  geom_point() +
  labs(
    title = "Figure 2: Mean Income Across Years",
    x = "Year",
    y = "Mean Income ($)"
  )
```

```
#graph 3 mean expenditure by income bracket - we want to check if spending rises with income
ggline(data=CE2, x="incomebracket25k",y="clothing",
       add = "mean",
       ylab= "Mean Clothing Expenditure",
       xlab= "Income Bracket ($25k)")+
  ggtitle("Figure 3: Clothing Expenditure compared with Income Bracket")+
  rotate_x_text()

#graph 4 mean expenditure by agegroup
ggline(data=CE2, x="agegroup_ref",y="clothing",
       add = "mean",
       ylab= "Mean Clothing Expenditure ",
       xlab= "Age Group")+
  ggtitle("Figure 4: Mean Clothing Expenditure compared with Age Group")+
  rotate_x_text()

#graph 5 mean expenditure by family size
ggline(data=CE2, x="famsizecap",y="clothing",
       add = "mean",
       ylab= "Mean Clothing Expenditure",
       xlab= "Family Size")+
  ggtitle("Figure 5: Mean Clothing Expenditure compared with Family Size")

#graph 6 mean expenditure by raceethnicity_ref
ggbarplot(data= CE2, x = "raceethnicity_ref", y = "clothing",
          add = "mean", label = TRUE, lab.nb.digit = 0,
          ylab = "Mean Clothing Expenditure", xlab = "Race & Ethnicity") +
  ggtitle("Figure 6: Mean Clothing Expenditure compared with Race and Ethnicity")

#regression
CE2$logincome <- log(CE2$income)
CE2 <- na.omit(CE2)   #removes rows with NaN or -Inf

model <- lm(data = CE2,log(clothing) ~ log(income) +
```

```
    agegroup_ref +
    famsizecap +
    raceethnicity_ref +
    factor(year),
  subset = clothing>0 & income>0)

summary(model)
```

USE OF AI

Below are examples of the types of prompts I used when consulting AI during this project.

- “This part of the graph is not working why am I getting this warning in R?”
- “How do I output the graph with a squared background in ggplot?”
- “This is the lab I need to do what are the main requirements I can’t forget?”
- “Explain the rubric so I know what each section is asking for.”
- “Can you grade my draft based on the rubric and tell me what I can improve?”
- “How do I format this citation in APA style?”
- “Correct any grammar mistake.”

Sources:

- Chat gpt
- Perplexity
- Gemini