

Demographics of Time Poverty: An Analysis of Gender Disparity and Temporal Stability in U.S. Time Use (2020–2024)

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Abstract

This study assesses the **gender disparity** and **temporal stability** of **time poverty** using five years of pooled data (2020–2024) from the American Time Use Survey (ATUS) [1]. Time-poverty is rigorously defined as the intersection of insufficient time for necessary self-maintenance (Personal Care) and discretionary enjoyment (Leisure Time), quantified by the 25th percentile of each distribution. Pearson’s χ^2 test and the Mantel-Haenszel (MH) test were employed to evaluate the hypotheses. Results show no statistically significant change in the absolute prevalence of time-poverty over the 2020–2024 period ($\chi^2 = 3.25, p = 0.5176$). However, a highly significant gender disparity exists, with the odds of a male being time-poor being 21.1% lower than for a female (Common OR = 0.789; 95% CI: 0.733–0.850). These findings establish that time poverty is a stable, gendered phenomenon during this period.

1 Introduction

Time is a fundamental resource, and its scarcity, known as time-poverty, impacts health, well-being, and economic mobility. While research often focuses on time spent in paid and unpaid work, time poverty is defined here as a deficit in time available for both essential self-maintenance and discretionary leisure. This paper investigates two main questions using pooled data from the American Time Use Survey (ATUS, 2020–2024) [1]: 1) Has the **absolute prevalence** of time poverty changed between 2020 and 2024? and 2) Is there a significant, stable **gender disparity** in the odds of experiencing time poverty across this period?

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2 Methods

2.1 Data

The **American Time Use Survey (ATUS)** is a U.S. government survey, designed to measure the amount of time people spend on various activities (e.g., paid work, childcare, socializing) [1]. The analysis in this study uses a pooled sample of ATUS data from **2020–2024** [2][3], comprising **42,222** individual-day observations. Each data point includes key demographic and time variables: **YEAR**, **CASEID**, **REGION**, **SEX**, **Leisure**, and **Personal_Care_Comp**.

The last two composite time variables record time spent (in minutes) daily on activities in their respective categories:

1. **Leisure**: Records time spent on Socializing, Relaxing, Sports/Exercise, Recreation, Volunteer Activities, related travel, Shopping (except groceries, food, and gas) and Researching Purchases.
2. **Personal_Care_Comp**: Records time spent on essential self-maintenance (Personal Care, Medical Services, Eating and Drinking), and uniquely includes Religious and Spiritual Activities.

These two composite time variables were used to calculate the time poverty thresholds in the study.

2.2 Time-Poverty Threshold

Two absolute thresholds were established using the 25th percentile (Q_1) of the pooled (2020–2024) minute distributions for Personal Care (P) and Leisure Time (L). An individual is defined as

“Time Poor” if their daily time falls below both thresholds:

$$\text{Time Poor} = 1 \quad \text{if } (L \leq T_{\text{Leisure}}) \quad \text{AND} \quad (P \leq T_{\text{Personal Care}}) \quad (1)$$

Based on the pooled data, the absolute thresholds were determined to be:

- $T_{\text{Leisure}} = 190$ minutes
- $T_{\text{Personal Care}} = 575$ minutes

2.3 Statistical Tests

Three primary statistical tests were employed on the resulting categorical variables:

1. **Time-Poverty Prevalence Trend:** Pearson’s χ^2 test on a 2×5 contingency table (Time Poor \times Year) to assess temporal changes in absolute prevalence of time-poverty.
2. **Gender Association:** Pearson’s χ^2 test on a 2×2 table (Time Poor \times Gender) to test for Gender Time-Poverty association.
3. **Stratified Gender Effect:** The Mantel-Haenszel (MH) test on a $2 \times 2 \times 5$ contingency array (Time Poor \times Gender \times Year) to compute a common Odds Ratio (OR), assessing gender disparity controlled for yearly variation.

3 Results

3.1 Prevalence Trend Over Time (Time Poor \times Year)

This analysis tested the independence of time poverty prevalence and the year of observation using a 2×5 contingency table (Time Poor \times Year).

Hypothesis: $H_0: p_{2020} = p_{2021} = p_{2022} = p_{2023} = p_{2024}$, where p_{year} is the true proportion of Time-Poor people in that year.

Table 1: Time Poverty Status Counts by Year (2020–2024)

Status	2020	2021	2022	2023	2024
Not Time Poor	8,132	8,421	7,574	7,963	7,128
Time Poor	650	666	562	585	541

The Pearson’s χ^2 test yielded $\chi^2 - \text{stat} = 3.2458$, $p = 0.5176$. As the p -value exceeds 0.05, we **fail to**

reject H_0 , at 5% significance level. This indicates that the absolute rate of time poverty remained **statistically stable** across the five years.

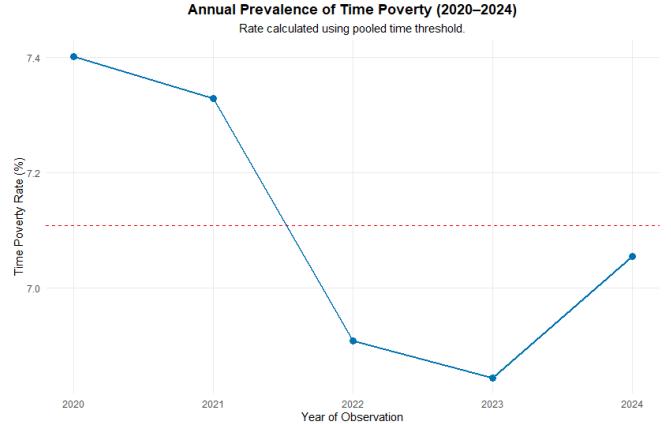


Figure 1: Rate of Time-Poverty by Year. The plot shows minor, non-significant fluctuations, supporting the stable prevalence conclusion.

3.2 Gender Disparity

3.2.1 Initial Association (Time Poor \times Gender) for Year 2024

This test established the initial relationship between gender and time-poverty for the 2024 sample, utilizing the pooled (2020–2024) threshold for Time-Poor classification.

Hypothesis: $H_0: p_{\text{male}} = p_{\text{female}}$, where p_{gender} is the true proportion of time-poor people of that gender.

Table 2: Time Poverty Status Counts by Gender for year 2024

Status	Male	Female
Not Time Poor	3,280	3,848
Time Poor	283	258

The Pearson’s χ^2 test yielded $\chi^2 - \text{stat} = 7.759$, $p = 0.005345$. We **reject H_0** at 5% level, confirming a **statistically significant association** between Gender and Time Poverty.

3.2.2 Stratified Odds Ratio (Mantel-Haenszel Test)

To quantify the gender effect while controlling for yearly variation, the Mantel-Haenszel test was per-

formed on the $2 \times 2 \times 5$ array (Time Poor \times Gender \times Year).

Hypothesis: $H_0: OR_{2020} = OR_{2021} = OR_{2022} = OR_{2023} = OR_{2024} = 1$, where OR_{year} is the gendered odds-ratio for that year.

Table 3: Gender \times Time Poverty Counts by Year (Stratified Data)

Status	2020	2021	2022	2023	2024
<i>Males</i>					
Not Time Poor	3,732	3,783	3,412	3,689	3,280
Time Poor	318	350	294	303	283
<i>Females</i>					
Not Time Poor	4,400	4,638	4,162	4,274	3,848
Time Poor	332	316	268	282	258

The MH test yielded $\chi^2_{\text{MH}} = 38.935$, $p = 4.381 \times 10^{-10}$. Hence, we **reject** H_0 at 0.01% level, confirming a **highly significant pooled association** between Gender and Time-Poverty.

Table 4: Mantel-Haenszel Common Odds Ratio: Gender Disparity in Time Poverty (2020–2024)

Comparison	Common OR	95% CI	<i>p</i> -value
Male vs. Female	0.7892	[0.7328, 0.8501]	< 0.0001

The common odds ratio of 0.7892 indicates that, controlling for the year, the odds of a Male experiencing time poverty were **21.1%** lower than the odds for a Female ($1 - 0.7892 = 0.2108$). The entire 95% CI: 0.733–0.850 is below 1.0, supporting the statistical significance of this result.

4 Conclusion

This study confirms two significant characteristics of time poverty defined by a dual deficit in personal care and leisure time: its **absolute temporal stability** and its **gender disparity**.

The χ^2 test for the time trend found no evidence that the proportion of the population facing the most time constraints changed significantly between 2020 and 2024.

On the other hand, the MH test revealed a robust gender disparity: the **odds of a Male being classified as “time-poor” were 21.1% lower than for a Female**, even after accounting for yearly variations.

References

- [1] Bureau of Labor Statistics (BLS). American time use survey (atus). <https://www.bls.gov/tus/>, 2024. Accessed: November 2025.
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