

# Association of Inflation-related Stress with Depression and Anxiety among Older Adults

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## Abstract

### Objectives:

To analyze the association of stress due to price increases with anxiety and depression among older adults in the US using near real-time survey data.

### Method:

Cross-sectional study using Census Household Pulse Survey data collected between Jan 4-Jan 16, 2023. The study sample included older adults (age  $\geq 65$  years) without missing data on anxiety, depression, perception of inflation, the stress of price increases in the past two months, and health insurance (unweighted N=16,079 representing 47 million older adults). Depression and anxiety were measured using Patient Health Questionnaire-2 and two-item Generalized Anxiety Disorder-2 instruments, respectively. The associations were examined with Rao-Scott Chi-square tests and multivariable logistic regressions adjusted for demographics, social determinants of health, long-COVID, and COVID-19 vaccination.

### Results:

The majority of our study population were female (53.0%), aged between 65-74 years (72.9%), and non-Hispanic white (77.1%). Overall, 93.3% reported experiencing price increases, 31.4% and 28.9% reported price increases to be very and moderately stressful respectively. Among those who were very stressed, a higher percentage of adults reported anxiety (32.8% vs 2.4%) and depression (25.2% vs 1.8%) compared to those without any stress. In adjusted logistic regressions, those who were very stressed due to inflation had higher odds of anxiety (AOR=6.27, 95% CI=3.46, 11.34) and depression (AOR=5.47, 95% CI=2.91, 10.29).

### Discussion:

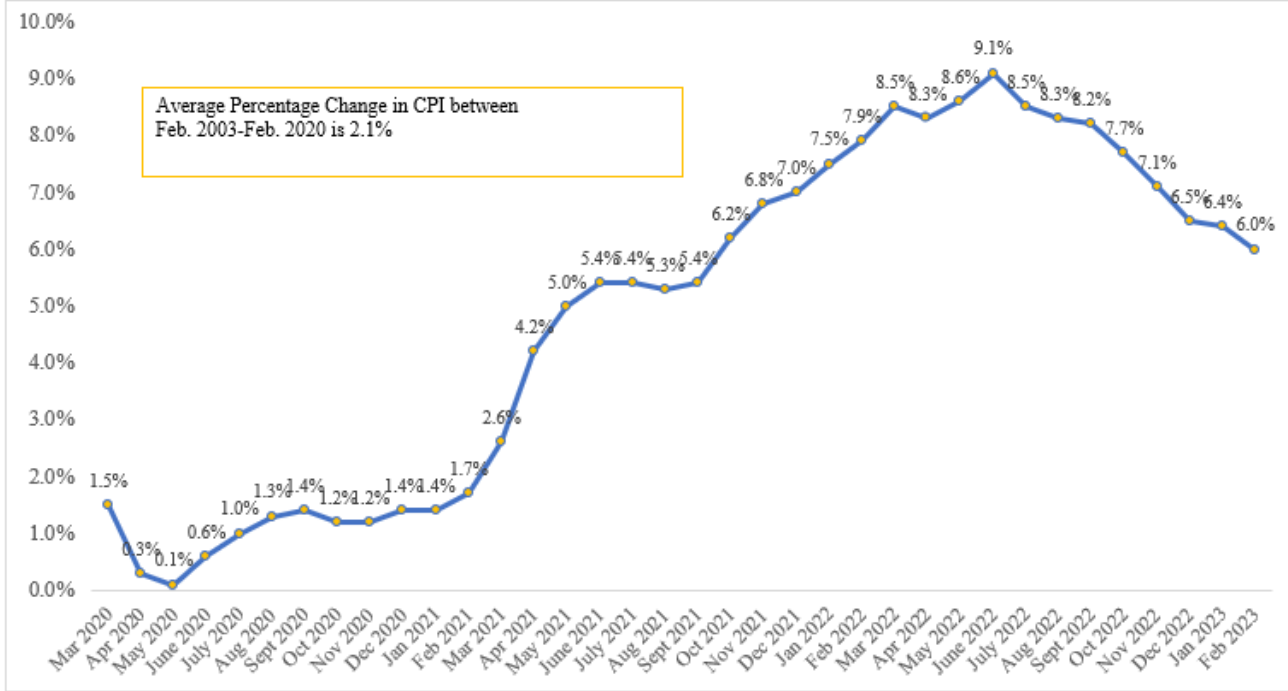
Those with high stress of price increases had higher odds of depression and anxiety. Policies have to address the rise in demand for mental health care in the near future.

**Keywords:** mental health; socioeconomic status; observational studies; perceived inflation

## Introduction

Financial affordability of goods and services can be influenced by unexpected personal and external events such as the COVID-19 pandemic, economic crisis, and inflation. In the United States (US), which has already impacted by the COVID-19 pandemic, inflation has surged since early 2021, reaching a peak of 9.1% in June 2022, and remaining

around 6.0% in February 2023 (Figure 1). Since World War II, there have been six periods (1946-48, 1950-51, 1969-71, 1973-82, 1989-1991 and 2008) in which inflation—as measured by CPI—was 5% or higher (Rouse et al., 2021).



Data Source: <https://www.bls.gov/charts/consumer-price-index/consumer-price-index-by-category-line-chart.htm>

**Figure 1:** 12-month Percentage Change in Consumer Price Index (CPI), All Items, Mar 2020–Feb 2023

Many studies have reported that financial stress can lead to poor mental health such as depression and anxiety (Guan et al., 2022; Ridley et al., 2020). Inflation erodes purchasing power of income and raise uncertainty about future prices and adversely impact the physical and mental health of the economically disadvantaged population. Recent studies documented that inflation has psychological impacts such as depression, tension and anxiety among in developing countries (Naz et al., 2012). However, no study on the association between inflation and mental health in the US using real-world data exists in the past 30 years, as there was no persistent inflation between 1992 and 2020 in the country. Dating back to 1976, a seminal survey of almost 2000 families found more than one-fourth families reported that financial pressures due to inflation had damaged their mental health (Caplovitz, 1981). The author measured inflation in two ways: objective inflation, which measures the extent income falls behind prices; and subjective inflation, which measures the degree to which it is hurting because of inflation. The study found 59 percent of families reported income fallen behind prices, while 52 percent of families experienced subjective inflation crunch.

Older adults are vulnerable to negative financial shocks due to their unique circumstances, such as income drops upon retirement and high healthcare expenditures that is paid out-of-pocket. A prospective cohort study found negative wealth shock is associated with all-cause-mortality among adults aged 51 and older (Pool et al., 2018). During the Great Recession of 2008, unemployment and decrease in income were associated with an increase in depressive symptoms among older adults (Hawkey et al., 2020; Wilkinson, 2016). Inflation shock may negatively affect older adults because they may delay or forego essential medical and basic care to cope with the price increases. Despite the well-established association between financial stress and decreased mental health, the impact of inflation on the mental well-being of older adults has been rarely studied due to the lack of observational data. Understanding the relationship between inflation related stress and mental health among older adults is particularly important during the COVID-19 pandemic, as older adults already have higher risks of severe complications from virus infections and have experienced increased loneliness during the pandemic (Emerson, 2020).

In this study, we used data from near real-time nationwide survey to examine the association of stress due to price increases with anxiety and depression among older adults (age ≥ 65 years) in the US during January 4th and January 16, 2023. We selected the time period based on consistent decline in inflation rates for 6 months and recency of data. We used subjective inflation measure from the survey as previous study documented difference in subjective and objective inflation measures among the retired population (Caplovitz, 1981).

**Methods**

**Study Design and Data Source**

We adopted a cross-sectional analysis of data from the online Household Pulse Survey (HPS) collected between Jan 4-Jan 16, 2023 (week 53). The U.S. Census Bureau, in partnership with 16 additional federal agencies, carries out the HPS to examine the impact of COVID-19 and other emergent concerns on the lives of American families. The HPS is structured for rapid and effective deployment, gathering information to assess household experiences throughout the COVID-19 pandemic and recovery phase. The collected data is shared promptly to support federal and state response and recovery strategies. The survey has been conducted regularly, on a weekly basis from April 23, 2020, until September 2021 and then biweekly starting from October 2021. Since October 2022, HPS has also collected data on perception of price change and stress of price increase.

**Analytical Sample**

The study was restricted to older adults (ages 65 or older) with health insurance. Respondents with missing data in anxiety or depression, perception of inflation and stress of price increase were excluded. The study sample included 16,079 individuals representing 46,954,005 older adults in the US population.

**Measures**

**Dependent Variables**

Anxiety and depression are the dependent variables. Anxiety was measured using the following questions: “Over the last 2 weeks, how

often have you been bothered by 1. Feeling nervous, anxious, or on edge? 2. Not being able to stop or control worrying?" The responses include not at all (score 0), several days (1), more than half the days (2) and nearly every day (3). The two-item Generalized Anxiety Disorder (GAD-2) scale the score was calculated by adding score for each question. A score of  $\geq 3$  points was considered as anxiety (Donker et al., 2011). Depression was measured by the Patient Health Questionnaire-2 (PHQ-2) score using the following questions: "Over the last 2 weeks, how often have you been bothered by 1. Little interest or pleasure in doing things? 2. Feeling down, depressed, or hopeless?" The responses include not at all (score 0), several days (1), more than half the days (2) and nearly every day (3). A total score of 3 or greater was considered as depression (Kroenke et al., 2003).

#### Key Explanatory Variable: Stress Due to Inflation

The key explanatory variable was stress due to inflation. The HPS queried respondents "in the area where you live and shop, do you think the prices for goods and services have changed in the last two months?". People who perceived a price increase were queried "How stressful, if at all, has the increase in prices in the last two months been for you?" The choices were: 1) Very stressful; 2) Moderately stressful; 3) A little stressful; and 4) Not at all stressful. We combined the two questions and created a 5-category variable consisting of the level of stress and a category for those who perceived prices "declined, no change, and do not know".

#### Other Explanatory Variables

Demographic variables were defined as age groups (65 – 74 years, 75 years or older), gender (female, male, transgender), race and ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic/Latino, Non-Hispanic Asian, and other), marital status (married, widowed, separated/divorced, and never married). Other socioeconomic variables included education (less than high school, high school, some college, associate degree and college), income (including 8 categories ranging from less than \$25,000 to greater than \$200,000), food insufficiency (low/very low, no food insufficiency), difficulty in paying for household

expenses in the last 7 days (very difficult, somewhat difficult, little difficult, not difficult), region (North East, South, Midwest, West), and private health insurance coverage (yes/no). In addition, we included COVID-19 vaccination (yes/no) and long COVID (long COVID, no long COVID, no COVID).

#### Statistical Analysis

We examined the associations between categorical variables and Anxiety and Depression using Rao-Scott chi-square tests. Three nested multivariable logistic regression models were designed to analyze the association between stress due to inflation with anxiety and depression after adjusting for other variables. Each model adjusted for different factors: Model 1 adjusted for difficulties in paying for household expenses in the last 7 days. Model 2 adjusted for age, gender, race and ethnicity, education, income, food insufficiency, and difficulties in paying for household expenses in the last 7 days, insurance type, marital status, region, long COVID, and COVID-19 vaccination. Model 3 included all factors from Model 2 and additionally adjusted for comorbid anxiety and depression. All analyses utilized SAS survey procedures, incorporating the jackknife method and replicate survey weights (SAS, 2017).

#### Results

We described the characteristics of our study sample of 16,079 older adults in Table 1. A majority of the individuals were female (53.0%), aged between 65-74 years (72.9%), and non-Hispanic white (NHW, 77.1%). Most individuals were married (63.3%) and nearly one-third had a college education (33.1%). The income distribution was dispersed, with 13.1% of individuals earning less than \$25,000, and 4.7% earning \$200,000 or more and most of the individuals earning between \$50,000 - \$74,999. An overwhelming majority (92.6%) had COVID-19 vaccine and 9.6% reported long COVID, while 30.6% did not have long COVID and 59.1% did not contract COVID-19 at all.

	N	Wt N	wt %
<b>ALL</b>	16,079	46,954,005	100.0
<b>Gender</b>			
Female	8,559	24,875,671	53.0
Male	7,329	21,375,544	45.5
Transgender	191	702,790	1.5
<b>Age</b>			
65 – 74 years	11,367	34,250,166	72.9
75 years or Older	4,712	12,703,839	27.1
<b>Race and Ethnicity</b>			
NHW	13,539	36,218,583	77.1
NHB	912	3,918,567	8.3
Hispanic	786	4,071,269	8.7
Asian	438	1,499,985	3.2
Other race	404	1,245,601	2.7
<b>Marital Status</b>			
Married	9,263	29,718,823	63.3
Widowed	2,313	6,043,193	12.9
Divorced/Separated	3,420	8,806,904	18.8
Never Married	993	2,137,838	4.6
<b>Education</b>			
Less than High School	254	2,938,922	6.3
High School	1,993	15,493,884	33.0
Some College	3,450	8,584,849	18.3
Associate degree	1,683	4,398,211	9.4
College	8,699	15,538,138	33.1

<b>Income</b>				
	Less than \$25,000	1,748	6,162,045	13.1
	\$25,000 - \$34,999	1,671	5,515,636	11.7
	\$35,000 - \$49,999	2,002	6,102,745	13.0
	\$50,000 - \$74,999	2,984	8,788,838	18.7
	\$75,000 - \$99,999	2,295	6,393,947	13.6
	\$100,000 - \$149,999	2,258	5,663,541	12.1
	\$150,000 - \$199,999	1,062	2,498,293	5.3
	\$200,000 and higher	1,027	2,191,875	4.7
<b>Food Insecurity</b>				
	Low/Very low	608	2,496,752	5.3
	No Food Insecurity	15,414	44,182,125	94.1
<b>Region</b>				
	Northeast	2,261	8,277,932	17.6
	South	5,157	17,832,520	38.0
	Midwest	3,403	10,073,100	21.5
	West	5,258	10,770,453	22.9
<b>COVID-19 Vaccine</b>				
	Yes	15,054	43,467,668	92.6
	No	941	3,251,295	6.9
<b>Long COVID</b>				
	Long COVID	1,415	4,502,071	9.6
	No long COVID	4,909	14,358,246	30.6
	No COVID	9,623	27,762,774	59.1
<b>Private Health Insurance</b>				
	Yes	10,621	30,271,928	69.6
	No	4,266	13,236,255	30.4

Notes: Based on 16,079 older adults (≥ 65 years) with health insurance, with no missing data on price change, stress due to price increase, anxiety, and depression variables. Missing data in marital status, food insecurity, income, COVID-19 vaccine, long COVID, private health insurance are not included in the table.

COVID: Coronavirus Disease; NHB: Non-Hispanic Black; NHW: Non-Hispanic White; Wt: Weighted

**Table 1: Description of Older Adults (Age ≥ 65 years), Census Household Pulse Survey, January 04 - January 16, 2023**

Table 2 summarizes the characteristics of individuals by stress of price changes in the last two months. Nearly one-third of the individuals reported being very stressful due to price changes (31.4%). 29.0% of the individuals reported being moderately stressful, 23.7% of the individuals reported being little stressful and 9.3 % of the individuals reported that they were not feeling stress. A small proportion of individuals reported

that there was no price change (6.7%). The majority of the respondents (57.0%) who were very concerned about the price increase in the next 6 months reported high stress. On the other hand, respondents who were not at all concerned showed the least level of stress with only 0.8% reporting as very stressful.

**Table 2: Description of Older Adults (Age ≥ 65 years) by Stress of Price Changes in the last two months Census Household Pulse Survey, January 04 - January 16, 2023**

	Very Stressful		Moderately stressful		Little Stress		No Stress		No Price Change		chisqval	chisqp
	N	Row wt %	N	Row wt %	N	Row wt %	N	Row wt %	N	Row wt %		
<b>ALL</b>	<b>4,139</b>	<b>31.4</b>	<b>4,537</b>	<b>29.0</b>	<b>4,399</b>	<b>23.7</b>	<b>1,730</b>	<b>9.3</b>	<b>1,274</b>	<b>6.7</b>		
<b>Paying for Household Expenses last 7 days</b>											2,010.737	<0.001
Very Difficult	1,141	86.5	106	7.1	20	1.7	6	0.7	22	4.0		
Somewhat Difficult	1,511	57.5	877	32.8	209	6.5	21	0.7	63	2.5		
Little Difficult	1,125	29.3	1,959	43.7	918	21.6	84	2.0	160	3.4		
Not Difficult	359	5.6	1,592	22.2	3,248	39.3	1,617	21.0	1,029	11.9		
<b>Gender</b>											41.179	<0.001
Female	2,453	33.6	2,541	30.5	2,294	22.7	731	8.0	540	5.1		

**Table 2: Description of Older Adults (Age ≥ 65 years) by Stress of Price Changes in the last two months Census Household Pulse Survey, January 04 - January 16, 2023**

		Very Stressful		Moderately stressful		Little Stress		No Stress		No Price Change			
		N	Row wt %	N	Row wt %	N	Row wt %	N	Row wt %	N	Row wt %	chisqval	chisqp
<b>ALL</b>		<b>4,139</b>	<b>31.4</b>	<b>4,537</b>	<b>29.0</b>	<b>4,399</b>	<b>23.7</b>	<b>1,730</b>	<b>9.3</b>	<b>1,274</b>	<b>6.7</b>		
Male		1,624	28.6	1,953	27.6	2,062	24.7	976	10.7	714	8.4		
Transgender		62	34.1	43	16.8	43	27.5	23	10.6	20	11.0		
<b>Age</b>												39.637	<0.001
65 – 74 years		3,139	33.6	3,193	28.9	3,010	22.5	1,114	8.3	911	6.6		
75 years or Older		1,000	25.2	1,344	29.2	1,389	26.9	616	11.8	363	6.9		
<b>Race and Ethnicity</b>												64.569	<0.001
NHW		3,257	28.8	3,837	30.0	3,818	24.7	1,484	9.6	1,143	7.0		
NHB		300	37.5	252	24.7	222	23.1	101	11.2	37	3.5		
Hispanic		309	41.7	220	27.4	158	17.8	55	4.9	44	8.2		
Asian		113	37.1	119	26.5	127	21.0	52	9.4	27	6.1		
Other race		160	46.6	109	22.7	74	17.9	38	8.0	23	4.8		
(Continued)													
<b>Marital Status</b>												75.771	<0.001
Married		2,035	28.1	2,600	29.4	2,747	25.8	1,113	9.7	768	7.0		
Widowed		725	36.1	646	25.9	589	23.7	209	8.8	144	5.5		
Divorced/Separated		1,107	37.9	1,001	30.8	776	17.2	292	8.4	244	5.7		
Never Married		245	34.9	257	23.7	269	21.3	107	9.9	115	10.2		
<b>Education</b>												221.271	<0.001
Less than High School		106	38.9	74	29.4	46	19.5	13	3.0	15	9.2		
High School		762	38.2	625	32.0	375	17.3	146	8.2	85	4.2		
Some College		1,210	37.6	1,030	27.3	778	22.6	236	7.2	196	5.3		
Associate Degree		555	34.2	526	30.0	381	23.4	130	7.2	91	5.2		
College		1,506	18.8	2,282	26.6	2,819	31.4	1,205	13.2	887	9.9		
<b>Income</b>												694.664	<0.001
Less than \$25,000		861	51.5	468	26.2	239	11.5	88	5.2	92	5.6		
\$25,000 - \$34,999		696	46.4	536	31.1	288	15.7	71	3.9	80	2.9		
\$35,000 - \$49,999		657	37.6	638	30.0	472	22.4	132	5.3	103	4.7		
\$50,000 - \$74,999		723	27.9	953	33.1	839	25.4	249	7.8	220	5.8		
\$75,000 - \$99,999		405	22.8	672	31.3	757	27.0	270	11.9	191	7.0		
\$100,000 - \$149,999		271	16.1	572	27.1	831	33.5	355	12.8	229	10.4		
\$150,000 - \$199,999		100	9.1	238	27.9	394	33.1	206	20.2	124	9.7		
\$200,000 and higher		78	8.1	166	17.8	352	35.2	262	24.1	169	14.8		
(Continued)													
<b>Food Insecurity</b>												301.230	<0.001
Low/Very low		499	81.1	63	11.7	23	2.7	9	2.0	14	2.5		
No Food Insecurity		3,620	28.4	4,455	30.1	4,363	24.9	1,719	9.7	1,257	7.0		
<b>Region</b>												28.382	0.005
Northeast		512	29.4	636	30.3	671	25.3	253	8.5	189	6.5		
South		1,492	34.4	1,477	29.3	1,329	21.5	500	8.4	359	6.4		
Midwest		830	27.6	965	30.4	976	25.2	364	9.8	268	6.9		
West		1,305	31.3	1,459	26.2	1,423	24.4	613	10.8	458	7.2		
<b>COVID-19 Vaccine</b>												155.216	<0.001
Yes		3,637	29.6	4,240	29.3	4,253	24.4	1,672	9.6	1,252	7.0		
No		468	53.4	273	25.5	128	14.0	51	4.1	21	3.0		
<b>Long COVID</b>												109.462	<0.001
Long COVID		531	45.0	439	28.4	309	18.6	67	4.1	69	3.8		
No long COVID		1,007	25.5	1,368	28.8	1,523	28.1	597	10.7	414	6.8		
No COVID		2,556	32.1	2,690	29.2	2,535	22.3	1,059	9.4	783	7.1		

**Table 2: Description of Older Adults (Age ≥ 65 years) by Stress of Price Changes in the last two months Census Household Pulse Survey, January 04 - January 16, 2023**

	Very Stressful		Moderately stressful		Little Stress		No Stress		No Price Change		chisqval	chisqp
	N	Row wt %	N	Row wt %	N	Row wt %	N	Row wt %	N	Row wt %		
<b>ALL</b>	<b>4,139</b>	<b>31.4</b>	<b>4,537</b>	<b>29.0</b>	<b>4,399</b>	<b>23.7</b>	<b>1,730</b>	<b>9.3</b>	<b>1,274</b>	<b>6.7</b>		
<b>Private Health Insurance</b>											45.359	<0.001
Yes	2,508	28.6	2,998	29.7	3,014	24.6	1,239	10.4	862	6.7		
No	1,318	37.1	1,206	27.6	1,060	21.9	360	6.9	322	6.6		

Notes: Based on 16,079 older adults (≥ 65 years) with health insurance, with no missing data on price change, stress due to price increase, anxiety, and depression variables. Missing data in paying for household expenses, marital status, food insecurity, income, COVID-19 vaccine, long COVID, private health insurance are not included in the table. Rao-Scott Chi-squared test was used to determine significant group differences by stress of price changes in the last two months.

Chisqp: Chi-square probability; Chisqval: Chi-square value; COVID: Coronavirus Disease; NHB: Non-Hispanic Black; NHW: Non-Hispanic White; Wt: Weight

We identified subgroup differences in the stress of price changes. All the social determinants of health (SDoH) were highly statistically significant with stress of price changes. We observed that transgender group with the highest rate of high stress at 34.1% followed by females at 33.6% and males having less percentage at 28.6%. In terms of age, the individuals between 65 – 74 years had the highest rate of stress 33.6%. With respect to race and ethnicity, we found that individuals who selected other had high stress at 46.6% followed by Hispanics at 41.7% compared to Non-Hispanic Blacks at 37.5%, Asians at 37.1% and Non-Hispanic Whites at 28.8%. In terms of marital status, married individuals reported lower levels of stress, with 28.1% experiencing very stressful situations while never married group had lower levels of moderate stress 23.7%. College-educated individuals had the lowest prevalence of stress due to price changes at 18.8% and all the other categories had higher stress which is about 30%. Food insufficiency is highly associated with stress due to price changes, with more than 80% of individuals having food insecurity reporting stress. Health insurance is associated with lower stress (28.6 %

among insured compared to 37.1 % among uninsured). Older adults with long COVID had a significantly higher rate of stress at 45.0 % compared with those with no long COVID (25.5 %) and no COVID (32.1 %).

Table 3 presents the description of older adults who are affected by anxiety and depression due to stress of price changes. Most of the individuals reported that they had anxiety (16.1%) and 12.1 % of the individuals reported that they had depression. Individuals who found it very difficult to pay for household expenses in the past week had the highest rates of anxiety (50.0%) and depression (40.8%). Anxiety (57.2%) and depression (48.4%) were notably higher among individuals experiencing low or very low food security. Long COVID is associated with anxiety (26.3 %) and depression (21.8%). The table further reveals that older adults with depression had a 73.5% rate of anxiety, while those without depression had an 8.1% rate of anxiety. Similarly, older adults with anxiety had a 55.4% rate of depression, while those without anxiety had a 3.8% rate of depression.

**Table 3: Description of Older Adults (Age ≥ 65 years) by Anxiety and Depression Census Household Pulse Survey, January 04 - January 16, 2023**

	With Anxiety				With Depression			
	N	Row wt %	chisqval	chisqp	N	Row wt %	chisqval	chisqp
<b>ALL</b>	<b>2,249</b>	<b>16.1</b>			<b>1,722</b>	<b>12.1</b>		
<b>Perception of Price Change last two months</b>			21.892	<0.001			9.909	0.002
Price Increased	2,162	16.7			1,657	12.5		
No	87	7.8			65	6.9		
<b>Stress of Price Increase</b>			659.693	<0.001			426.995	<0.001
Very Stressful	1,361	32.8			1,037	25.2		
Moderate	530	12.8			399	8.6		
Little Stress	234	5.5			185	4.5		
No Stress	37	2.4			36	1.8		
No Price change	87	7.8			65	6.9		
<b>Price Increase next 6 months</b>			369.354	<0.001			417.044	<0.001
Very Concerned	1,718	24.9			1,317	19.1		
Somewhat Concerned	338	9.0			250	5.7		
Little Concerned	143	3.9			118	3.2		
Not at all Concerned	43	4.3			31	3.8		

**Table 3: Description of Older Adults (Age ≥ 65 years) by Anxiety and Depression  
Census Household Pulse Survey, January 04 - January 16, 2023**

		With Anxiety				With Depression			
		N	Row wt %	chisqval	chisqp	N	Row wt %	chisqval	chisqp
<b>ALL</b>		<b>2,249</b>	<b>16.1</b>			<b>1,722</b>	<b>12.1</b>		
<b>Paying for Household Expenses last 7 days</b>				765.951	<0.001			578.862	<0.001
	Very Difficult	653	50.0			524	40.8		
	Somewhat Difficult	657	23.5			486	18.0		
	Little Difficult	539	13.7			397	9.0		
	Not Difficult	398	5.3			312	4.0		
<b>Gender</b>				36.999	<0.001			6.040	0.049
	Female	1,414	18.9			1024	13.2		
	Male	798	12.7			677	10.8		
	Transgender	37	19.6			21	12.2		
<b>Age</b>				15.396	<0.001			12.556	<0.001
	65 – 74 years	1,728	17.3			1297	12.9		
	75 years or Older	521	12.8			425	9.9		
<b>Race and Ethnicity</b>				16.148	0.003			35.048	<0.001
	NHW	1,834	15.1			1386	10.8		
	NHB	140	17.5			111	12.9		
	Hispanic	155	24.0			135	23.3		
	Asian	37	13.5			34	12.2		
	Other race	83	17.0			56	12.2		
	(Continued)								
<b>Marital Status</b>				30.348	0.000			32.968	<0.001
	Married	1,041	14.2			732	10.4		
	Widowed	353	16.8			307	13.2		
	Divorced/Separated	672	20.7			544	16.7		
	Never Married	165	19.7			122	13.6		
<b>Education</b>				39.829	<0.001			36.699	<0.001
	Less than High School	59	22.1			50	18.0		
	High School	352	18.1			272	13.7		
	Some College	617	17.6			488	13.4		
	Associate Degree	294	19.2			237	15.5		
	College	927	11.2			675	7.7		
<b>Income</b>				176.753	<0.001			135.192	<0.001
	Less than \$25,000	480	28.0			379	22.4		
	\$25,000 - \$34,999	370	23.7			292	17.9		
	\$35,000 - \$49,999	349	18.4			286	13.6		
	\$50,000 - \$74,999	370	14.9			281	11.2		
	\$75,000 - \$99,999	232	11.8			154	9.1		
	\$100,000 - \$149,999	180	7.8			128	5.7		
	\$150,000 - \$199,999	61	5.7			53	4.3		
	\$200,000 and higher	62	7.4			46	5.6		
<b>Food Insecurity</b>				223.725	<0.001			337.964	<0.001
	Low/Very low	333	57.2			290	48.4		
	No Food Insecurity	1,904	13.7			1423	10.1		
<b>Region</b>				9.005	0.029			18.729	<0.001

**Table 3: Description of Older Adults (Age ≥ 65 years) by Anxiety and Depression  
Census Household Pulse Survey, January 04 - January 16, 2023**

		With Anxiety				With Depression			
		N	Row wt %	chisqval	chisqp	N	Row wt %	chisqval	chisqp
<b>ALL</b>		<b>2,249</b>	<b>16.1</b>			<b>1,722</b>	<b>12.1</b>		
	Northeast	334	17.6			234	12.6		
	South	766	17.1			617	13.5		
	Midwest	405	13.0			278	8.0		
	West	744	16.0			593	13.4		
<b>COVID-19 Vaccine</b>				6.552	0.038			6.187	0.045
	Yes	2,051	15.8			1565	11.9		
	No	188	19.9			152	15.5		
	(Continued)								
<b>Long COVID</b>				79.823	<0.001			84.177	<0.001
	Long COVID	352	26.3			271	21.8		
	No long COVID	454	10.6			323	7.2		
	No COVID	1,424	17.2			1116	13.1		
<b>Private Health Insurance</b>				20.445	<0.001			27.436	<0.001
	Yes	1,341	14.1			1000	9.9		
	No	722	19.3			584	16.2		
<b>Depression</b>				817.269	<0.001				
	Yes	1,238	73.5						
	No	1,011	8.1						
<b>Anxiety</b>								817.269	<0.001
	Yes					1,238	55.4		
	No					484	3.8		

Notes: Based on 16,079 older adults (≥ 65 years) with health insurance, with no missing data on price change, stress due to price increase, anxiety, and depression variables. Missing data in perception price change, stress of price increase, price increase concern, paying for household expenses, marital status, food insecurity, income, COVID-19 vaccine, long COVID, private health insurance, anxiety, or depression are not included in the table. Rao-Scott Chi-squared test was used to determine significant group differences by Anxiety and Depression.

No Price change includes prices did not change, declined, and do not know responses.

Chisqp: Chi-square probability; Chisqval: Chi-square value; COVID: Coronavirus disease; NHB: Non-Hispanic Black; NHW: Non-Hispanic White; Wt: Weighted

Table 4 displays the results of adjusted logistic regression models analyzing the relationship between stress of price increase and paying for household expenses on anxiety and depression, comprising three distinct models each adjusted for different variables. In Model 1, stress from price increases showed a significant positive association with both anxiety and depression. The adjusted Odds Ratio (aOR) for anxiety and depression increased with stress levels, with very stressful exhibiting the highest AOR for anxiety (aOR=7.28, 95% CI= 4.04, 13.12) and depression (aOR= 6.32, 95% CI= 3.37, 11.84). In Model 2, the AORs for anxiety and depression decreased marginally compared to Model 1 but remained significant and exhibited a similar pattern. As in the previous model,

individuals had higher odds of anxiety (aOR =6.27, 95% CI= 3.46, 11.34) and depression (aOR =5.47, 95% CI= 2.91, 10.29) from stress due to inflation. In Model 3, the aORs for anxiety and depression further decreased compared to Model 2 but remained significant for most stress levels, except for anxiety and depression resulting from Little Stress [aOR = 1.59, 95% CI= 0.91 ,2.77 and aOR = 1.14, 95% CI= 0.80 ,1.61 respectively]. In all models, difficulty affording household expenses also demonstrated a significant positive association with anxiety and depression. In the fully adjusted model, those who reported high difficulty in meeting household expenses had the highest aOR for depression (aOR= 2.37, 95% CI= 1.49, 3.78) and anxiety (aOR =3.31, 95% CI= 2.26, 4.86).



**Table 4: Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI) from Separate Logistic Regressions on Anxiety and Depression among Older Adults (Age ≥ 65 years) Census Household Pulse Survey, January 04 - January 16, 2023**

	Anxiety				Depression			
	AOR	95% CI	chisqp	sig	AOR	95% CI	chisqp	sig
<b>Model 1</b>								
<b>Stress of Price Increase</b>								
Very Stressful	7.28	[ 4.04, 13.12]	<0.001	***	6.32	[ 3.37, 11.84]	<0.001	***
Moderate	3.77	[ 2.10, 6.79]	<0.001	***	3.21	[ 1.71, 6.01]	<0.001	***
Little Stress	2.01	[ 1.13, 3.58]	0.017	*	2.20	[ 1.19, 4.07]	0.012	*
No Stress (Ref)								
Not changed/Decreased/ Do not know	2.54	[ 1.25, 5.18]	0.010	*	2.88	[ 1.33, 6.24]	0.007	**
<b>Paying for Household Expenses last 7 days</b>								
Not Difficult (Ref)								
Little Difficult	1.69	[ 1.28, 2.24]	<0.001	***	1.53	[ 1.07, 2.20]	0.019	*
Somewhat Difficult	2.52	[ 1.86, 3.42]	<0.001	***	2.69	[ 1.82, 3.96]	<0.001	***
Very Difficult	6.87	[ 4.87, 9.70]	<0.001	***	7.07	[ 4.73, 10.57]	<0.001	***
<b>Model 2</b>								
<b>Stress of Price Increase</b>								
Very Stressful	6.27	[ 3.46, 11.34]	<0.001	***	5.47	[ 2.91, 10.29]	<0.001	***
Moderate	3.42	[ 1.89, 6.17]	<0.001	***	2.96	[ 1.58, 5.55]	0.001	***
Little Stress	1.93	[ 1.08, 3.44]	0.027	*	2.16	[ 1.18, 3.96]	0.013	*
No Stress (Ref)								
Not changed/Decreased/ Do not know			0.006	**	2.80	[ 1.35, 5.81]	0.006	**
<b>Paying for Household Expenses last 7 days</b>								
Not Difficult (Ref)								
Little Difficult	1.64	[ 1.24, 2.17]	0.001	***	1.41	[ 0.99, 2.01]	0.055	
Somewhat Difficult	2.28	[ 1.66, 3.15]	<0.001	***	2.27	[ 1.50, 3.43]	<0.001	***
Very Difficult	4.88	[ 3.41, 6.98]	<0.001	***	4.67	[ 3.04, 7.16]	<0.001	***
<b>Model 3</b>								
<b>Stress of Price Increase</b>								
Very Stressful	4.39	[ 2.48, 7.78]	<0.001	***	2.89	[ 1.62, 5.14]	<0.001	***
Moderate	2.80	[ 1.59, 4.92]	<0.001	***	2.08	[ 1.17, 3.70]	0.012	*
Little Stress	1.59	[ 0.91, 2.77]	0.102		1.87	[ 1.08, 3.25]	0.026	*
No Stress (Ref)								
Not changed/Decreased/ Do not know		[ 1.02, 3.61]	0.044	*	2.24	[ 1.15, 4.34]	0.017	*
<b>Paying for Household Expenses last 7 days</b>								
Not Difficult (Ref)								
Little Difficult	1.64	[ 1.25, 2.15]	<0.001	***	1.14	[ 0.80, 1.61]	0.477	
Somewhat Difficult	1.95	[ 1.35, 2.80]	<0.001	***	1.64	[ 1.02, 2.63]	0.041	*
Very Difficult	3.31	[ 2.26, 4.87]	<0.001	***	2.37	[ 1.49, 3.78]	<0.001	***

Note: Based on 16,079 older adults (≥ 65 years) with health insurance, with no missing data on price change, stress due to price increase, anxiety, and depression variables. Missing data in paying for household expenses are not included in the table.

Model 1 is adjusted for difficulties in paying for household expenses in the last 7 days.

Model 2 is adjusted for age, gender, race and ethnicity, education, income, food insecurity, and difficulties in paying for household expenses in the last 7 days, insurance type, marital status, region, long COVID, and COVID-19 vaccination.

Model 3 is adjusted for age, gender, race and ethnicity, education, income, food insecurity, difficulties in paying for household expenses in the last 7 days, insurance type, marital status, region, long COVID, and COVID-19 vaccination, and comorbid anxiety and depression.

Chisqp: Chi-square probability; COVID: Coronavirus Disease; Ref: Reference Group

\*\*\* p < 0.001; \*\* 0.001 < p < .01; \* 0.01 < p < .05

**Discussion**

In this first nation-wide study of stress due to inflation during the third year of a pandemic and health outcomes, we observed that an overwhelming majority of older adults (93.3%) reported price increases in the last two months in the areas they live. Approximately, one in three older were very stressed about the price increases. As suggested by social stress theory older adults may feel stressed because of their vulnerability to stress and fewer coping resources (Mossakowski, 2014). Such stress can be due to limited financial resources to cushion against inflation. For

example, 9 out of 10 Americans over the age of 65 were using social security benefits and more than 50 percent receive their income from social security and were receiving less than \$2000 per month (Social Security Administration, 2023). Furthermore, the average annual medical expense for retirees over 65 is \$4,274 out of pocket (McInerney et al., 2017). Thus, inflation may affect affordability and may make it difficult to pay for usual household expenses. Indeed, in our study, 30.7% of older adults reported that it had been very difficult or somewhat difficult to pay for usual household expenses with the past 7 days.

A main finding from our research is that older adults who were very stressed about price increases, had higher odds of anxiety and depression compared to those who had no stress about price increases. This finding suggests that inflation may be related to declining health outcomes through stress. As there are no nationwide studies on how the current inflation affects mental health, we have relied on studies on financial stress and outcomes to draw parallels of our study. Financial strain, whether due to inflation or recession have been reported to affect mental health of older adults (Ryu & Fan, 2023). Our findings are consistent with a NBER study on prescription drug price increase and health outcomes. In the simulation study, a \$10 increase in prescription drug prices was associated with 33% increase in mortality because individuals may cut back on essential medications (Chandra et al., 2021).

The inflation in the US has come during the COVID-19 pandemic, which has already highlighted the shortages of mental health professionals and unmet mental health treatment needs among older individuals (Coley & Baum, 2022). The Department of Health and Human Service projected a shortage of 10,000 social workers by 2025 (U.S. Department of Health and Human Services, 2016). Despite the implementation of policies and strategies such as telehealth assisted by Medicare, challenges remain as the COVID-19 pandemic worsened the national shortage of mental health care professionals. According to House Pulse Survey, 12.8% of older adults report an unmet need for mental health treatment (Nagata et al., 2022). A recent survey of patients in an age-friendly health system found 15.2% of vulnerable older adults had unmet need for mental health services, and those who had depression or anxiety also had a higher unmet need for medications and food insecurity (Tai-Seale et al., 2023).

Our findings highlighted the importance of public policy to reduce the stress due to inflation. The Inflation Reduction Act of 2022, which will invest approximately \$433 billion in energy, climate and health to reduce deficit, is a step in the right direction (117th Congress, 2022). In particular, this bill will allow Medicare to negotiate for prescription drug prices, and cap the annual out-of-pocket prescription drug costs at \$2000. Such policy responses are especially important to older adults with high out-of-pocket expenses for health care (McInerney et al., 2017).

## Limitations

While this is a first nationwide study of associated stress due to inflation during the third year COVID-19 pandemic, the study presents with limitations. This was a cross sectional study and self-reported data is subject to recall bias. In addition, because the HPS survey is an online survey there is a potential for selection bias as it is only accessible to households who have at least one email address or cell phone number. Furthermore, the data lacked information on chronic conditions and physical health status, which may influence depression and anxiety.

## Conclusion

COVID-19 pandemic shed light on the shortcomings of mental health access and exacerbated an already short supply of therapist, psychologists, psychiatrists, and social workers leading to access barriers. This study not only highlights the association of depression and anxiety in individuals who perceive price increase but also calls to attention the consequences, such as individuals delaying medical care due to inflation (Weinick et al., 2005). Furthermore, as the mental health impact of external shocks outlasts the physical impact, our study findings suggest the demand for mental health care may increase in the coming months, and policies and programs must address both the demand and supply for appropriate health care professionals. Finally, public health and policy interventions should be developed and implemented to identify the patients with high risk of stress due to inflation and address mental health-related unmet social needs.

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## References:

1. Inflation Reduction Act of 2022, H.R.5376 (2022).
2. Caplovitz, D. (1981). Making ends meet: How families cope with inflation and recession. *The Annals of the American Academy of Political and Social Science*, 456(1), 88-98.
3. Chandra, A., Flack, E., & Obermeyer, Z. (2021). The health costs of cost-sharing (NBER Working Paper No. w28439). National Bureau of Economic Research.
4. Coley, R. L., & Baum, C. F. (2022). Trends in mental health symptoms, service use, and unmet need for services among US adults through the first 8 months of the COVID-19 pandemic. *Translational Behavioral Medicine*, 12(2), 273-283.
5. Donker, T., van Straten, A., Marks, I., & Cuijpers, P. (2011). Quick and easy self-rating of Generalized Anxiety Disorder: Validity of the Dutch web-based GAD-7, GAD-2 and GAD-SI. *Psychiatry Research*, 188(1), 58-64.
6. Emerson, K. G. (2020). Coping with being cooped up: Social distancing during COVID-19 among 60+ in the United States. *Revista Panamericana de Salud Pública*, 44, e81.
7. Guan, N., Guariglia, A., Moore, P., Xu, F., & Al-Janabi, H. (2022). Financial stress and depression in adults: A systematic review. *PloS one*, 17(2), e0264041.
8. Hawkley, L. C., Zheng, B., & Song, X. (2020). Negative financial shock increases loneliness in older adults, 2006–2016: Reduced effect during the Great Recession (2008–2010). *Social Science & Medicine*, 255, 113000.
9. Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2003). The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener. *Medical Care*, 41(11).
10. McInerney, M., Rutledge, M. S., & King, S. E. (2017). HOW MUCH DOES OUT-OF-POCKET MEDICAL SPENDING EAT AWAY AT RETIREMENT INCOME? Mossakowski, K. N. (2014). Stress and mental illness. *The Wiley Blackwell encyclopedia of health, illness, behavior, and society*, 1-5.
11. Nagata, J. M., Ganson, K. T., Bonin, S. L., Twadell, K. L., Garcia, M. E., Langrock, O., Vittinghoff, E., Tsai, A. C., Weiser, S. D., & Abdel Magid, H. S. (2022). Prevalence and Sociodemographic Correlates of Unmet Need for Mental Health Counseling Among Adults During the COVID-19 Pandemic. *Psychiatric Services*, 73(2), 206-209.
12. Naz, A., Chaudhry, H.-u.-R., Hussain, M., Daraz, U., & Khan, W. (2012). Inflation: the social monster socio-economic and psychological impacts of inflation and price hike on poor families of district Malakand, Khyber Pakhtunkhwa, Pakistan. *International Journal of Business and Social Science*, 2(14).
13. Pool, L. R., Burgard, S. A., Needham, B. L., Elliott, M. R., Langa, K. M., & De Leon, C. F. M. (2018). Association of a negative wealth shock with all-cause mortality in middle-aged and older adults in the United States. *Jama*, 319(13), 1341-1350.
14. Ridley, M., Rao, G., Schilbach, F., & Patel, V. (2020). Poverty, depression, and anxiety: Causal evidence and mechanisms. *Science*, 370(6522), eaay0214.
15. Rouse, C., Zhang, J., & Tedeschi, E. (2021). Historical parallels to today's inflationary episode. *The White House*.
16. Ryu, S., & Fan, L. (2023). The Relationship Between Financial Worries and Psychological Distress Among U.S.

- Adults. *Journal of Family and Economic Issues*, 44(1), 16-33.
18. SAS. (2017). Introduction to Survey Sampling and Analysis Procedures. In *SAS/STAT® 14.3 User's Guide* (pp. 243-256). SAS Institute Inc.
19. Social Security Administration. (2023). Fact Sheet.
20. Tai-Seale, M., Cheung, M. W., Kwak, J., Harris, V., Madonis, S., Russell, L., Haley, E., & Agnihotri, P. (2023). Unmet needs for food, medicine, and mental health services among vulnerable older adults during the COVID-19 pandemic. *Health Services Research*, 58(S1), 69-77.
21. U.S. Department of Health and Human Services. (2016). National Projections of Supply and Demand for Selected Behavioral Health Practitioners: 2013-2025.
22. Weinick, R. M., Byron, S. C., & Bierman, A. S. (2005). Who can't pay for health care? *Journal of General Internal Medicine*, 20(6), 504-509.
23. Wilkinson, L. R. (2016). Financial strain and mental health among older adults during the great recession. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 71(4), 745-754.



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