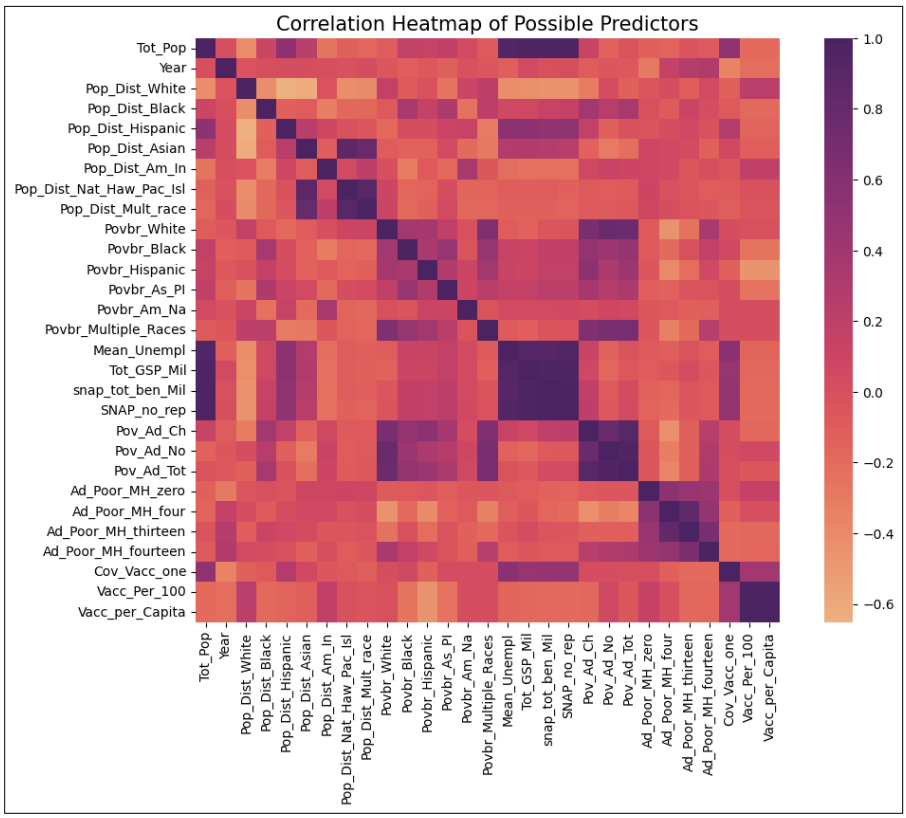
Figures

Correlation –

Figure 1: Heatmap of socioeconomic and health predictors.



Strong correlations among variables (purple clusters) illustrate potential multicollinearity, motivating the use of VIF diagnostics and LASSO regression to ensure stable estimation of relationships

Regression Outputs

Figure 2: Comparison of OLS and LASSO model fit across three outcomes. Target =Tot_GSP_Mil.

Target	R2_OLS	R2_LASSO	LASSO_alpha
Cov_Vacc_one	0.368347	0.313383	6.88E+07
Tot_GSP_Mil	0.957124	0.950134	2.91E+04
Ad_Poor_MH_fourteen	0.153734	0.150151	1.78E-02

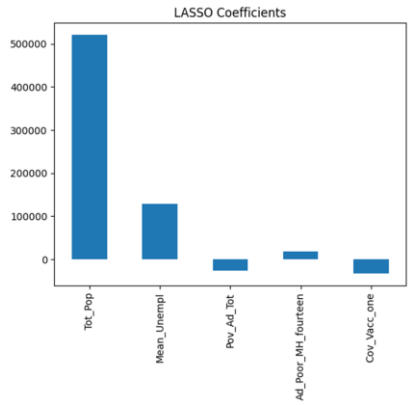
Reported values include R^2 for both OLS and LASSO regressions, as well as the optimal LASSO penalty (α) selected by cross-validation. Gross State Product (Tot_GSP_Mil) showed strong and stable explanatory power in both models ($R^2 \approx .96$ for OLS, .95 for LASSO), confirming robust economic predictors. Vaccination coverage (Cov_Vacc_one) was moderately predictable ($R^2 \approx .37$ OLS, .31 LASSO), consistent with distress-driven variation in uptake. Mental health

Figures

Coefficients –

Figure 3A: OLS regression results for Gross State Product (Tot_GSP_Mil)

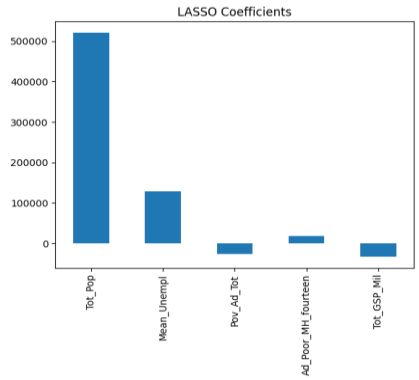
Variable	Coefficient	Std_Err	t_stat	p_value
const	2120.39624	68098.676	0.03114	9.75E-01
Tot_Pop	0.07061	0.004489	15.7279	2.61E-33
Mean_Unempl	0.732756	0.183249	3.9987	1.01E-04
Pov_Ad_Tot	-12792.6947	4666.1226	-2.74161	6.87E-03
Ad_Poor_MH_fourteen	8008.07022	4021.2899	1.99142	4.83E-02
Cov_Vacc_one	-0.000039	0.000013	-3.04513	2.76E-03



The high explanatory power ($R^2 \approx .96$), as shown in the regression comparison table, demonstrates that core predictors such as population, unemployment, and poverty account for nearly all variance in state economic output, while LASSO regularization confirmed the stability of these effects under penalization.

Figure 3B: OLS regression results for Vaccination Coverage (Cov_Vacc_one)

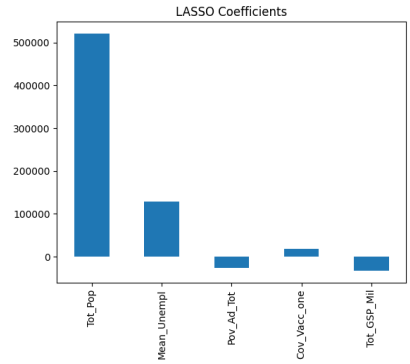
Variable	Coefficient	Std_Err	t_stat	p_value
const	7.50E+08	4.34E+08	1.72829	0.08608
Tot_Pop	9.73E+01	4.61E+01	2.11092	0.036508
Mean_Unempl	4.41E+03	1.17E+03	3.76176	0.000245
Pov_Ad_Tot	6.11E+06	3.04E+07	0.20095	0.841022
Ad_Poor_MH_fourteen	-4.32E+07	2.59E+07	-1.66969	0.097153
Tot_GSP_Mil	-1.52E+03	5.09E+02	-2.98317	0.003352



The model explained a moderate proportion of variance ($R^2 \approx .37$) shown on the regression comparison table, consistent with the observed association between distress and vaccination uptake. LASSO regularization reduced explanatory fit slightly ($R^2 \approx .31$), as referenced on the comparison table. Indicating that only a subset of predictors contributes uniquely to vaccination outcomes. Some potentially unmeasured impacts here are hesitancy to see a doctor and vaccine misinformation (Loomer et al.).

Figure 3C: OLS regression results for Mental Health Distress (Ad_Poor_MH_fourteen).

Variable	Coefficient	Std_Err	t_stat	p_value
const	9.74E+00	1.12E+00	8.69952	6.16E-15
Tot_Pop	-1.91E-07	1.48E-07	-1.28932	1.99E-01
Mean_Unempl	-3.51E-06	3.89E-06	-0.90023	3.69E-01
Pov_Ad_Tot	3.95E-01	9.12E-02	4.33635	2.68E-05
Tot_GSP_Mil	3.28E-06	1.65E-06	1.99142	4.83E-02
Cov_Vacc_one	-4.17E-10	2.62E-10	-1.58866	1.14E-01

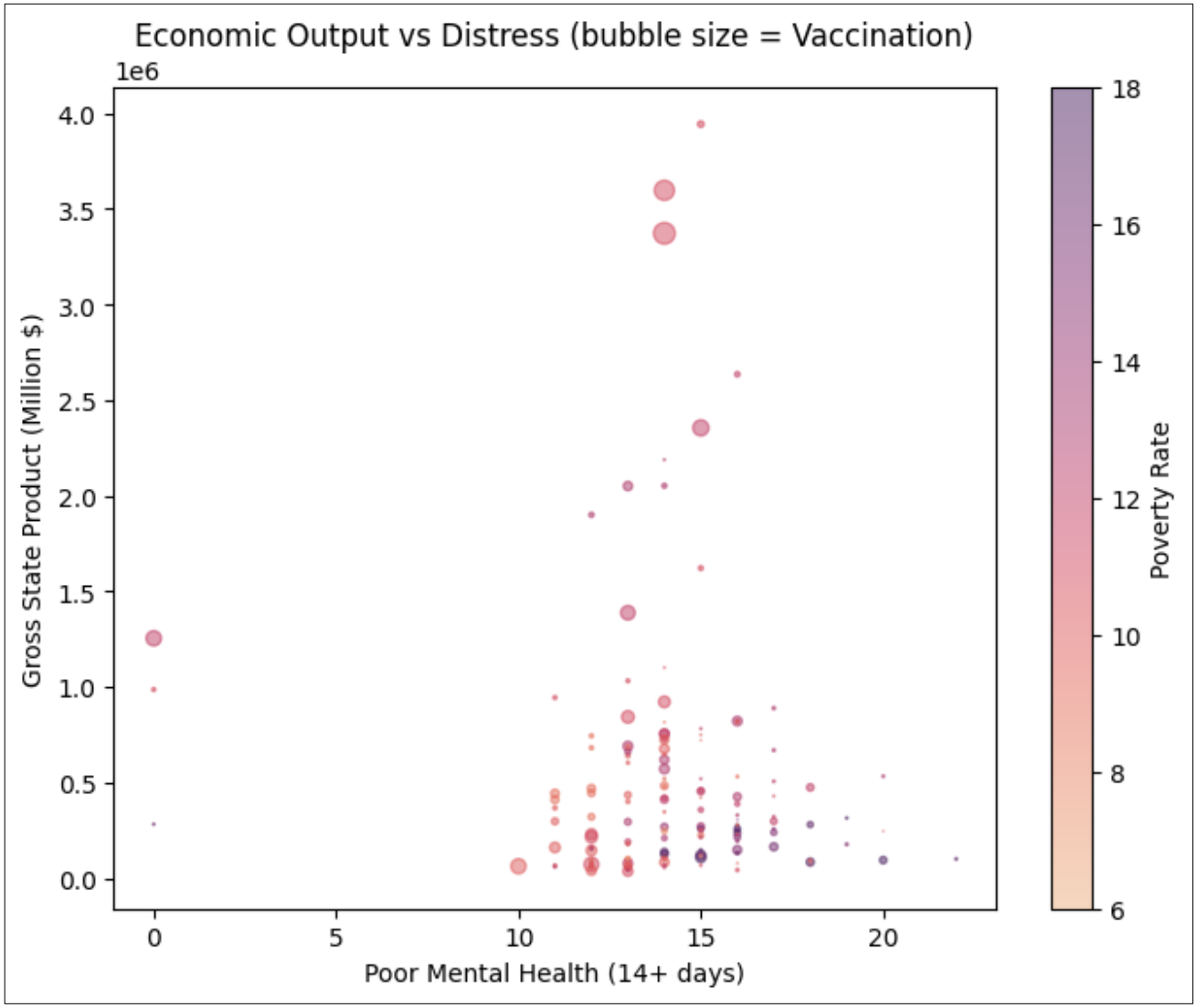


The model explained only a small share of variance ($R^2 \approx .15$), underscoring that poverty is a significant but incomplete predictor of distress. LASSO regression retained a nearly identical fit, suggesting that additional unmeasured factors are likely driving much of the variance in mental health outcomes.

Figures

Contextual Summary Research

Figure 4: Economic Output vs. Distress (bubble size = Vaccination, color = Poverty)

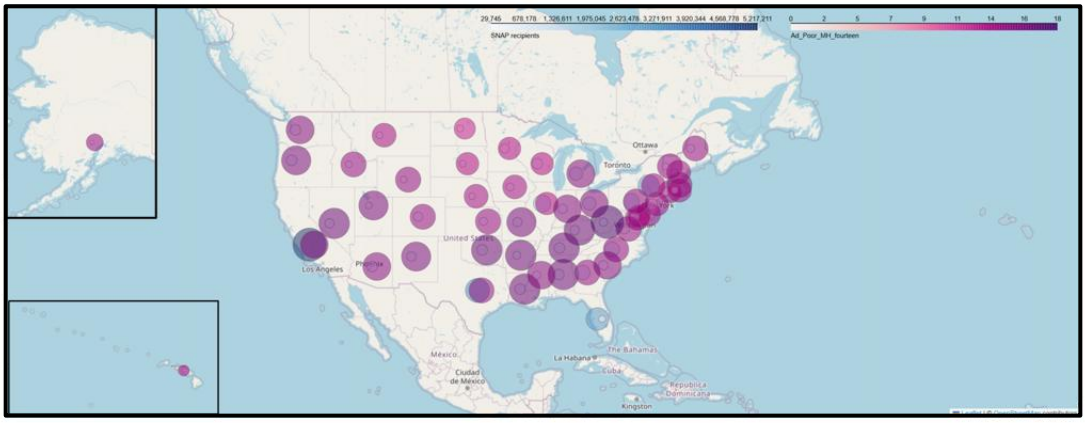


This scatterplot visualizes the relationship between poor mental health (14+ days) and gross state product (GSP, in millions of dollars). Bubble size represents vaccination coverage, and color represents poverty rates. The figure illustrates that states with higher economic output cluster across varying levels of mental health distress, with larger vaccination bubbles concentrated in higher-output states. The color gradient indicates that poverty is inversely associated with GSP, reinforcing how socioeconomic conditions and health behaviors interact.

Figures

Figure 5: Geography of SNAP Participation and Mental Health Distress (2021–2023)[1]

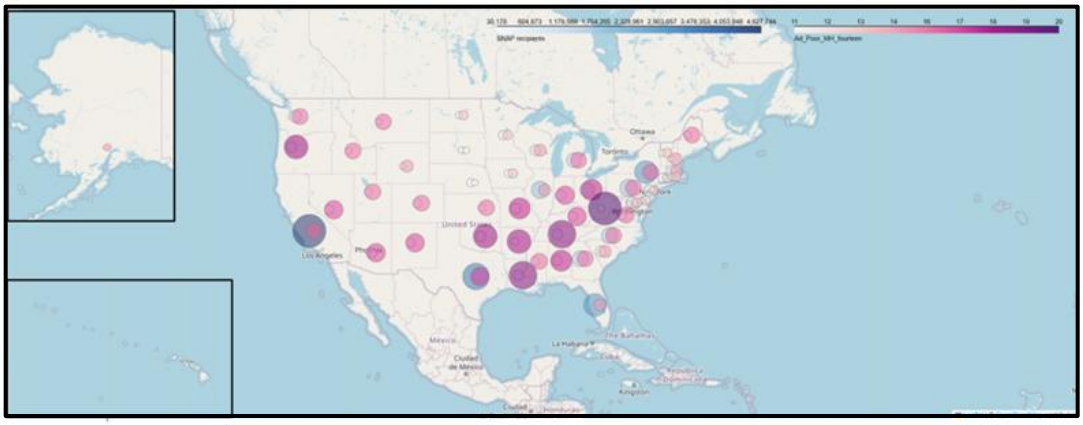
Geography of SNAP_pct and AD_Poor_MH_fourteen 2021



In 2021, KFF documented that the COVID-19 pandemic exacerbated anxiety and depression disproportionately impacts on people facing financial strain and food insecurity.

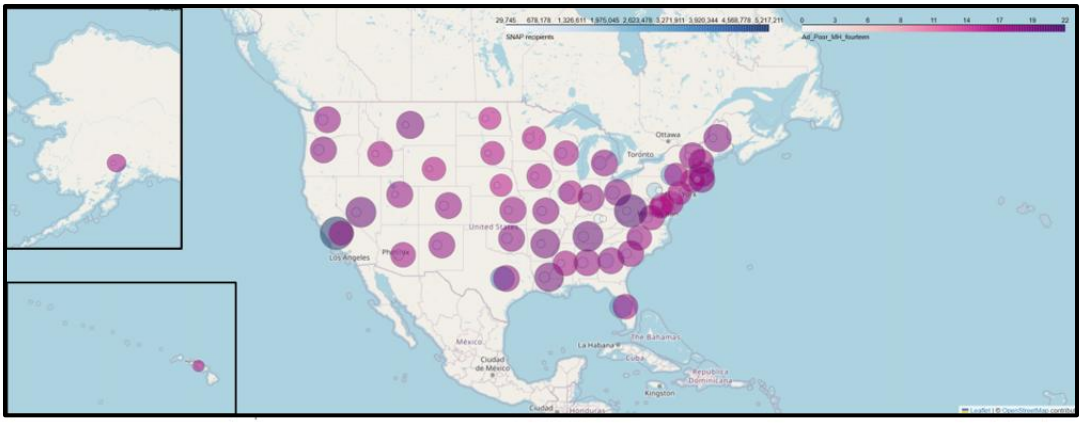
CBPP reported that SNAP participation rose sharply during the pandemic, particularly in low-income states, helping families buffer against sudden job and income loss.

Geography of SNAP_pct and AD_Poor_MH_fourteen 2022



By 2022, mental health needs remained elevated while SNAP reliance continued in many states. Improvements likely reflect the impact of federal relief programs, such as direct stimulus payments, expanded unemployment benefits, rental assistance, enhanced SNAP, and Child Tax Credit expansions—policies that KFF found significantly reduced economic hardship and child poverty.

Geography of SNAP_pct and AD_Poor_MH_fourteen 2023

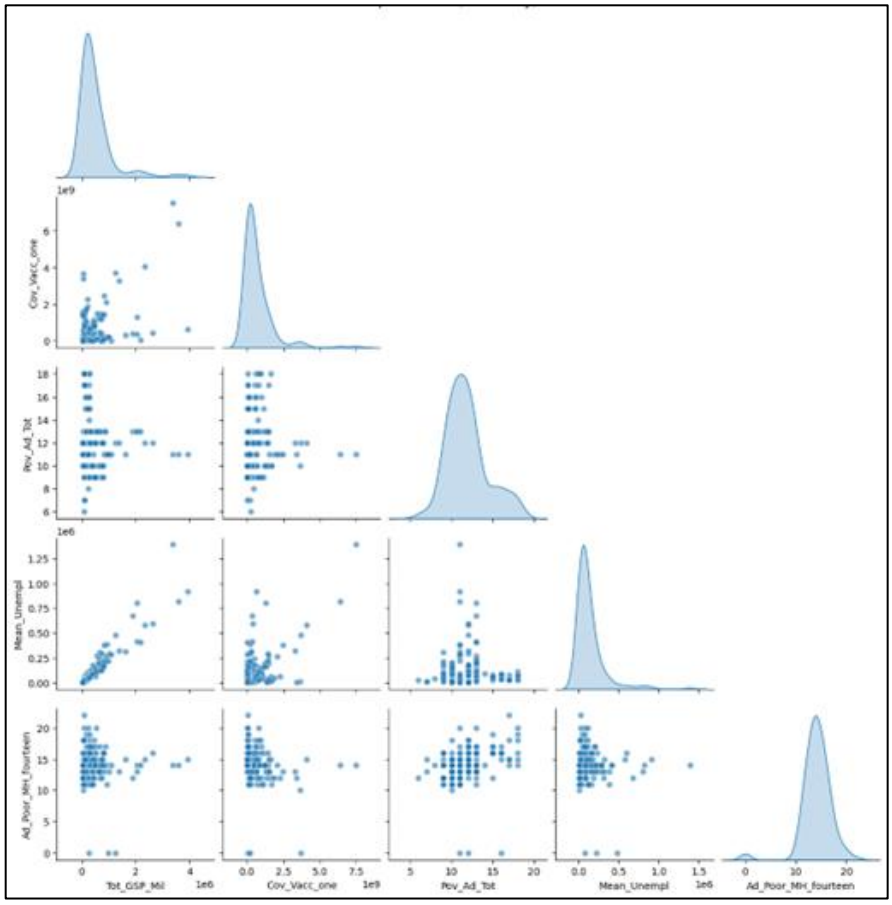


In 2023, CBPP reported that SNAP participation remained high in economically vulnerable states even as benefits were greatly reduced as emergency allotments expired. Resulting in substantial benefit reductions/increased food hardship. At the same time, KFF analyses showed over 30% of U.S. adults reporting symptoms of anxiety or depression. This suggests that, even as the pandemic officially ended, its economic and psychological effects persisted.

[1] Click on the links to be taken to the relevant articles.

Figures

Figure 6: Pairwise Relationships: Ad_Poor_MH_fourteen, Tot_GSP_Mil, Cov_Vacc_one



This pair plot shows relationships among gross state product (Tot_GSP_Mil), vaccination coverage (Cov_Vacc_one), poverty (Pov_Ad_Tot), unemployment (Mean_Unempl), and poor mental health (Ad_Poor_MH_fourteen). Higher poverty and unemployment are associated with greater reported distress, while vaccination coverage varies widely across states. The chart highlights how economic strain and health behaviors intersect with mental health outcomes, consistent with KFF findings on disparities by social vulnerability.