

**The impact of the COVID-19 pandemic and policy response on health care utilization:
Evidence from county-level medical claims and cellphone data**

Supplementary Appendix

Appendix Table 1: Changes in Sample Population Following Policy Implementation

	(1)	(2)	(3)	(4)	(5)	(6)
	sample population			ln(sample population)		
post shelter in place	-3.721*** (1.303)	-1.208 (1.352)	5.941*** (1.364)	-0.0222*** (0.00647)	0.0540*** (0.0107)	0.0600*** (0.0118)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013
R-squared	0.653	0.653	0.653	0.942	0.943	0.943

This table presents changes in the sample population, measured in cells at the age category, gender, county, and week level, following the implementation of shelter in place policies. Regression models were estimated using ordinary least squares. Regression models also include controls for the patient's age and gender, and fixed effects for week and county. Standard errors are clustered at the county level. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 2: Heterogeneous Effects of Social Distancing Policies on Preventive, Elective, and Non-Elective Procedure Utilization

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Colonoscopy	Preventive Care Mammogram	Immunizations	MRI	Elective Care Musculoskeletal surgery	Cataract surgery	Office visits In-person office visits	Telemedicine
Poverty quartiles								
post shelter in place X 2nd quartile	0.800*	3.172	2.988*	0.537**	0.231**	0.0211	32.93**	-24.49*
	(0.433)	(1.981)	(1.616)	(0.237)	(0.106)	(0.0228)	(13.45)	(14.35)
post shelter in place X 3rd quartile	0.0725	-1.059	-0.856	-0.0640	0.0978	-0.0250	2.138	-8.183
	(0.579)	(2.213)	(1.777)	(0.364)	(0.108)	(0.0408)	(18.09)	(12.84)
post shelter in place X 4th quartile	-0.0132	-1.247	0.0589	-0.00723	0.0409	-0.0128	3.368	-4.644
	(0.427)	(1.918)	(0.909)	(0.199)	(0.0795)	(0.0187)	(10.92)	(9.286)
White race quartiles								
post shelter in place X 2nd quartile	-0.218	-0.469	-0.789	-0.196	-0.0725	0.00330	-0.571	-3.333
	(0.421)	(1.634)	(1.407)	(0.244)	(0.0781)	(0.0147)	(10.91)	(9.265)
post shelter in place X 3rd quartile	0.0344	0.192	-1.460	-0.151	-0.0642	0.00657	1.761	-10.58
	(0.230)	(1.229)	(1.167)	(0.148)	(0.0510)	(0.0105)	(6.964)	(6.890)
post shelter in place X 4th quartile	-0.375	-1.405	-2.781**	-0.353*	-0.131*	-0.0119	-11.68	2.350
	(0.328)	(1.467)	(1.325)	(0.190)	(0.0756)	(0.0160)	(9.528)	(8.540)
Age categories								
post shelter in place X ages 3-12				-0.152***	-0.0338*	-0.00614*	-20.83***	21.81***
				(0.0584)	(0.0174)	(0.00330)	(4.814)	(6.134)
post shelter in place X ages 13-18				-0.348***	-0.0840***	-0.0119*	-6.579*	25.34***
				(0.107)	(0.0326)	(0.00678)	(3.866)	(7.370)
post shelter in place X ages 19-26				-0.250**	-0.0570	-0.00910	-4.398	32.97***
				(0.108)	(0.0371)	(0.00563)	(4.298)	(8.857)
post shelter in place X ages 27-45				-0.749***	-0.201***	-0.00600	-54.29***	100.7***
				(0.260)	(0.0773)	(0.00379)	(16.28)	(24.16)
post shelter in place X ages 46-59				-1.106***	-0.449***	-0.114***	-53.18***	65.32***
				(0.429)	(0.165)	(0.0388)	(15.91)	(13.14)
post shelter in place X ages 60-64				-0.921**	-0.350***	-0.341**	-28.15**	27.41***
				(0.412)	(0.119)	(0.141)	(13.44)	(7.339)

Regression models were estimated using ordinary least squares. Regression models also include measures for the patient's age, gender, and county. Outcome measure is the number of patients, and all models are weighted for the total number of eligible enrollees. Standard errors are clustered at the county level. Immunizations are restricted to those aged 2 or younger. Colonoscopy is restricted to those 46 or older. Mammograms were restricted to females aged 46 or older. For these services, we do not examine heterogeneity based on age. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 3: Heterogeneous Effects of Social Distancing Policies on Log-Transformed Preventive, Elective, and Non-Elective Procedure Utilization

	(1)	(2)	(3)	(4)	(5)	(6)	(10)	(11)
	Colonoscopy	Preventive Care Mammogram	Immunizations	MRI	Elective Care Musculoskeletal surgery	Cataract surgery	Office visits In-person office visits	Telemedicine
Poverty quartiles								
post shelter in place X 2nd quartile	0.0831**	0.0803**	0.0454	0.0454*	0.0460**	0.00770	0.0902**	-0.145
	(-0.0366)	(0.0358)	(0.0452)	(0.0240)	(0.0196)	(0.00870)	(0.0422)	(0.127)
post shelter in place X 3rd quartile	0.0675*	0.0928***	0.0194	0.0237	0.0158	-0.00511	0.113***	-0.186*
	(-0.0362)	(0.0297)	(0.0290)	(0.0185)	(0.0152)	(0.0113)	(0.0276)	(0.104)
post shelter in place X 4th quartile	0.0613	0.0661	0.0229	0.0127	0.0155	-0.00511	0.0942***	-0.329*
	(-0.0535)	(0.0522)	(0.0258)	(0.0217)	(0.0176)	(0.00834)	(0.0339)	(0.195)
White race quartiles								
post shelter in place X 2nd quartile	0.0115	0.00347	0.000818	-0.000709	-0.00788	0.00295	-0.00921	0.0166
	(0.0430)	(0.0333)	(0.0332)	(0.0222)	(0.0155)	(0.00686)	(0.0295)	(0.123)
post shelter in place X 3rd quartile	0.0847***	0.0616	-0.0218	0.00691	-0.00426	0.00691	-0.0264	-0.508***
	(0.0302)	(0.0414)	(0.0546)	(0.0234)	(0.0144)	(0.00467)	(0.0426)	(0.126)
post shelter in place X 4th quartile	0.0792**	0.126***	0.0357	0.0193	-0.00806	0.00134	0.0376	-0.758***
	(0.0321)	(0.0358)	(0.0352)	(0.0184)	(0.0141)	(0.00631)	(0.0352)	(0.118)
Age categories								
post shelter in place X ages 3-12				-0.0425***	-0.0108**	-0.00187**	-0.200***	0.828***
				(0.0122)	(0.00484)	(0.000955)	(0.0104)	(0.0298)
post shelter in place X ages 13-18				-0.0999***	-0.0311***	-0.00393*	-0.0267*	0.886***
				(0.0177)	(0.00815)	(0.00215)	(0.0141)	(0.0441)
post shelter in place X ages 19-26				-0.0579***	-0.0185	-0.00323	0.104***	0.976***
				(0.0162)	(0.0115)	(0.00204)	(0.0132)	(0.0414)
post shelter in place X ages 27-45				-0.0908***	-0.0670***	-0.00327	0.0524***	1.358***
				(0.0212)	(0.0173)	(0.00205)	(0.0141)	(0.0558)
post shelter in place X ages 46-59				-0.0918***	-0.0935***	-0.0529***	0.0631***	1.514***
				(0.0211)	(0.0210)	(0.0154)	(0.0136)	(0.0419)
post shelter in place X ages 60-64				-0.106***	-0.0973***	-0.116***	0.0412**	0.948***
				(0.0254)	(0.0205)	(0.0305)	(0.0190)	(0.0476)

Regression models were estimated using ordinary least squares. Regression models also include measures for the patient's age, gender, and county. Outcome measure is the log-transformed number of patients, and all models are weighted for the total number of eligible enrollees. Standard errors are clustered at the county level. Immunizations are restricted to those aged 2 or younger. Colonoscopy is restricted to those 46 or older. Mammograms were restricted to females aged 46 or older. For these services, we do not examine heterogeneity based on age. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 4: Effect of Social Distancing Policies on Preventive, Elective, and Non-Elective Procedure Utilization, Alternative Policy Construction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Preventive Care		Colonoscopy			Mammogram			Immunizations	
post shelter in place	-1.990*** (0.522)	-1.787*** (0.547)	-0.408* (0.220)	-8.262*** (2.008)	-6.723*** (2.213)	-0.868 (1.477)	-2.606** (1.101)	-2.855** (1.299)	0.00733 (1.161)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,669	1,064,669	1,064,669	529,100	529,100	529,100	418,099	418,099	418,099
R-squared	0.706	0.719	0.749	0.783	0.794	0.816	0.879	0.895	0.904
baseline mean	4.1	4.1	4.1	21.6	21.6	21.6	22.0	22.0	22.0
Panel B: Elective Care		MRI			Musculoskeletal surgery			Cataract surgery	
post shelter in place	-1.141*** (0.293)	-0.989*** (0.280)	-0.278* (0.165)	-0.357*** (0.0909)	-0.307*** (0.0907)	-0.114** (0.0580)	-0.0878*** (0.0259)	-0.0820*** (0.0260)	-0.0204 (0.0141)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013
R-squared	0.617	0.620	0.628	0.489	0.492	0.499	0.256	0.258	0.263
baseline mean	3.3	3.3	3.3	1.1	1.1	1.1	0.2	0.2	0.2
Panel C: Non-Elective Care		Labor and delivery			Chemotherapy			Angiograms	
post shelter in place	0.0954 (0.0970)	0.159 (0.103)	0.153 (0.131)	-0.0592 (0.0874)	-0.0286 (0.0778)	-0.0127 (0.0742)	-0.131*** (0.0374)	-0.0952*** (0.0366)	-0.0471 (0.0419)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,628	1,064,628	1,064,628	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013
R-squared	0.555	0.556	0.556	0.542	0.543	0.544	0.439	0.441	0.442
baseline mean	1.8	1.8	1.8	1.5	1.5	1.5	0.5	0.5	0.5

Baseline means are calculated based on the ninth week of 2019. The shelter in place dummy is turned on when the policy is enacted. The shelter in place dummy is turned off when the policy is ended. Regression models were estimated using ordinary least squares. Regression models also include controls for the patient's age and gender, and fixed effects for week and county. The outcome measure is the number of patients, and all models are weighted for the total number of eligible enrollees. Standard errors are clustered at the county level. Immunizations are restricted to those aged 2 or younger. Colonoscopy is restricted to those 46 to 64. Mammograms were restricted to females aged 46 to 64. Deliveries were restricted to women between the ages of 19 and 45. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 5: Effect of Social Distancing Policies on Log-Transformed Preventive, Elective, and Non-Elective Procedure Utilization, Alternative Policy Construction

	(1)	(4)	(5)	(6)	(9)	(10)	(11)	(14)	(15)
Panel A: Preventive Care		Colonoscopy			Mammogram			Immunizations	
post shelter in place	-0.340*** (0.0320)	-0.257*** (0.0430)	-0.0683*** (0.0205)	-0.459*** (0.0223)	-0.306*** (0.0367)	-0.0831*** (0.0257)	-0.0871*** (0.0199)	-0.0512** (0.0237)	-0.0109 (0.0288)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,669	1,064,669	1,064,669	529,100	529,100	529,100	418,099	418,099	418,099
R-squared	0.739	0.756	0.779	0.870	0.889	0.902	0.927	0.928	0.929
baseline mean	4.1	4.1	4.1	21.6	21.6	21.6	22.0	22.0	22.0
Panel B: Elective Care		MRI			Musculoskeletal surgery			Cataract surgery	
post shelter in place	-0.158*** (0.0166)	-0.116*** (0.0198)	-0.0411** (0.0162)	-0.0987*** (0.0134)	-0.0752*** (0.0154)	-0.0289** (0.0132)	-0.0360*** (0.00769)	-0.0309*** (0.00778)	-0.00755 (0.00521)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013
R-squared	0.716	0.718	0.721	0.551	0.554	0.558	0.295	0.298	0.303
baseline mean	3.3	3.3	3.3	1.1	1.1	1.1	0.2	0.2	0.2
Panel C: Non-Elective Care		Labor and delivery			Chemotherapy			Angiograms	
post shelter in place	0.00563 (0.00863)	0.00999 (0.0120)	0.0121 (0.00982)	-0.0114 (0.0108)	-0.00265 (0.0107)	0.000621 (0.0118)	-0.0482*** (0.00873)	-0.0333*** (0.00933)	-0.0186* (0.0108)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,628	1,064,628	1,064,628	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013	3,567,013
R-squared	0.646	0.646	0.646	0.626	0.626	0.626	0.477	0.479	0.480
baseline mean	1.8	1.8	1.8	1.5	1.5	1.5	0.5	0.5	0.5

Baseline means are calculated based on the ninth week of 2019. The shelter in place dummy is turned on when the policy is enacted. The shelter in place dummy is turned off when the policy is ended. Regression models were estimated using ordinary least squares. Regression models also include controls for the patient's age and gender, and fixed effects for week and county. The outcome measure is the log-transformed number of patients, and all models are weighted for the total number of eligible enrollees. Standard errors are clustered at the county level. Immunizations are restricted to those aged 2 or younger. Colonoscopy is restricted to those 46 to 64. Mammograms were restricted to females aged 46 to 64. Deliveries were restricted to women between the ages of 19 and 45. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 6: Effect of County-Level Shelter in Place Policies on Visits to Medical and Diagnostic Laboratories, Nursing Care Facilities, Retirement Communities and Specialty Hospitals, Alternative Policy Construction

	(1)	(2)	(3)	(4)	(5)	(6)
	Medical and Diagnostic Laboratories			Nursing Care Facilities		
Panel A: Level changes						
post shelter in place	-5.812*** (0.775)	-1.036 (1.039)	0.996 (1.079)	-12.36*** (1.395)	-2.655* (1.580)	0.438 (1.279)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,157,337	1,157,337	1,157,337	748,765	748,765	748,765
R-squared	0.07	0.07	0.07	0.21	0.21	0.22
baseline mean	28.09	28.09	28.09	61.54	61.54	61.54
Panel B: Log changes						
post shelter in place	-0.198*** (0.0167)	-0.0703*** (0.0206)	-0.00615 (0.0171)	-0.221*** (0.0227)	-0.0457* (0.0243)	0.0172 (0.0187)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,157,337	1,157,337	1,157,337	748,765	748,765	748,765
R-squared	0.10	0.10	0.10	0.23	0.23	0.24
Baseline mean	2.59	2.59	2.59	3.68	3.68	3.68
	Retirement Communities and Assisted Living Facilities			Specialty Hospitals		
Panel A: Level changes						
post shelter in place	-8.572*** (0.796)	-2.360** (0.972)	-0.0761 (0.792)	-11.09*** (1.933)	-4.489** (2.210)	-1.816 (2.192)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,622,258	1,622,258	1,622,258	294,129	294,129	294,129
R-squared	0.13	0.13	0.13	0.16	0.16	0.16
baseline mean	39.80	39.80	39.80	39.71	39.71	39.71
Panel B: Log changes						
post shelter in place	-0.233*** (0.0171)	-0.0667*** (0.0173)	-0.000644 (0.0112)	-0.235*** (0.0244)	-0.114*** (0.0320)	-0.0446 (0.0294)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,622,258	1,622,258	1,622,258	294,129	294,129	294,129
R-squared	0.17	0.18	0.18	0.21	0.21	0.22
Baseline mean	3.19	3.19	3.19	2.77	2.77	2.77

Caption: The shelter in place dummy is turned on when the policy is enacted. The shelter in place dummy is turned off when the policy is ended. Unit of analysis is the number of visits in a week to health care provider locations. Baseline means are calculated based on the ninth week of 2019. Regression models were estimated using ordinary least squares and regressions include fixed effects for county and week. The outcome measure is the number of visits. We use the four-digit NAICS code to identify medical and diagnostic laboratories (6215), nursing care facilities (6231), retirement communities and assisted living facilities (6233), and specialty hospitals (6223). Standard errors are clustered at the county level. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 7: Effect of County-Level Shelter in Place Policies on Visits to Physician Office, General and Medical Service Hospitals, Health and Personal Care Stores, and Office of Dentists, Alternative Policy Construction

	(1)	(2)	(3)	(4)	(5)	(6)
	Offices of Physicians			General and Medical Service Hospitals		
Panel A: Level changes						
post shelter in place	-5.557*** (0.289)	-1.862*** (0.389)	0.133 (0.349)	-87.44*** (17.92)	-56.23*** (20.75)	-27.59 (23.88)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	13,430,991	13,430,991	13,430,991	1,045,379	1,045,379	1,045,379
R-squared	0.03	0.03	0.03	0.17	0.17	0.17
baseline mean	31.09	31.09	31.09	363.11	363.11	363.11
Panel B: Log changes						
post shelter in place	-0.191*** (0.00600)	-0.102*** (0.00990)	-0.0419*** (0.00620)	-0.269*** (0.0528)	-0.231*** (0.0599)	-0.158** (0.0681)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	13,430,991	13,430,991	13,430,991	1,045,379	1,045,379	1,045,379
R-squared	0.06	0.06	0.06	0.23	0.23	0.23
Baseline mean	2.60	2.60	2.60	4.44	4.44	4.44
Health and Personal Care Stores						
Office of Dentists						
Panel A: Level changes						
post shelter in place	-15.51*** (1.384)	-7.882*** (1.622)	-2.027 (1.559)	-3.691*** (0.292)	-2.134*** (0.332)	-0.963*** (0.361)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	3,809,626	3,809,626	3,809,626	9,332,246	9,332,246	9,332,246
R-squared	0.11	0.11	0.11	0.01	0.01	0.01
baseline mean	79.36	79.36	79.36	16.64	16.64	16.64
Panel B: Log changes						
post shelter in place	-0.250*** (0.0222)	-0.155*** (0.0235)	-0.0688*** (0.0178)	-0.200*** (0.00547)	-0.129*** (0.0108)	-0.0573*** (0.00645)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	3,809,626	3,809,626	3,809,626	9,332,246	9,332,246	9,332,246
R-squared	0.15	0.15	0.15	0.07	0.07	0.07
Baseline mean	3.85	3.85	3.85	2.27	2.27	2.27

Caption: The shelter in place dummy is turned on when the policy is enacted. The shelter in place dummy is turned off when the policy is ended. Unit of analysis is the number of visits in a week to health care provider locations. Baseline means are calculated based on the ninth week of 2019. Regression models were estimated using ordinary least squares. The outcome measure is the number of visits and regressions include fixed effects for county and week. We use the four-digit NAICS code to identify office of physicians (6211), general medical and surgical hospitals (6221), health and personal care stores (4461), and offices of dentists (6212). Standard errors are clustered at the county level. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 8: Effect of State-Elective Procedure Ban Policies on Preventive, Elective, and Non-Elective Procedure Utilization

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Preventive Care		Colonoscopy			Mammogram			Immunizations	
post shelter in place	-1.909*** (0.428)	-1.279*** (0.274)	-0.663*** (0.212)	-7.986*** (1.613)	-4.181*** (1.061)	-2.498*** (0.964)	-3.891*** (0.849)	-0.208 (1.400)	-1.608*** (0.560)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,825	1,064,825	1,064,825	529,256	529,256	529,256	418,103	418,103	418,103
R-squared	0.703	0.714	0.749	0.781	0.792	0.816	0.88	0.894	0.904
baseline mean	4.1	4.1	4.1	21.6	21.6	21.6	22.0	22.0	22.0
Panel B: Elective Care		MRI			Musculoskeletal surgery			Cataract surgery	
post shelter in place	-1.096*** (0.237)	-0.687*** (0.140)	-0.204** (0.0866)	-0.282*** (0.0664)	-0.155*** (0.0403)	-0.106** (0.0434)	-0.0629*** (0.0185)	-0.0560** (0.0223)	-0.0174 (0.0123)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685
R-squared	0.616	0.619	0.628	0.488	0.491	0.499	0.255	0.258	0.263
baseline mean	3.3	3.3	3.3	1.1	1.1	1.1	0.2	0.2	0.2
Panel C: Non-Elective Care		Labor and delivery			Chemotherapy			Angiograms	
post shelter in place	-0.111 (0.0783)	-0.0493 (0.0942)	0.0675 (0.0797)	-0.128*** (0.0402)	-0.164*** (0.0393)	-0.0809** (0.0348)	-0.134*** (0.0287)	-0.0615* (0.0352)	-0.0188 (0.0199)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,971	1,064,971	1,064,971	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685
R-squared	0.555	0.556	0.556	0.542	0.543	0.544	0.439	0.441	0.442
baseline mean	1.8	1.8	1.8	1.5	1.5	1.5	0.5	0.5	0.5

Baseline means are calculated based on the ninth week of 2019. Regression models were estimated using ordinary least squares. Regression models also include controls for the patient's age and gender, and fixed effects for week and county. The outcome measure is the number of patients, and all models are weighted for the total number of eligible enrollees. Standard errors are clustered at the county level. Immunizations are restricted to those aged 2 or younger. Colonoscopy is restricted to those 46 to 64. Mammograms were restricted to females aged 46 to 64. Deliveries were restricted to women between the ages of 19 and 45. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 9: Effect of State-Elective Procedure Ban Policies on Log-Transformed Preventive, Elective, and Non-Elective Procedure Utilization

	(1)	(4)	(5)	(6)	(9)	(10)	(11)	(14)	(15)
Panel A: Preventive Care									
		Colonoscopy			Mammogram			Immunizations	
post shelter in place	-0.341*** (0.0341)	-0.248*** (0.0418)	-0.0910*** (0.0285)	-0.384*** (0.0224)	-0.410*** (0.0527)	-0.0828*** (0.0276)	-0.122*** (0.0134)	-0.0832*** (0.0200)	-0.0583*** (0.0199)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,825	1,064,825	1,064,825	529,256	529,256	529,256	418,103	418,103	418,103
R-squared	0.737	0.753	0.779	0.867	0.888	0.902	0.927	0.928	0.929
baseline mean	4.1	4.1	4.1	21.6	21.6	21.6	22.0	22.0	22.0
Panel B: Elective Care									
		MRI			Musculoskeletal surgery			Cataract surgery	
post shelter in place	-0.161*** (0.0159)	-0.119*** (0.0204)	-0.0209 (0.0132)	-0.0849*** (0.0120)	-0.0624*** (0.0121)	-0.0307*** (0.0107)	-0.0261*** (0.00570)	-0.0211*** (0.00695)	-0.00406 (0.00588)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685
R-squared	0.716	0.718	0.721	0.55	0.553	0.558	0.295	0.298	0.303
baseline mean	3.3	3.3	3.3	1.1	1.1	1.1	0.2	0.2	0.2
Panel C: Non-Elective Care									
		Labor and delivery			Chemotherapy			Angiograms	
post shelter in place	-0.0261*** (0.00822)	-0.0131 (0.0120)	-0.00882 (0.00895)	-0.0369*** (0.00599)	-0.0303*** (0.00831)	-0.0142 (0.00902)	-0.0531*** (0.00843)	-0.0350*** (0.0102)	-0.0109 (0.00682)
Weeks since first case FE		X	X		X	X		X	X
Weeks since first death FE		X	X		X	X		X	X
Year X Week FE			X			X			X
Observations	1,064,971	1,064,971	1,064,971	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685	3,567,685
R-squared	0.646	0.646	0.646	0.626	0.626	0.626	0.477	0.479	0.479
baseline mean	1.8	1.8	1.8	1.5	1.5	1.5	0.5	0.5	0.5

Baseline means are calculated based on the ninth week of 2019. The shelter in place dummy is turned on when the policy is enacted. The shelter in place dummy is turned off when the policy is ended. Regression models were estimated using ordinary least squares. Regression models also include controls for the patient's age and gender, and fixed effects for week and county. The outcome measure is the log-transformed number of patients, and all models are weighted for the total number of eligible enrollees. Standard errors are clustered at the county level. Immunizations are restricted to those aged 2 or younger. Colonoscopy is restricted to those 46 to 64. Mammograms were restricted to females aged 46 to 64. Deliveries were restricted to women between the ages of 19 and 45. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 10: Effect of State-Elective Procedure Ban Policies on Visits to Physician Office, General and Medical Service Hospitals, Health and Personal Care Stores, and Office of Dentists

	(1)	(2)	(3)	(4)	(5)	(6)
	Offices of Physicians			General and Medical Service Hospitals		
Panel A: Level changes						
post shelter in place	-6.825*** (0.442)	-1.885*** (0.533)	0.0474 (0.506)	-101.9*** (16.78)	-80.35*** (25.67)	-64.88** (29.13)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	13,430,991	13,430,991	13,430,991	1,045,379	1,045,379	1,045,379
R-squared	0.03	0.03	0.03	0.17	0.17	0.17
baseline mean	31.09	31.09	31.09	363.11	363.11	363.11
Panel B: Log changes						
post shelter in place	-0.186*** (0.0107)	-0.0752*** (0.0136)	-0.0158* (0.00851)	-0.270*** (0.0519)	-0.315*** (0.0761)	-0.264*** (0.0858)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	13,430,991	13,430,991	13,430,991	1,045,379	1,045,379	1,045,379
R-squared	0.06	0.06	0.06	0.23	0.23	0.23
Baseline mean	2.60	2.60	2.60	4.44	4.44	4.44
Health and Personal Care Stores						
Office of Dentists						
Panel A: Level changes						
post shelter in place	-16.48*** (1.655)	-6.385*** (1.905)	-1.954 (1.322)	-3.263*** (0.352)	-1.365** (0.533)	-0.138 (0.559)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	3,809,626	3,809,626	3,809,626	9,332,246	9,332,246	9,332,246
R-squared	0.11	0.11	0.11	0.01	0.01	0.01
baseline mean	79.36	79.36	79.36	16.64	16.64	16.64
Panel B: Log changes						
post shelter in place	-0.236*** (0.0242)	-0.105*** (0.0262)	-0.0399** (0.0158)	-0.157*** (0.00995)	-0.0832*** (0.0152)	-0.0107 (0.00856)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	3,809,626	3,809,626	3,809,626	9,332,246	9,332,246	9,332,246
R-squared	0.15	0.15	0.15	0.07	0.07	0.07
Baseline mean	3.85	3.85	3.85	2.27	2.27	2.27

Caption: Unit of analysis is the number of visits in a week to health care provider locations. Baseline means are calculated based on the ninth week of 2019. Regression models were estimated using ordinary least squares. The outcome measure is the number of visits and regressions include fixed effects for county and week. We use the four-digit NAICS code to identify office of physicians (6211), general medical and surgical hospitals (6221), health and personal care stores (4461), and offices of dentists (6212). Standard errors are clustered at the county level. *** p<0.01, ** p<0.05, * p<0.1

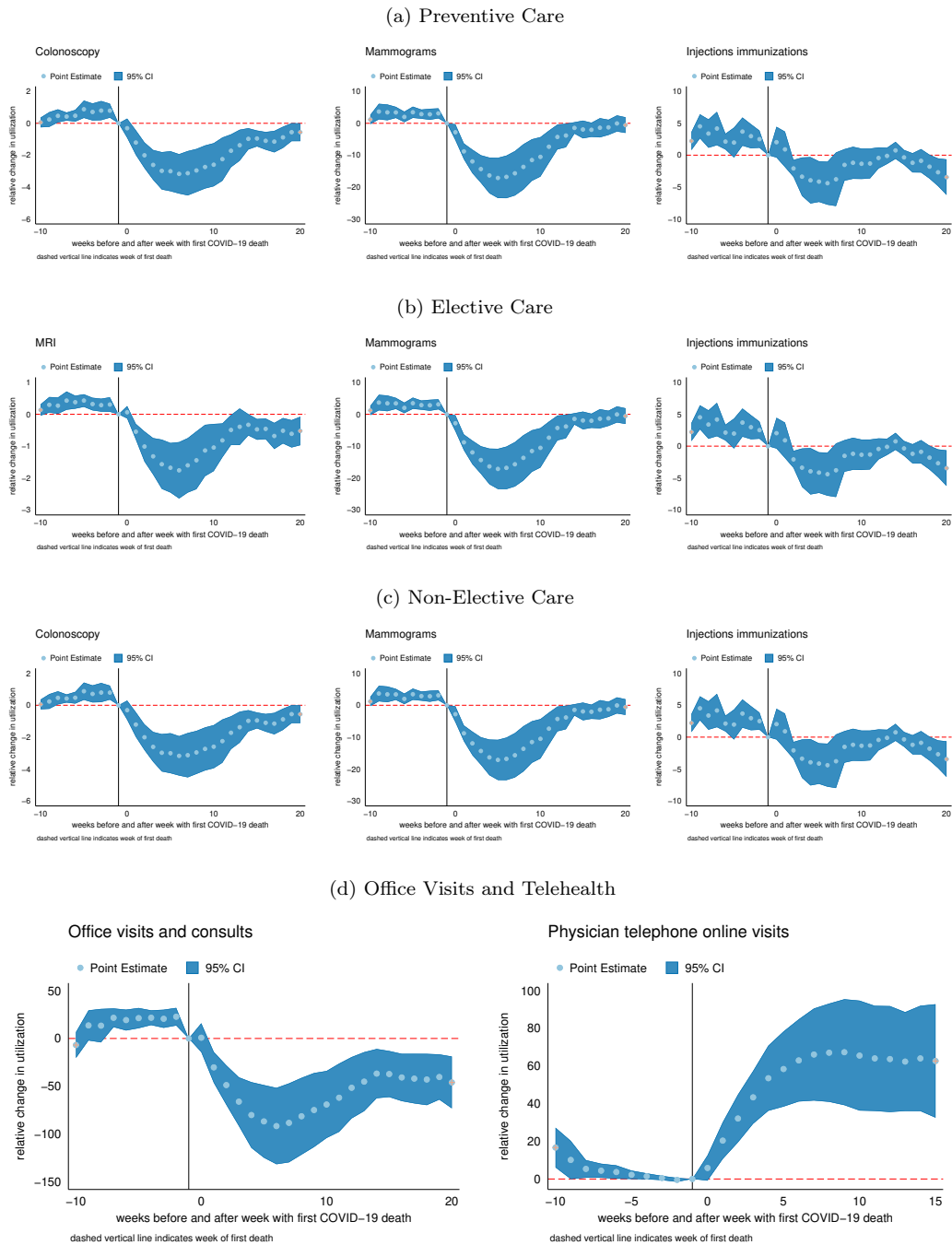
Appendix Table 11: Effect of State-Elective Procedure Ban Policies on Visits to Medical and Diagnostic Laboratories, Nursing Care Facilities, Retirement Communities and Specialty Hospitals

	(1)	(2)	(3)	(4)	(5)	(6)
	Medical and Diagnostic Laboratories			Nursing Care Facilities		
Panel A: Level changes						
post shelter in place	-4.751*** (0.633)	-1.524* (0.777)	0.765 (0.671)	-11.54*** (1.215)	-5.464*** (1.326)	-1.619 (1.312)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,157,337	1,157,337	1,157,337	748,765	748,765	748,765
R-squared	0.07	0.07	0.07	0.21	0.21	0.22
baseline mean	28.09	28.09	28.09	61.54	61.54	61.54
Panel B: Log changes						
post shelter in place	-0.182*** (0.0137)	-0.0894*** (0.0168)	-0.0209* (0.0127)	-0.246*** (0.0194)	-0.145*** (0.0209)	-0.0764*** (0.0184)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,157,337	1,157,337	1,157,337	748,765	748,765	748,765
R-squared	0.10	0.10	0.10	0.23	0.24	0.24
Baseline mean	2.59	2.59	2.59	3.68	3.68	3.68
	Retirement Communities and Assisted Living Facilities			Specialty Hospitals		
Panel A: Level changes						
post shelter in place	-6.752*** (0.590)	-2.225*** (0.691)	0.583 (0.554)	-8.864*** (1.885)	-4.041* (2.241)	-0.931 (2.675)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,622,258	1,622,258	1,622,258	294,129	294,129	294,129
R-squared	0.13	0.13	0.13	0.16	0.16	0.16
baseline mean	39.80	39.80	39.80	39.71	39.71	39.71
Panel B: Log changes						
post shelter in place	-0.208*** (0.0125)	-0.0947*** (0.0147)	-0.0204** (0.0102)	-0.253*** (0.0221)	-0.159*** (0.0263)	-0.0895*** (0.0275)
Weeks since first case FE		X	X		X	X
Weeks since first death FE		X	X		X	X
Year X Week FE			X			X
Observations	1,622,258	1,622,258	1,622,258	294,129	294,129	294,129
R-squared	0.17	0.18	0.18	0.21	0.21	0.22
Baseline mean	3.19	3.19	3.19	2.77	2.77	2.77

Caption: Unit of analysis is the number of visits in a week to health care provider locations. Baseline means are calculated based on the ninth week of 2019. Regression models were estimated using ordinary least squares and regressions include fixed effects for county and week. The outcome measure is the number of visits. We use the four-digit NAICS code to identify medical and diagnostic laboratories (6215), nursing care facilities (6231), retirement communities and assisted living facilities (6233), and specialty hospitals (6223). Standard errors are clustered at the county level. *** p<0.01, ** p<0.05, * p<0.1

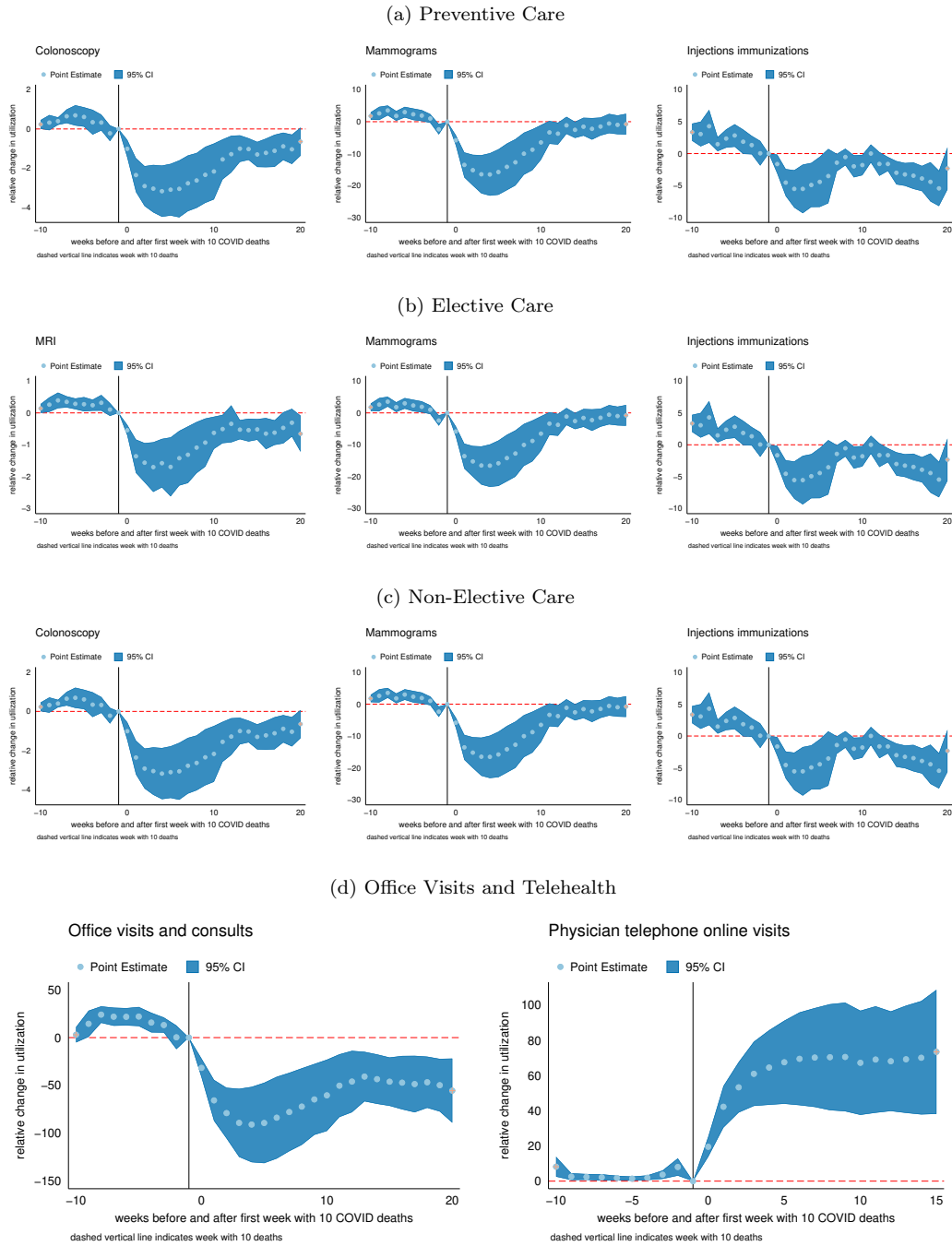
Supplemental Appendix Figures

Figure A.1: Alternative Policy: Week of First COVID-19 Death in County



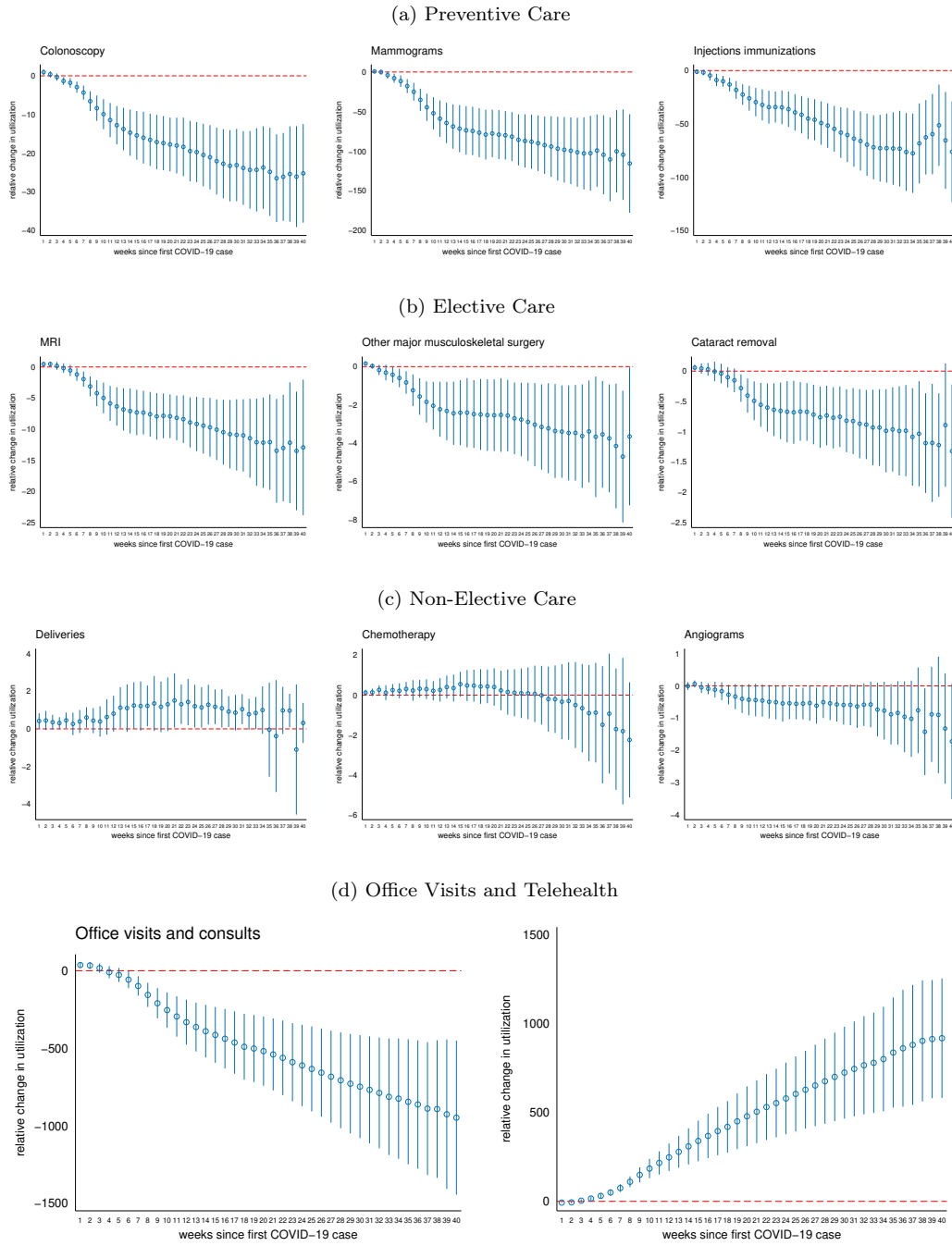
These figures present event study results that estimate the change in utilization for each service in the weeks before and after the first COVID-19 death in a county. The event study regressions are specified in equation (2).

Figure A.2: Alternative Policy: First Week with 10 COVID-19 Deaths in County



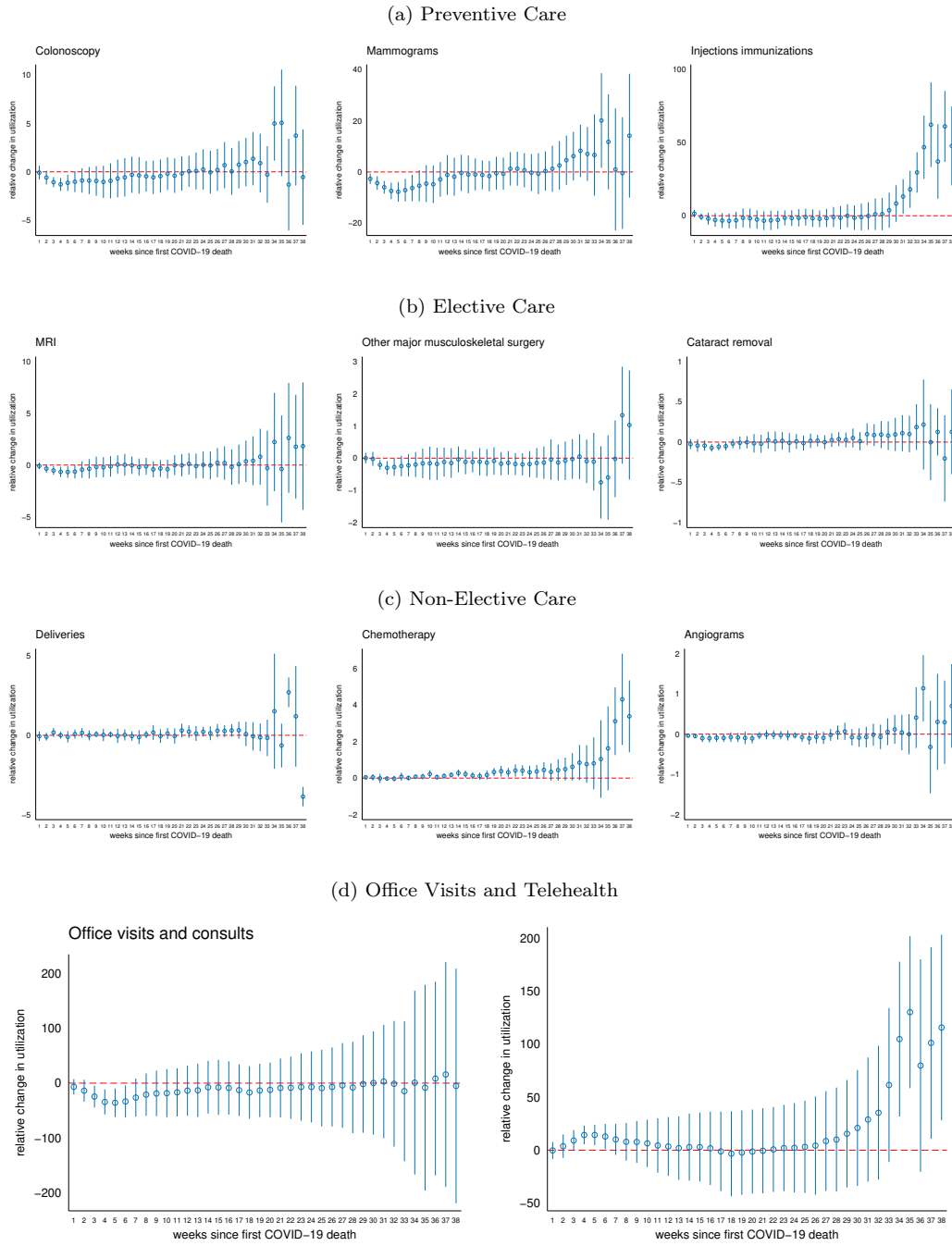
These figures present event study results that estimate the change in utilization for each service in the weeks before and after the first week with 10 or more COVID-19 deaths in a county. The event study regressions are specified in equation (2).

Figure A.3: Fixed Effects for Weeks Since First COVID-19 Case



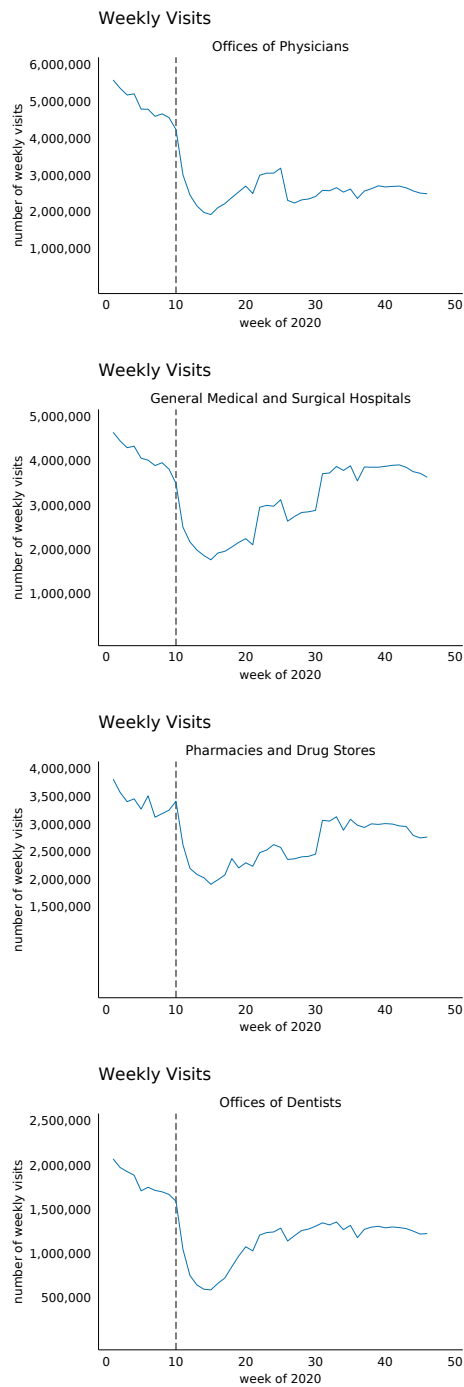
These figures present the $\sum_t \phi_t caseweeks_{gt}$ fixed effects from equation (1) that measure the number of weeks since the first COVID-19 case in a county.

Figure A.4: Fixed Effects for Weeks Since First COVID-19 Death



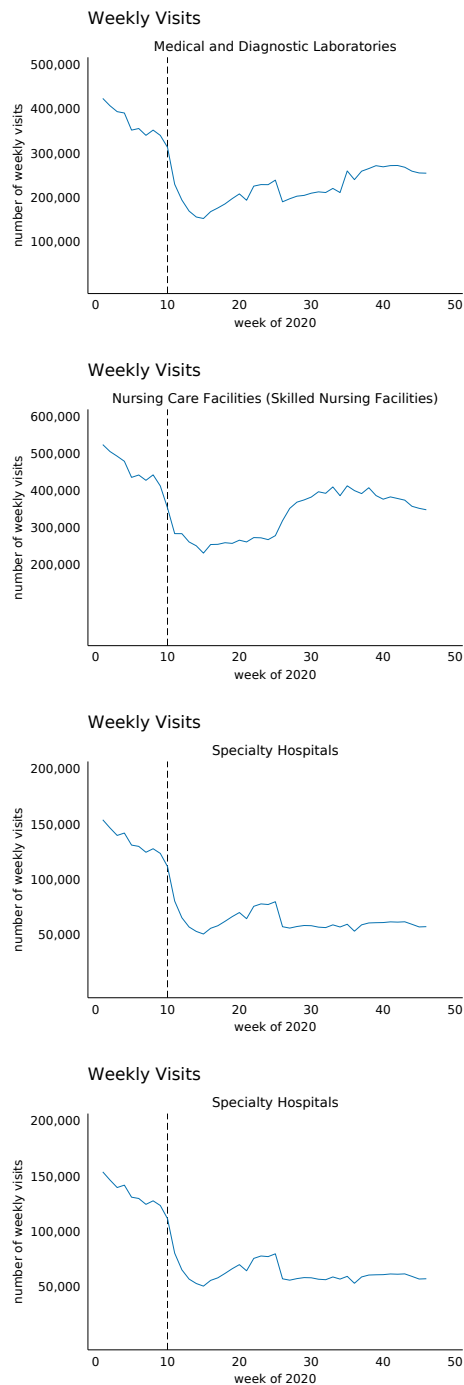
These figures present the $\sum_t \phi_t deathweeks_{gt}$ fixed effects from equation (1) that measure the number of weeks since the first COVID-19 death in a county.

Figure A.5: Trends in Weekly Visits to Physician Office and Hospital Locations Using Cellular Phone Mobility Data for 2020



Total number of weekly visits were calculated for hospitals and offices of physicians in the SafeGraph data. We use the four-digit NAICS code to identify office of physicians (6211), general medical and surgical hospitals (6221), health and personal care stores (4461), and offices of dentists (6212).

Figure A.6: Trends in Weekly Visits to Medical and Diagnostic Laboratories, Nursing Care Facilities, Retirement Communities and Specialty Hospitals Using Cellular Phone Mobility Data for 2020



Total number of weekly visits were calculated for hospitals and offices of physicians in the SafeGraph data. We use the four-digit NAICS code to identify medical and diagnostic laboratories (6215), nursing care facilities (6231), retirement communities and assisted living facilities (6233), and specialty hospitals (6223).