A. Online Appendix

This appendix contains supplemental material to the main paper and is not intended to be read in isolation. Section A.1 provides additional model estimates as the supporting evidence for the robustness checks described in §6 of the paper. Section A.2 provides tables with descriptive statistics for both the cross sectional census data as well as the panel data used in the main analysis. Section A.3 provides extended versions of the main results where the estimates for the control variables have not been suppressed. Section §A.4 provides supplemental figures including a map of the region with treatment and control locations, as well as a map showing the locations of major competitor hospitals. Section §A.5 presents the investigation for evidence against parallel trends. Section §A.6 describes the details of the matching procedure between patients' de-identified addresses and census locations. Finally, section A.7 presents further a robustness investigation as to whether the imperfect tracking of referral follow-up at the hospital inherent in the data may impact the main insights.

A.1. Estimates for Robustness Checks Described in §6.

Unless otherwise noted - all regressions below include location and time FEs, as well as variables for camps, and controls as given by equation (2). Two-way clustered standard errors (Census Location i, Period t) are shown in parenthesis where significance is indicated by $^{*}(p < 0.05)$, $^{**}(p < 0.01)$, $^{***}(p < 0.001)$.

Table 7 Robustness to Census Location Specific Time Trends and Spillover Beyond 10km

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	1.84***	1.96***	-0.12	1.11***	-0.00	0.65***	-0.08	0.22***	0.02	126.96
	(0.18)	(0.16)	(0.11)	(0.09)	(0.05)	(0.10)	(0.08)	(0.03)	(0.03)	(150.48)
Telemed. Center[10-15km]	0.46***	0.42***	0.03	0.21**	-0.00	0.24***	0.07	0.08**	0.06*	155.84
	(0.12)	(0.09)	(0.08)	(0.07)	(0.04)	(0.07)	(0.06)	(0.03)	(0.02)	(144.20)
Census Location Time Trend						Yes				
Observations	186552	186552	186552	186552	186552	186552	186552	186552	186552	186552
Adjusted R^2	0.767	0.693	0.760	0.616	0.585	0.581	0.556	0.467	0.190	0.248

Table 8 Controls more than 15km from a telemedicine center

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	2.25***	2.53***	-0.28*	1.25***	-0.14**	0.85***	-0.10	0.22***	0.03	-59.20
	(0.24)	(0.21)	(0.12)	(0.11)	(0.05)	(0.12)	(0.07)	(0.04)	(0.02)	(140.19)
Observations	114616	114616	114616	114616	114616	114616	114616	114616	114616	114616
Adjusted R^2	0.725	0.525	0.745	0.578	0.582	0.542	0.537	0.458	0.191	0.202

Table 9 Controls more than 20km from a telemedicine center

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	2.02***	2.44***	-0.42**	1.17***	-0.16**	0.74***	-0.21*	0.17***	0.01	-157.58
	(0.27)	(0.25)	(0.14)	(0.13)	(0.06)	(0.14)	(0.09)	(0.04)	(0.04)	(206.05)
Observations	66119	66119	66119	66119	66119	66119	66119	66119	66119	66119
Adjusted R^2	0.733	0.524	0.763	0.583	0.596	0.568	0.570	0.489	0.218	0.249

Table 10 Treatment Group Only

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	1.55***	1.96***	-0.41***	1.05***	-0.14**	0.48***	-0.20**	0.14**	0.00	-197.39
	(0.19)	(0.16)	(0.12)	(0.10)	(0.05)	(0.09)	(0.06)	(0.04)	(0.03)	(169.63)
Observations	59555	59555	59555	59555	59555	59555	59555	59555	59555	59555
Adjusted R^2	0.763	0.509	0.786	0.616	0.635	0.575	0.584	0.512	0.214	0.246

Table 11 Extended Treatment Group Only Baseline

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	1.65***	2.04***	-0.38***	1.04***	-0.15**	0.53***	-0.20**	0.16***	0.00	-202.29
	(0.18)	(0.15)	(0.10)	(0.10)	(0.04)	(0.09)	(0.06)	(0.04)	(0.02)	(151.85)
Observations	86320	86320	86320	86320	86320	86320	86320	86320	86320	86320
Adjusted R^2	0.750	0.525	0.780	0.606	0.626	0.577	0.584	0.515	0.210	0.241

Table 12 Early Opening TCs - Extended Treatment Group

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Early Telemed. Ctr. $[0-10km]$	1.76***	1.87***	-0.11	1.00***	-0.14	0.70***	0.07	0.14*	0.03	241.61
	(0.30)	(0.24)	(0.19)	(0.15)	(0.10)	(0.15)	(0.10)	(0.06)	(0.03)	(187.05)
Observations	38619	38619	38619	38619	38619	38619	38619	38619	38619	38619
Adjusted R^2	0.822	0.590	0.845	0.683	0.709	0.669	0.683	0.609	0.284	0.331

Table 13 Mid Opening TCs - Extended Treatment Group

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Middle Telemed. Ctr. $[0-10km]$	2.06***	2.24***	-0.18	1.23***	-0.12	0.66***	-0.09	0.24**	0.01	79.90
	(0.41)	(0.33)	(0.19)	(0.21)	(0.08)	(0.19)	(0.11)	(0.07)	(0.03)	(243.04)
Observations	32141	32141	32141	32141	32141	32141	32141	32141	32141	32141
Adjusted R^2	0.695	0.495	0.743	0.562	0.604	0.590	0.600	0.536	0.230	0.325

Table 14 Late Opening TCs - Extended Treatment Group

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Late Telemed. Ctr. $[0-10km]$	2.10***	2.15***	-0.05	0.97***	-0.03	0.91***	-0.03	0.27***	0.02	-241.33
	(0.37)	(0.30)	(0.18)	(0.16)	(0.08)	(0.22)	(0.14)	(0.07)	(0.05)	(429.82)
Observations	31464	31464	31464	31464	31464	31464	31464	31464	31464	31464
Adjusted R^2	0.664	0.416	0.680	0.491	0.483	0.464	0.457	0.389	0.163	0.189

Table 15 Telemedicine Center Propensity Score Model With Competitors

	(1)	
No. of Potential TC locations [0-10km]	1.184***	(0.0141)
population (1000s)	0.970***	(0.00807)
Road Proximity		
[0-5km]	1.710*	(0.390)
[5-10km]	1.646*	(0.400)
Indicator for competitors within [0-10km]	0.277***	(0.0591)
No. of competitors [0-10km]	1.145***	(0.0365)
Indicator for competitors within [10-20km]	1.291	(0.180)
No. of competitors [10-20km]	1.042	(0.0217)
Hospital Proximity		
[25-50km]	1.826*	(0.432)
[50-75km]	1.247	(0.319)
[75+km]	0.493*	(0.138)
District FEs	Yes	
Observations	1973	

Exponentiated coefficients; Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16 Competitor Controls

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	2.03***	2.34***	-0.31*	1.11***	-0.16***	0.81***	-0.09	0.19***	0.02	-2.69
	(0.29)	(0.26)	(0.12)	(0.13)	(0.05)	(0.15)	(0.07)	(0.04)	(0.02)	(137.29)
# Competitors[0-10km]	0.12	-0.07**	0.19*	0.03	0.06*	0.08*	0.10**	0.03	0.00	214.74**
	(0.07)	(0.02)	(0.07)	(0.03)	(0.03)	(0.04)	(0.04)	(0.02)	(0.01)	(79.84)
# Competitors[10-20km]	0.08	-0.07**	0.15***	0.03	0.07***	0.05*	0.08***	0.03**	0.01	101.17*
	(0.04)	(0.02)	(0.04)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.00)	(42.56)
Telemed. Center[0-10km]	-0.22**	-0.26***	0.04	-0.09*	0.05	-0.11**	-0.01	0.01	-0.02	-16.13
× # Competitors[0-10km]	(0.08)	(0.04)	(0.06)	(0.04)	(0.03)	(0.04)	(0.03)	(0.02)	(0.01)	(65.35)
Telemed. Center[0-10km]	0.10	0.01	0.09*	0.06*	0.04*	0.01	0.03	0.02	0.00	59.37
× # Competitors[10-20km]	(0.06)	(0.05)	(0.04)	(0.03)	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)	(37.77)
Observations	195740	195740	195740	195740	195740	195740	195740	195740	195740	195740
Adjusted R^2	0.717	0.493	0.735	0.556	0.558	0.536	0.529	0.437	0.185	0.207

Table 17 Repeat Camps (12mo Rolling Total)

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	2.06***	2.41***	-0.35**	1.13***	-0.17***	0.76***	-0.15*	0.19***	0.01	-18.52
	(0.25)	(0.23)	(0.11)	(0.12)	(0.04)	(0.13)	(0.07)	(0.04)	(0.03)	(137.17)
Rolling 12mo Camps[0-10km]	0.02	-0.01	0.03*	0.02*	0.02**	0.01	0.01	0.01*	-0.00	45.17*
	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(21.19)
Camps[0-10km]: One	0.21***	-0.01	0.22***	-0.00	0.00	0.20***	0.21***	-0.01	0.19***	-110.02
	(0.05)	(0.02)	(0.04)	(0.02)	(0.02)	(0.03)	(0.03)	(0.01)	(0.02)	(60.47)
Camps[0-10km]: Two+	0.37**	-0.04	0.41***	0.03	0.04	0.37***	0.38***	0.02	0.25***	118.95
	(0.11)	(0.05)	(0.11)	(0.05)	(0.05)	(0.08)	(0.08)	(0.03)	(0.04)	(133.95)
Observations	166481	166481	166481	166481	166481	166481	166481	166481	166481	166481
Adjusted R^2	0.727	0.537	0.741	0.570	0.564	0.541	0.531	0.447	0.185	0.216

Table 18 Robustness Minimum Census Location Visit Count

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	2.24***	2.70***	-0.46***	1.31***	-0.19***	0.77***	-0.21**	0.21***	0.02	-154.46
	(0.27)	(0.25)	(0.13)	(0.13)	(0.05)	(0.13)	(0.07)	(0.04)	(0.03)	(152.82)
Observations	136460	136460	136460	136460	136460	136460	136460	136460	136460	136460
Adjusted R^2	0.757	0.533	0.784	0.619	0.645	0.601	0.606	0.549	0.232	0.300

Table 19 Standard Errors Clustered by Subdistrict and Time

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	2.03***	2.32***	-0.28**	1.14***	-0.13***	0.75***	-0.11	0.19***	0.02	-14.57
	(0.25)	(0.24)	(0.10)	(0.14)	(0.04)	(0.14)	(0.07)	(0.04)	(0.03)	(144.72)
Observations	186552	186552	186552	186552	186552	186552	186552	186552	186552	186552
Adjusted R^2	0.718	0.499	0.735	0.560	0.561	0.531	0.524	0.441	0.183	0.209

Table 20 Two-way Robust Clustered Standard Errors, Closest Telemedicine Center and Time

	Network	Telemed. Center	Hospital	Network General	Hospital General	Network Cataract	Hospital Cataract	Glasses Rx.	Cataract Surgery	Network Charge Rate
Telemed. Center[0-10km]	2.03***	2.32***	-0.28*	1.14***	-0.13**	0.75***	-0.11	0.19***	0.02	-14.57
	(0.21)	(0.18)	(0.10)	(0.12)	(0.04)	(0.14)	(0.06)	(0.03)	(0.03)	(119.90)
Observations	186552	186552	186552	186552	186552	186552	186552	186552	186552	186552
Adjusted R^2	0.718	0.499	0.735	0.560	0.561	0.531	0.524	0.441	0.183	0.209

A.2. Descriptive Statistics

Table 21 provides descriptive statistics for the cross-sectional census location level data, 22 provides descriptive statistics for the panel data, and 23 presents the average hospital visit rates for 25km rings around the hospital.

Table 21 Descriptive Statistics (Cross-sectional Census Data)

	Treatment Group $n = 729$ mean (std. error)	Control Group $n = 1244$ mean (std. error)	Total $n = 1973$ mean (std. error)
No. of Potential TC Locations $[0-10km]$	7.96 (0.21)	4.59 (0.13)	5.84 (0.12)
Population (1000s)	3.28 (0.2)	4.93 (0.87)	4.32 (0.55)
Road $[0-5km]$ (indicator)	0.78 (0.02)	0.78 (0.01)	0.78 (0.01)
Road $[5-10km]$ (indicator)	0.17 (0.01)	0.16 (0.01)	0.16 (0.01)
Distance to Madurai Hospital (km)	43.33 (0.77)	50.76 (0.72)	48.01 (0.54)
No. of Doctors	0.86 (0.1)	1.3 (0.24)	1.14 (0.15)
No. of Health Centers	1.68 (0.12)	2.07 (0.14)	1.93 (0.1)
No of Dispensaries	0.64 (0.07)	1.52 (0.52)	1.19 (0.33)
Homeless Population (1000s)	0.86 (0.05)	1.3 (0.23)	1.14 (0.14)
Female Population (1000s)	1.64 (0.1)	2.46 (0.43)	2.16 (0.28)
Literate Population (1000s)	2.27 (0.15)	3.61 (0.71)	3.12 (0.45)
Area (Sq. km)	7.76 (0.39)	9.32 (0.31)	8.74 (0.24)
No. Households	860.95 (52.54)	1303.18 (227.25)	1139.78 (144.65)

A.3. Regression with estimates for controls

To provide transparency over controls, we provide copies of the main regression results in Table 24 below including estimates for all controls with the exception of the 112 time fixed effects and the 1682 location fixed effects.

Table 22 Descriptive Statistics (Panel data used in second-stage DiD models)

	Treatment Group	Control Group	Total
Dependent Variables	mean (std. error)	mean (std. error)	mean (std. error)
Network Visit Rate	6.18 (0.03)	4.54 (0.02)	5.18 (0.02)
Telemed. Ctr. Visit Rate	1.5 (0.01)	0.42 (0.01)	0.84 (0.01)
Hospital Visit Rate	4.69 (0.03)	4.11 (0.02)	4.34 (0.02)
Hospital Visit Rate (Excluding referrals)	4.62 (0.03)	4.09 (0.02)	4.3 (0.02)
New Patient Visit Rate	2.97 (0.02)	2.08 (0.01)	2.43 (0.01)
Return Patient Visit Rate	3.21 (0.02)	2.45 (0.01)	2.75 (0.01)
General Patient Visit Rate (Network)	2.39 (0.01)	1.55 (0.01)	1.87 (0.01)
General Patient Visit Rate (Telemed. Ctr.)	0.88 (0.01)	0.23 (0)	0.48 (0)
General Patient Visit Rate (Hospital)	1.51 (0.01)	1.31 (0.01)	1.39 (0.01)
Cataract Patient Visit Rate (Network)	2.52 (0.02)	1.96 (0.01)	2.18 (0.01)
Cataract Patient Visit Rate (Telemed. Ctr.)	0.5 (0.01)	0.16 (0)	0.29 (0)
Cataract Patient Visit Rate (Hospital)	2.02 (0.01)	1.8 (0.01)	1.89 (0.01)
Glasses Rx. Rate (Network)	0.98 (0.01)	0.76 (0.01)	0.84 (0)
Glasses Rx. Rate (Telemed. Ctr.)	0.2 (0)	0.05 (0)	0.11 (0)
Glasses Rx. Rate (Hospital)	0.79 (0.01)	0.7 (0.01)	0.73 (0)
Cataract Surgery Rate	0.47 (0.01)	0.42 (0)	0.44 (0)
Charge Rate (Network)	2439.73 (32.18)	2136.75 (21.67)	2254.74 (18.23)
Charge Rate (Telemed. Ctr.)	56.92 (0.77)	16.43 (0.55)	32.2 (0.45)
Charge Rate (Hospital)	2382.81 (32.13)	2120.32 (21.64)	2222.54 (18.2)
Independent Variables	n	n	n
Telemedicine Center [0-10km]			
No (baseline catg.)	34,064	113,906	147,970
Yes	38,582	0	38,582
Camps[0-10km]			
Zero (baseline catg.)	56,982	89,082	146,064
One	14,328	22,304	36,632
Two+	1,336	2,520	3,856
Lag Camps[0-10km] (1 pd)			
Zero (baseline catg.)	56,991	89,158	146,149
One	14,317	22,289	36,606
Two+	1,338	2,459	3,797
Dindigul Secondary Hospital			
[0-5km]	114	228	342
[5-10km]	912	513	1,425
[10-15km]	1,083	969	2,052
[15-20km]	969	1,008	1,977
[20-25km]	1,083	627	1,710
[25-30km]	513	1,425	1,938
[30km+] (baseline catg.)	67,972	109,136	177,108
Other Secondary Hospital			
[20-25km]	0	306	306
[25-30km]	0	408	408
[30km+] (baseline catg.)	72,646	113,192	185,838
Other Telemedicine Center			
[0-5km]	0	356	356
[5-10km]	235	734	969
[10-15km]	307	1,433	1,740
[15km+] (baseline catg.)	72,104	111,383	183,487

Table 23 Descriptive Statistics (Hospital Visit Rates by Distance to the Hospital)

Distance to the Hospital	Mean Hospital Visit Rate (Std. Err)
$0-25km$	7.14 (0.05)
$25-50km$	4.21 (0.03)
$50-75km$	2.88 (0.02)
$75km+$	2.58 (0.04)
Total	4.33 (0.17)

Table 24 Main Regression Results with Control Variable Estimates

	(1) Network	(2) Telemed. Center	(3) Hospital	(4) Network General	(5) Hospital General	(6) Network Cataract	(7) Hospital Cataract	(8) Glasses Rx.	(9) Cataract Surgery	(10) Network Charge Rate
Telemed. Center[0-10km]	2.03***	2.32***	-0.28*	1.14***	-0.13**	0.75***	-0.11	0.19***	0.02	-14.57
	(0.23)	(0.21)	(0.11)	(0.11)	(0.04)	(0.12)	(0.06)	(0.04)	(0.02)	(129.49)
Camps[0-10km]: One	0.24***	-0.02	0.26***	0.01	0.02	0.22***	0.23***	0.00	0.19***	-42.06
	(0.05)	(0.02)	(0.04)	(0.02)	(0.02)	(0.03)	(0.03)	(0.01)	(0.02)	(49.82)
Camps[0-10km]: Two+	0.42***	-0.06	0.48***	0.06	0.09	0.36***	0.38***	0.04	0.23***	174.57
	(0.10)	(0.06)	(0.12)	(0.05)	(0.06)	(0.07)	(0.07)	(0.03)	(0.03)	(138.15)
Lag(Camps[0-10km]): One	0.01	-0.01	0.02	-0.01	0.01	0.02	0.00	-0.01	-0.02	-41.74
	(0.04)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)	(53.65)
Lag(Camps[0-10km]): Two+	0.16	-0.03	0.19	0.04	0.07	0.15*	0.13*	0.01	0.01	-23.59
	(0.10)	(0.06)	(0.11)	(0.05)	(0.05)	(0.06)	(0.06)	(0.03)	(0.03)	(114.30)
Dindigul[0-5km]	-2.00***	-1.03***	-0.97***	-0.89***	-0.36***	-0.96***	-0.57***	-0.35***	-0.08*	-1365.84***
	(0.26)	(0.20)	(0.13)	(0.12)	(0.05)	(0.13)	(0.09)	(0.04)	(0.04)	(178.90)
Dindigul[5-10km]	-3.30***	-1.07***	-2.22**	-1.40***	-0.82**	-1.46***	-1.06***	-0.61***	-0.34	-1220.91***
	(0.85)	(0.25)	(0.75)	(0.35)	(0.29)	(0.33)	(0.29)	(0.17)	(0.19)	(329.58)
Dindigul[10-15km]	-2.08***	-0.62**	-1.46***	-0.81***	-0.54***	-1.03***	-0.76***	-0.41***	-0.17***	-997.28***
	(0.33)	(0.21)	(0.23)	(0.15)	(0.09)	(0.14)	(0.09)	(0.08)	(0.03)	(187.02)
Dindigul[15-20km]	-1.37***	-0.05	-1.32***	-0.44	-0.57***	-0.65***	-0.54***	-0.20*	-0.09	-846.34***
	(0.37)	(0.44)	(0.17)	(0.26)	(0.09)	(0.16)	(0.08)	(0.09)	(0.05)	(184.32)
Dindigul[20-25km]	-1.35***	-0.41	-0.94***	-0.50**	-0.38***	-0.66***	-0.50***	-0.26***	-0.10***	-1021.45***
	(0.32)	(0.30)	(0.12)	(0.17)	(0.05)	(0.15)	(0.07)	(0.04)	(0.02)	(199.35)
Dindigul[25-30km]	-0.74***	-0.11	-0.63***	-0.17	-0.23***	-0.54***	-0.42***	-0.10	-0.08*	-490.14
	(0.21)	(0.20)	(0.13)	(0.13)	(0.05)	(0.11)	(0.10)	(0.05)	(0.03)	(250.65)
Other Hosptial[20-25km]	0.07	-0.07	0.14	-0.11	-0.11	0.29	0.28	-0.05	0.17	-814.83
	(1.20)	(0.52)	(0.69)	(0.43)	(0.16)	(0.77)	(0.55)	(0.10)	(0.14)	(509.13)
Other Hosptial[25-30km]	-1.57***	-0.76***	-0.81***	-0.64***	-0.26***	-0.81***	-0.54**	-0.23***	-0.07	-1591.57***
	(0.22)	(0.08)	(0.20)	(0.06)	(0.04)	(0.18)	(0.17)	(0.05)	(0.09)	(282.26)
Other Telemed. Ctr.[0-5km] (Theni Hospital)	-0.87***	-0.29*	-0.58**	-0.43***	-0.29***	-0.51***	-0.39***	-0.20***	-0.07***	-315.24
	(0.24)	(0.13)	(0.19)	(0.11)	(0.08)	(0.13)	(0.11)	(0.05)	(0.02)	(250.32)
Other Telemed. Ctr.[5-10km] (Theni Hospital)	-0.05	0.38	-0.42	-0.16	-0.35*	0.09	-0.05	-0.23**	-0.03	307.51
	(0.46)	(0.27)	(0.35)	(0.20)	(0.16)	(0.27)	(0.24)	(0.08)	(0.09)	(271.12)
Other Telemed. Ctr.[10-15km] (Theni Hospital)	-0.17	0.09	-0.26	-0.14	-0.13	-0.01	-0.07	-0.08	-0.00	-150.00
	(0.29)	(0.18)	(0.19)	(0.14)	(0.09)	(0.14)	(0.10)	(0.04)	(0.03)	(159.93)

All regressions include location and time FEs, as well as variables for camps, and controls as given by equation (2). Two-way clustered standard errors (Census Location i, Period t) show in parenthesis * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

A.4. Supplemental Figures

Figure 5 below shows the census locations where the different shapes and colors indicate the treatment and control groups. The red circles are the control locations and the blue crosses are the treatment locations.

Figure 5 Map of the region indicating treatment and control groups

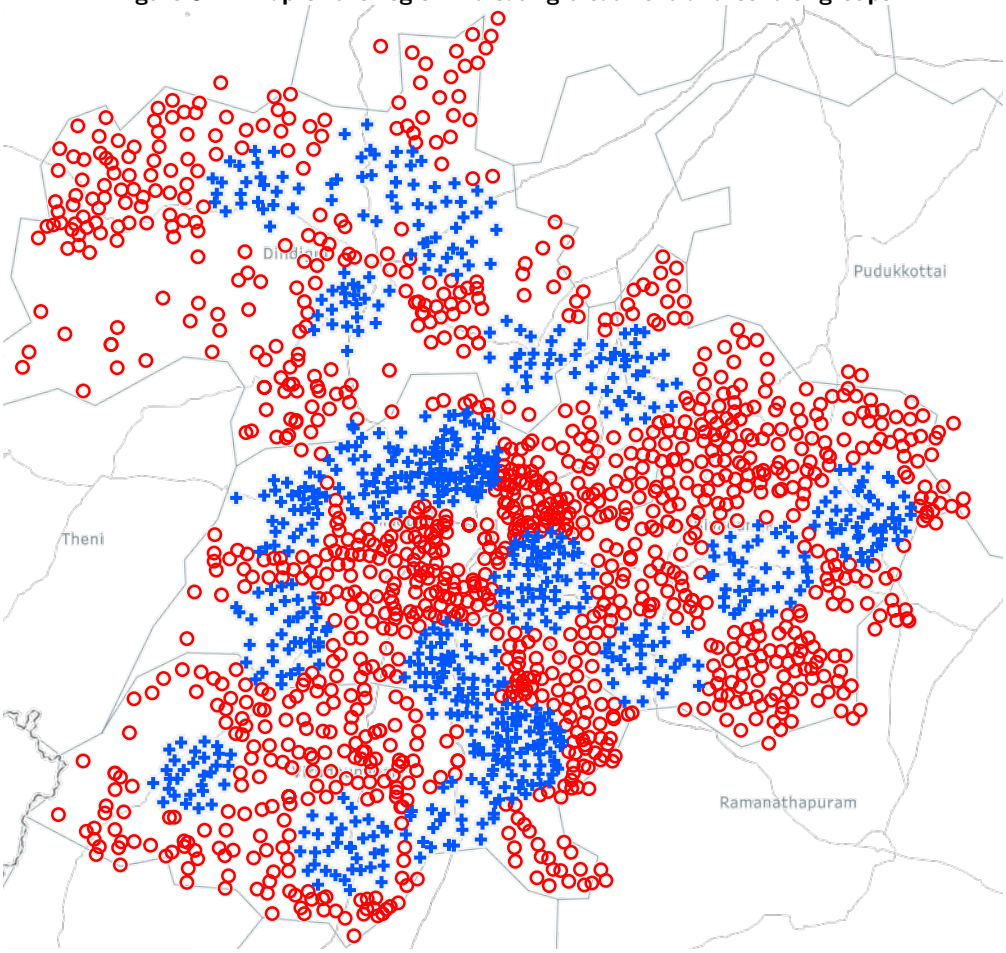
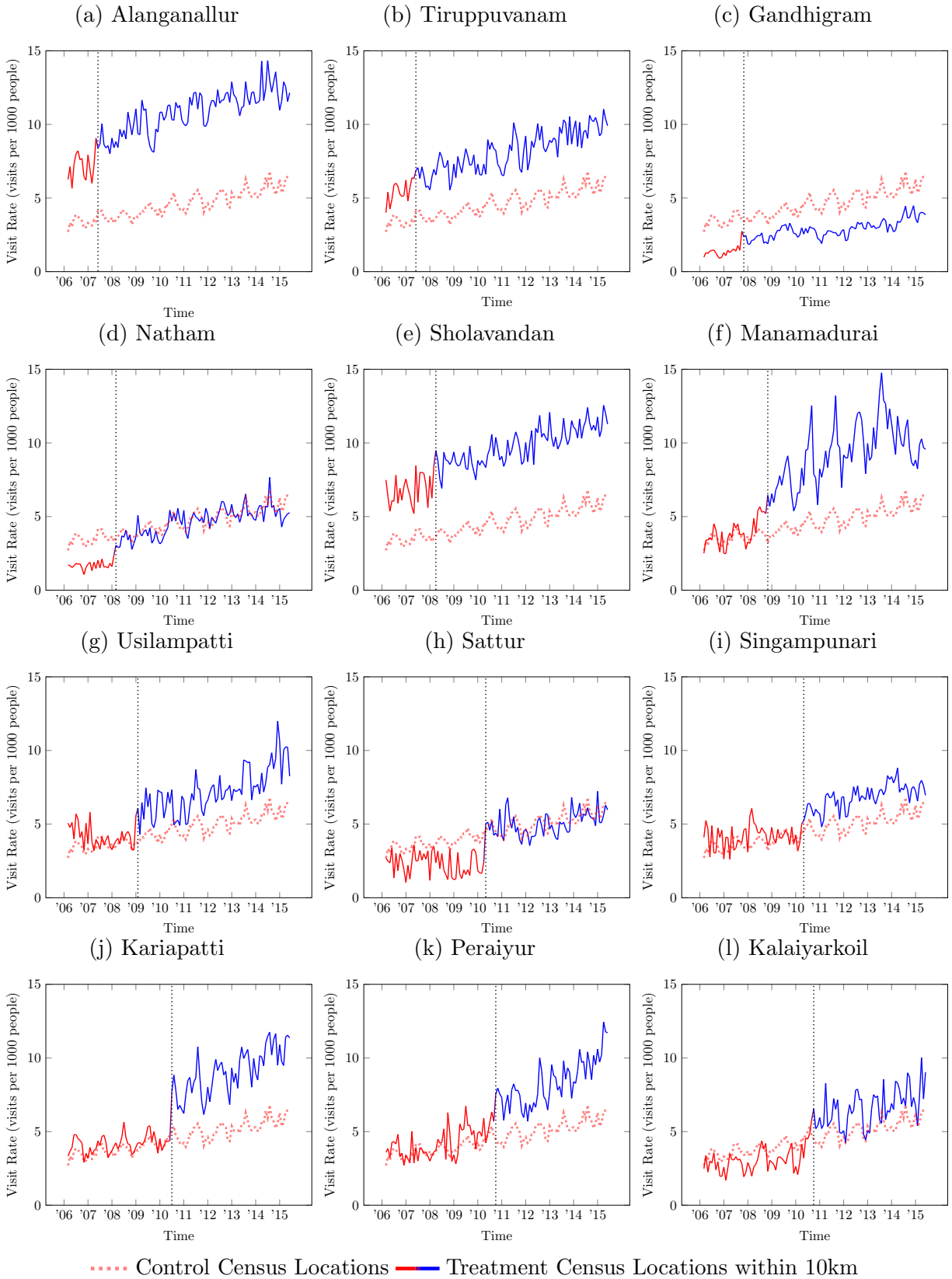
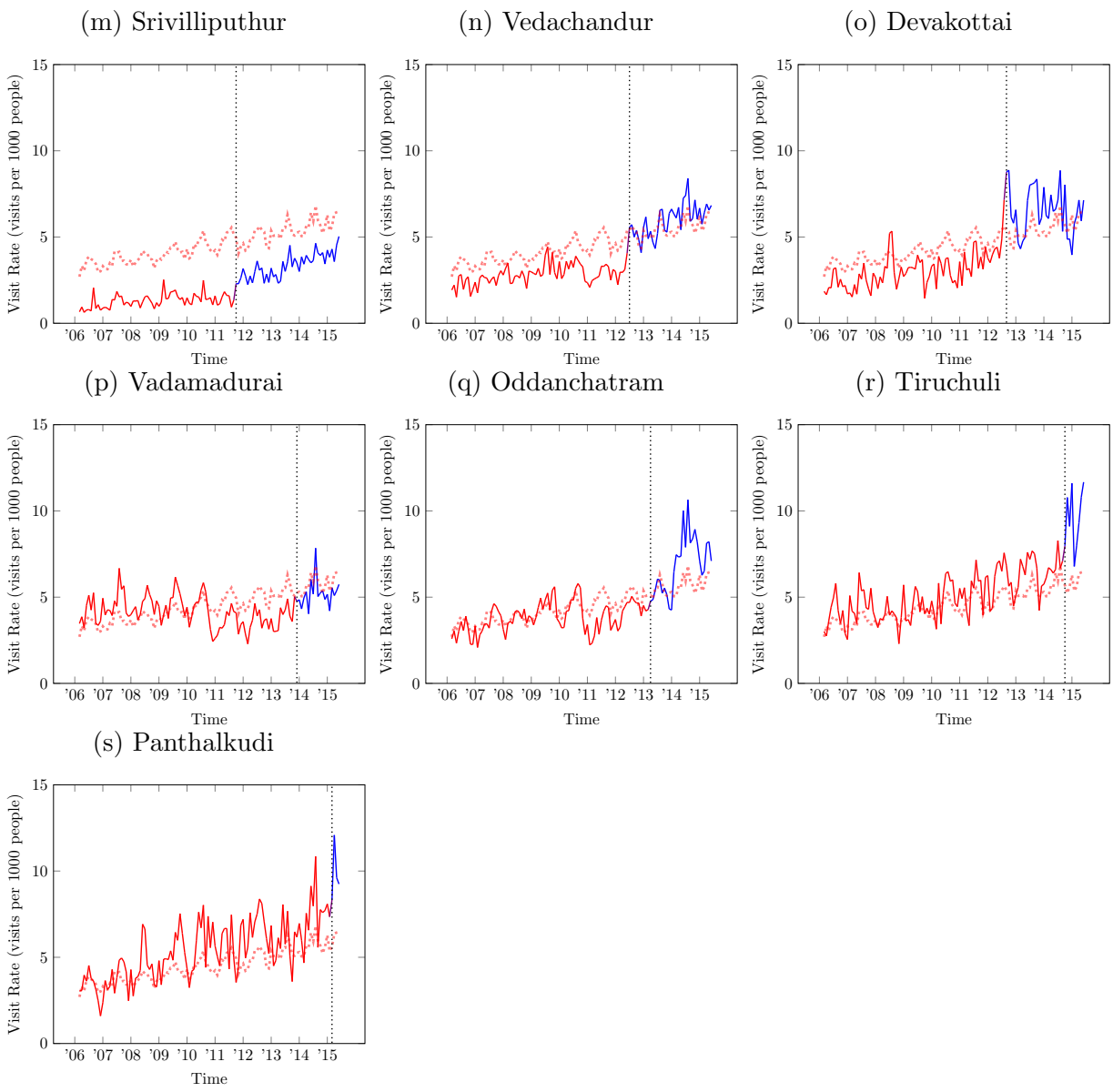


Figure 6 provides an extended version of Figure 2, and shows the corresponding graphic for each of the 19 telemedicine centers.

Figure 6 Effect of telemedicine center on monthly visit rate (per 1000 people) to the Aravind network

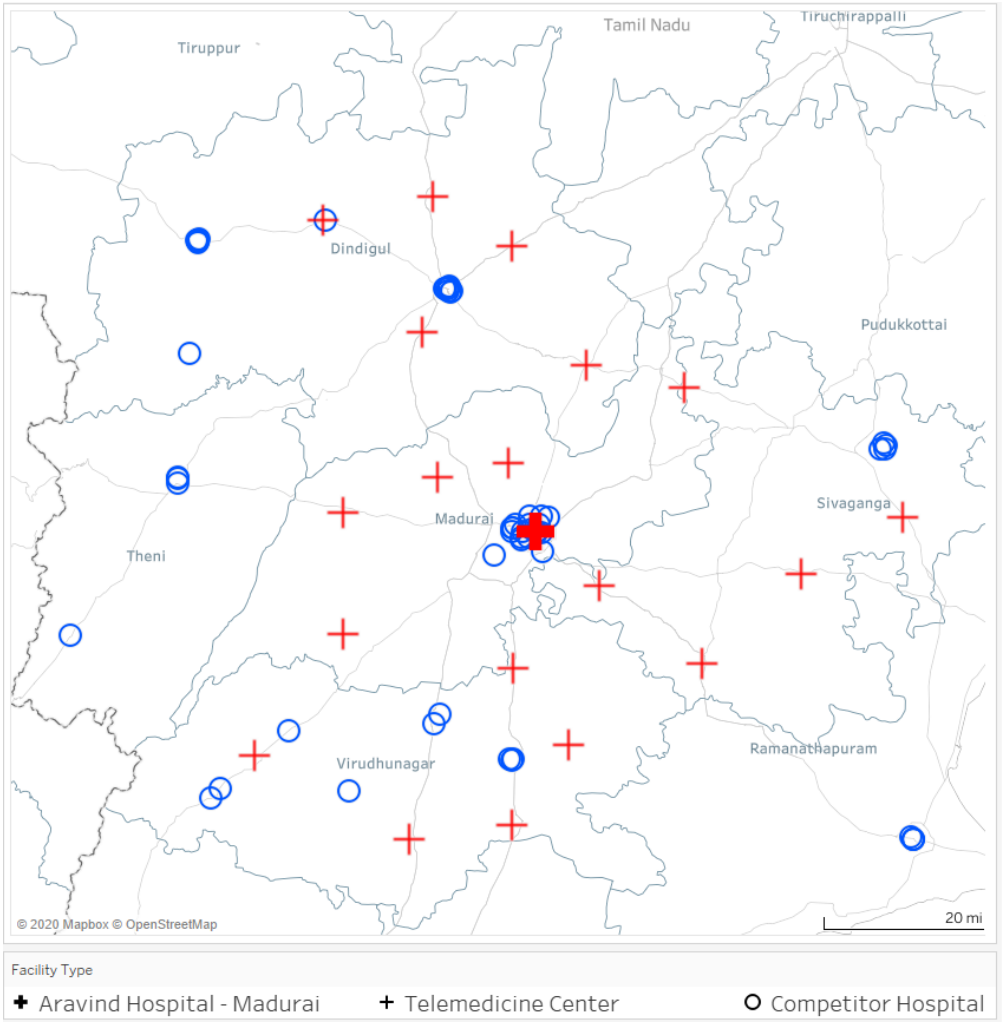




Note: The red dotted line represents the average visit rate (per 1000 people) over all control locations (i.e., all census locations that are never within 10km of a telemedicine center). The vertical black dotted line in each subfigure represents the month during which a telemedicine center opened in the village indicated by the subfigure title. The red and blue solid lines represent the average visit rate from treated locations (i.e., all census locations within 10km) of the telemedicine center where the color change from red to blue highlights the contrast before and after its opening.

Figure 7 shows the locations Both Aravind and Competitor facilities. The Aravind hospital in Madurai is indicated by the thick red cross, the telemedicine centers are indicated by the thin red crosses and competitor facilities are indicated by blue circles.

Figure 7 Madurai Hospital, Associated Telemedicine Centers, and Competitor Hospitals



A.5. Assessment of parallel trends assumption

As in other non-experimental settings, the application of the DiD model in our setting is not without concern. The primary concern is the validity of the parallel trends assumption which is the key of the DiD identification strategy, and which, if violated, could lead to biased estimates. While it is not a verifiable assumption, we look for evidence against parallel trends in two ways. The first is by fitting a parametric (linear) time trend for the treatment group in pretreatment periods, to see if there is a difference across the treatment and control groups before telemedicine centers open. The second is by generating random pre-treatment placebo effects. For the second, we run 100 simulations using the data where at some random point in time before treatment, a placebo effect captures differences across treatment and control groups. Since there cannot possibly be an effect of telemedicine centers before they open, we check if the p-values are less than 0.05 more than 5% of the time by computing the fifth percentile of the simulated p-values. If the fifth percentile is below 0.05, then estimating a standard difference in difference without controlling for

any differential in trends across the treatment and control groups may lead to biased estimates of the impact of telemedicine centers.

Table 25 shows the results of these tests for each dependent variable in our analysis. The first two columns show the coefficients and p-values for the parametric linear time trend tests. None of the estimates are significant at the 95% confidence level, though a few, specifically the cataract clinical group, cataract treatments, and charge rates show marginal significance at the 90% confidence level. The last three columns show the average coefficient, the average p-value, and the fifth percentile of the p-values, respectively across 100 simulated placebo treatments. The story is much the same as the parametric time trends analysis, the difference is this test shows those dependent variables with a marginally significant time trend for the treatment group, show significance at the 95% confidence level as shown in the third column. While we note the effect sizes are relatively small, this could lead to biased estimates in our base specification. To address this concern, we provide robustness checks that control for such differences by including census location specific time trends.

We note that a second possible concern is that if the treatment effects "spillover" and effect the control group, i.e., the effects of telemedicine centers extend past the ten kilometer boundary. However, as long as the effect on the treatment and control group is in the same direction, then the post treatment trends across treatment and control groups will be more similar than they otherwise would have been in the absence of spillover. Because this decreases the differences in differences across the treatment and control groups, this would bias the coefficient of telemedicine centers towards zero. As such, the base specification can be considered robust to spillovers. However, to address this concern we run robustness checks including spillover effects for census locations between ten to fifteen kilometers from a nearby telemedicine center.

Table 25 Pre-treatment Parallel Trends Analysis

	Treatment Group Trend		Summary of 100 Placebo Tests		
	Coefficient	p-value	Mean Coefficient	Mean p-value	5^{th} Percentile p-value
Network	0.004	0.312	0.094	0.520	0.136
Telemed. Ctr.	0.000	0.853	0.024	0.672	0.374
Hospital	0.004	0.255	0.070	0.537	0.102
Hospital (no referrals)	0.003	0.280	0.065	0.551	0.107
Network New Patient	0.000	0.862	0.001	0.657	0.303
Network Return Patient	0.004	0.179	0.093	0.389	0.067
Network General Clinical Group	0.000	0.904	-0.014	0.640	0.210
Telemed. Center General Clinical Group	0.000	0.821	0.013	0.677	0.323
Hospital General Clinical Group	0.000	0.935	-0.028	0.506	0.117
Network Cataract Clinical Group	0.004	0.087	**0.131**	0.184	**0.022**
Telemed. Center Cataract Clinical Group	0.000	0.989	0.007	0.670	0.305
Hospital Cataract Clinical Group	0.004	0.059	**0.124**	0.171	**0.019**
Network Glasses Rx.	0.000	0.884	-0.013	0.605	0.111
Telemed. Center Glasses Rx.	0.000	0.871	0.003	0.642	0.296
Hospital Glasses Rx.	0.000	0.923	-0.015	0.577	0.092
Hospital Cataract Surgery	0.001	0.168	**0.033**	0.292	**0.018**
Network Charges	12.57	0.079	**328.14**	0.187	**0.026**
Telemed. Center Charges	-0.03	0.762	0.126	0.732	0.253
Hospital Charges	12.60	0.078	**328.02**	0.187	**0.026**

Note, all regressions were run on census locations within the common support with propensity score weights, excluding census locations without any visits and any observations in the top percentile of the network visit rate.

A.6. Procedure for matching de-identified patient address to census locations

Before presenting a high level description of the procedure which generates a "fuzzy" match between patients and census locations, we note that it is a natural question whether an imperfect procedure could bias our estimates? We believe the answer, is very likely to be no. First let us consider that incorrectly assigning a patient to the wrong census locations introduces measurement error in the dependent variables of visit rates and none of the independent variables which depend on geolocation data and timing. Since the assignment procedure that matches census locations to patient address does not depend on any of the independent variables, any such measurement errors introduced by incorrect assignment should be uncorrelated with the independent variables, and in particular whether a census location is in the control group. Therefore, it will not bias the estimates of the independent variables, but may inflate estimates of standard errors. Thus, our results should be considered robust to such errors in assignment of patients to census locations.

We begin with a brief description of the data used in the matching of patients to census locations. We require such a procedure because the patient address data captured at Aravind does not specify the census location. Specifically, the de-identified patient address in the Aravind data is stored in multiple fields: locality, village, town, block/taluk, and district. The source data is filled out by patients on paper and is entered into the system by an administrator. However, the data entered is far from "clean" in the sense that there patients without homes (e.g., patients may put the name of a neighborhood for their locality or village) and multiple spellings/spelling errors because there are no limitations on what is entered into the system (except for the district field which is chosen from a drop down list). The census data we want to match the patient address information to contains the location name, which may be a rural village, or an urban town, subdistrict (which we note is distinct from block or taluk), and district. We further augment the census data with habitations and habitation blocks. Habitations can be considered neighborhoods, and habitation blocks are larger but distinct from village or town name and subdistrict. We note that there may be multiple habitations within a single census village and that not all census locations have such data. The description below outlines the high level aspects of the procedure to generate a "fuzzy" match between the patient address information and the census location information in order to measure the visit rates of each census location.

The procedure works by processing the given set of patient address fields and identifying the best match to the given data from the census data. The address information is then separated into what we deem "detailed" and "coarse" address information. Specifically we use locality, and village as detailed address information, and village, town, block/taluk, and district as coarse information.

For each patient, we first restrict all potential census location matches to the census locations in their district. We then make several comparisons between text strings in the patient address

information and the census location data. Note, to make these comparisons, we use the Levenshtein ratio which returns a measure between 0 and 1 where 0 indicates no similarity and 1 indicates perfect similarity. Specifically we make five comparisons: (1) detailed address strings to the census location name, (2) detailed address strings to habitations, (3) coarse address strings to the census location name, (4) coarse address strings to habitation blocks, and (5) coarse address information to sub-district. For each comparison, we use both the direct string as well as phonetically processed strings to address minor differences in spellings across patient address records.

We select the best census location matches from each comparison with a minimum of .8 similarity. This leaves 5 sets of potential matches. We group the matches based on which census data is matched to, specifically, matches to census location name, census subdistrict name, or habitations data. This creates 3 sets based on matching to distinct census location fields. The idea being, the more distinct matches to separate fields in the census data, the more likely the patient belongs to a specified census location. Therefore, we rank all potential census location matches by how many of these three sets they occur in. We note that we show preference to matches at the census location name and sub-district, simply because not all census locations have habitations data. If there are not matches in any set, the patient is considered un-matchable and is excluded.

The census location match for each patient is taken from the bast match within the best rank, where within rank, better matches are identified by matches to more detailed patient address information compared to coarse. For example, if there were two rank one matches, but one matched to census location name on the detailed patient address information and the other matched on coarse patient address information, the first is taken as a better match. When the rankings return a single match the procedure assigns that patient to the given census location and the procedure terminates. If there is not a unique match left after the ranking, the patient is randomly assigned to one of the remaining "best" matches where the probability of each is proportion to it's population, and the procedure terminates.

A.7. Robustness to imperfect measurement of referral follow-up

When measured from our data approximately 12.36% (87,053/704,409) of telemedicine center visits are referred to the hospital. If we consider any subsequent visit to the hospital following a referral as a follow-up, the follow-up rate per referral when computed from our data is 21.0% (18,278/87,053).

The follow-up rate computed from the data is likely underestimated, for two reasons. The first and most important is that patients must self-identify as a referral when visiting the hospital – patients are given a referral slip which they are supposed to bring with them to the hospital, which allows Aravind to track the patient's medical record across facilities. If patients do not self-identify using the referral slip, we are unable to track them across locations, resulting in an underestimate of the number of referral follow-up visits. The second reason is that if patients follow-up at a different hospital such as the surgical hospital in Dindigul, we would not observe these follow-ups in the visit data.

For completeness, it is important for us to address how the inability to identify referral follow-ups with perfect accuracy may impact the insights about the effect of referrals on the hospital visit rate which is used in the calculation for the proportion of visits that would not have occurred in the absence of a nearby telemedicine center. We discuss two further robustness checks to this point below.

One approach is to simply include the referral rate as a control variable in the regression on the hospital visit rate, but this would be a bad control as it is an intermediate outcome (**?**, §3.2.3). However, we can check for evidence of an effect of the referral rate (which is measured without error) on the hospital visit rate when excluding visits from previously referred patients. In theory, the referral rate and the hospital visit rate excluding referrals would be independent if follow-up visits are properly accounted for. In other words, the referral rate should not have any impact on the hospital visit rate when follow-ups are excluded, and if this is true, the inclusion of the referral rate is no longer a bad control as it would no longer be an intermediate outcome (Cinelli et al. (2019) see page 6, model 14). Column 5 in Table 26 shows (1) effect of the referral rate on the hospital visit rate excluding all subsequent visits made by previously referred patients is not statistically significant, and (2) that the estimate of the effect of telemedicine centers is robust. This suggests that (1) the exclusion of the follow-up visits is accounting for referred patients appropriately and (2) that our insights for the proportion of telemedicine centers visits that would not have occurred in the absence of a nearby telemedicine centers is robust to the concern that follow-ups may be systematically underestimated due to limitations of the data.

As a second indirect check, we estimate the impact of nearby telemedicine centers on the referral rate directly in Column 6 as 0.32. If we assume that all patients who are referred follow up (i.e., a 100% follow-up rate) and that the net effect of substitution away from the hospital and

referrals to the hospital in column (3) is $-0.28 =$ *referral effect* + *substitution effect*, this implies that the *substitution effect* would be $-.28 - 0.32 = -0.6$ instead of the -0.39. This is likely an overestimate of substitution as is it unlikely that all referred patients would follow up at the hospital, however it implies that the proportion of telemedicine center visits that are substitutes for hospital visits is $26\% = 0.60/2.32$ instead of our estimate of $16.8\% = 0.39/2.32$. Taking this estimate of substitution implies that instead of approximately 5 out of every 6 visits to a telemedicine center (83%) representing visits that would not have occurred had a telemedicine center not been opened, this ratio should be revised downward to approximately 3 out of 4 visits (75%). However, 75% is likely an underestimate (because we assumed 100% of telemedicine center visits that are referred follow up at the hospital), therefore we do not include it in the main results.

Based on our original estimate of the treatment effect and these alternative approaches, we believe our insights are robust to any limitations of the data with regard to measurement of follow-ups. The most likely reason for the limited difference in the estimates across these approaches is the relatively low number of referrals compared to the overall visits.

Table 26 Roubstness - Impact of Referrals

	(1) Network	(2) Telemedicine Center	(3) Hospital	(4) Hospital (excl. referrals)	(5) Hospital (excl. referrals)	(6) Referral Rate
Vision Center[0-10km]	2.03***	2.32***	-0.28*	-0.39***	-0.42***	0.32***
	(0.23)	(0.21)	(0.11)	(0.11)	(0.11)	(0.03)
Referral Rate					0.10	
					(0.06)	
Observations	186552	186552	186552	186552	186552	186552
Adjusted R^2	0.718	0.499	0.735	0.734	0.734	0.265

All regressions include location and time FEs, as well as variables for camps, and controls as given by equation (2).
Two-way Clustered Standard Errors (Census Location i, Period t) shown in parenthesis.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

References

Cinelli, C., A. Forney, J. Pearl. 2019. A crash course in good and bad control. Tech. rep.