

## **Appendix to “Continuity of community-based healthcare provision during COVID-19: a multi-country interrupted time series analysis”**

This appendix provides further methodological details for “Continuity of community-based healthcare provision during COVID-19: a multi-country interrupted time series analysis.” This study appendix provides detailed tables and visualizations of data in an effort to illustrate the transparency of our methodological approach and descriptive analytical steps.

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**Table 1.** Program Implementation, as assessed by CHW AIM Quality Tool<sup>22</sup>

	Highly functional
	Functional
	Partially functional
	Non functional

Community Health Worker Assessment and Improvement Matrix (CHW AIM) Updated Program Functionality Matrix for Optimizing Community Health Programs		Regions				
		1	2	3	4	5
Role & Recruitment	<ul style="list-style-type: none"> <li>CHW role is clearly defined and documented</li> <li>CHW to population ratio reflects CHW role expectation, population density, geographic constraints, and travel requirements</li> <li>Recruitment methods and selection criteria designed to maximize women’s participation in the workforce and overcome gender inequities.</li> <li>CHW is recruited from community with community participation</li> <li>Attitudes, expertise, and availability deemed essential for the job are clearly delineated prior to recruitment and linked to competency demonstrations</li> <li>Role of CHWs includes proactively searching for patients door-to-door, care for patients in their homes, and providing training to families on how to identify danger signs.</li> <li>Train-then-select: recruit more CHWs to the first module of pre-service training than are ultimately needed and select the best performers</li> </ul>					
Training	<ul style="list-style-type: none"> <li>Initial training meeting global guidelines is provided to all CHWs within six months of recruitment.</li> <li>CHW training includes practicum time in government health facilities and in the community.</li> <li>Continuous capacity development is provided to reinforce initial training, teach CHWs new skills, and to help ensure quality.</li> </ul>					
Accreditation	<ul style="list-style-type: none"> <li>Health knowledge and competencies are tested and CHWs must meet a minimum standard prior to practicing.</li> <li>Provisions for CHWs to re-test are in place</li> <li>CHWs are accredited by a national body based on clear documented standards.</li> </ul>					
Equipment & Supplies	<ul style="list-style-type: none"> <li>All necessary supplies, including job aids, are available with no substantial stockout periods</li> <li>Supplies are ordered and available for resupply on a regular basis and buffer stock is available. At all levels, a standard tool is used for supply forecasting</li> <li>Supplies are checked and updated regularly to verify expiration dates, quality, and inventory.</li> <li>CHW inventory is monitored, whether through manual or digital systems.</li> </ul>					
Supervision	<ul style="list-style-type: none"> <li>A dedicated supervisor conducts monthly supervision visits that include reviewing reports and providing problem- solving support to the CHW.</li> <li>Supervisors are trained, have the technical skills to do service delivery observations, and have basic supervision tools checklists to aid them.</li> <li>The supervisor provides summary statistics of CHW performance to CHW to identify areas for improved service delivery.</li> <li>The supervisor directly observes CHW practice with patients and provides targeted feedback after patient encounters on areas for continued improvement.</li> <li>The supervisor audits data/assesses patient experience (without the CHW present)</li> <li>Program directors have considered how else supervisors can serve CHWs and the community (e.g., restocking supplies, referral support, higher level care, etc.) and have implemented services as applicable.</li> </ul>					
Incentive	<ul style="list-style-type: none"> <li>Full-time CHWs are compensated financially at a competitive rate relative to the respective market (at least minimum wage, if not more competitive), and salaries are</li> </ul>					

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	<ul style="list-style-type: none"> <li>consistently paid on-time.</li> <li>Incentives are balanced, with both financial and non-financial incentives provided, and are commensurate with expectations of CHW role, role</li> <li>The possibility for negative unintended consequences has been examined prior to integrating performance incentives for specific tasks.</li> <li>Health workers receive employee benefits (e.g. housing, vacation etc.)</li> </ul>					
Community Involvement	<ul style="list-style-type: none"> <li>Community plays a significant role in supporting the CHW and helps to establish the CHW as a leader in the community.</li> <li>CHW is widely recognized and appreciated</li> <li>Community leaders have ongoing dialogue with CHW regarding health issues using data gathered by the CHW.</li> <li>CHW engages existing multi sectoral community structures</li> <li>Community interacts with the supervisor during visits to provide feedback and solve problems.</li> <li>A broad cross-section of the community plays a role in planning the CHW program and providing feedback to the health system.</li> </ul>					
Opportunity for Advancement	<ul style="list-style-type: none"> <li>Advancement is offered to CHWs who perform well and who express an interest in advancement if the opportunity exists.</li> <li>Training opportunities are offered to CHWs to learn new skills to advance their roles and CHWs are aware of them.</li> <li>Advancement is intended to reward good performance or achievement and is based on a fair evaluation</li> </ul>					
Data	<ul style="list-style-type: none"> <li>CHWs document their visits consistently in a standardized format.</li> <li>Supervisors monitor quality of data, discuss data with CHWs, and provide help when needed.</li> <li>Data is reported to public-sector monitoring and evaluation systems.</li> <li>CHWs/communities work with supervisor to use data in problem solving</li> <li>Supervisors use data to provide feedback on CHW performance and inform programmatic improvement.</li> <li>Digital technologies are employed to make data systems more efficient, useable, or scalable and/or leverage data to improve the quality, speed, or equity of service</li> </ul>					
Linkage to the Health System	<ul style="list-style-type: none"> <li>CHWs are recognized as part of the formal health system (policies are in place that define their roles, tasks, relationship to the health system).</li> <li>The national health budget has appropriate provisions for CHWs (e.g. salary, equipment, supervision, etc).</li> <li>Health system accompanies CHW deployment with investments to increase the capacity, accessibility, and quality of the primary care facilities and providers to which CHWs link.</li> <li>CHWs always have means for transport and have a functional logistics plan for emergencies (transport, funds).</li> <li>Patients are referred with a standardized form and information flows back to CHW with a returned referral form.</li> <li>Point-of-care user fees are not charged for services or for care commodities.</li> <li>There is multi-sectoral engagement in the design, implementation and management of the CHW program.</li> </ul>					

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**Table 2.** COVID-19 descriptive statistics for March 2020 to June 2021 across all COVID metrics, including min, mean, and max values by month

Metric	Date	Min	Mean	Max
CHW Infections	2020-03	0	0	0
CHW Infections	2020-04	0	0	0
CHW Infections	2020-05	0	0	0
CHW Infections	2020-06	0	0	1
CHW Infections	2020-07	0	0	0
CHW Infections	2020-08	0	0	1
CHW Infections	2020-09	0	0	2
CHW Infections	2020-10	0	0	2
CHW Infections	2020-11	0	2	11
CHW Infections	2020-12	0	1	2
CHW Infections	2021-01	0	0	1
CHW Infections	2021-02	0	1	3
CHW Infections	2021-03	0	1	2
CHW Infections	2021-04	0	1	2
CHW Infections	2021-05	0	0	1
CHW Infections	2021-06	0	1	2
CHW without Symptoms	2020-03	100.0	100.0	100.0
CHW without Symptoms	2020-04	100.0	100.0	100.0
CHW without Symptoms	2020-05	99.1	99.6	100.0
CHW without Symptoms	2020-06	0.1	73.8	100.0
CHW without Symptoms	2020-07	0.0	78.9	99.9
CHW without Symptoms	2020-08	0.0	78.5	100.0
CHW without Symptoms	2020-09	0.0	78.0	100.0
CHW without Symptoms	2020-10	0.0	72.9	100.0
CHW without Symptoms	2020-11	0.0	78.7	100.0
CHW without Symptoms	2020-12	0.0	78.9	100.0
CHW without Symptoms	2021-01	0.0	78.8	100.0
CHW without Symptoms	2021-02	0.0	78.3	100.0

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<b>CHW without Symptoms</b>	2021-03	0.0	78.1	100.0
<b>CHW without Symptoms</b>	2021-04	93.4	98.0	100.0
<b>CHW without Symptoms</b>	2021-05	89.4	97.0	100.0
<b>CHW without Symptoms</b>	2021-06	92.7	97.3	100.0
<b>Contacts Traced</b>	2020-03	100	100	100
<b>Contacts Traced</b>	2020-04	100	100	100
<b>Contacts Traced</b>	2020-05	100	100	100
<b>Contacts Traced</b>	2020-06	100	100	100
<b>Contacts Traced</b>	2020-07	100	100	100
<b>Contacts Traced</b>	2020-08	100	100	100
<b>Contacts Traced</b>	2020-09	100	100	100
<b>Contacts Traced</b>	2020-10	100	100	100
<b>Contacts Traced</b>	2020-11	100	100	100
<b>Contacts Traced</b>	2020-12	100	100	100
<b>Contacts Traced</b>	2021-01	100	100	100
<b>Contacts Traced</b>	2021-02	100	100	100
<b>Contacts Traced</b>	2021-03	100	100	100
<b>Contacts Traced</b>	2021-04	100	100	100
<b>Contacts Traced</b>	2021-05	100	100	100
<b>Contacts Traced</b>	2021-06	100	100	100
<b>COVID Equipment</b>	2020-03	-	-	-
<b>COVID Equipment</b>	2020-04	-	-	-
<b>COVID Equipment</b>	2020-05	73.8	86.9	100.0
<b>COVID Equipment</b>	2020-06	50.9	83.6	100.0
<b>COVID Equipment</b>	2020-07	79.2	94.4	100.0
<b>COVID Equipment</b>	2020-08	73.2	93.1	100.0
<b>COVID Equipment</b>	2020-09	66.9	91.4	100.0
<b>COVID Equipment</b>	2020-10	98.4	99.5	100.0
<b>COVID Equipment</b>	2020-11	86.0	96.3	100.0

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COVID Equipment	2020-12	89.6	97.3	100.0
COVID Equipment	2021-01	90.4	97.4	100.0
COVID Equipment	2021-02	94.3	98.4	100.0
COVID Equipment	2021-03	90.7	97.5	100.0
COVID Equipment	2021-04	88.3	95.8	100.0
COVID Equipment	2021-05	89.1	96.1	100.0
COVID Equipment	2021-06	87.7	95.7	100.0
COVID Training	2020-03	100.0	100.0	100.0
COVID Training	2020-04	100.0	100.0	100.0
COVID Training	2020-05	99.0	99.7	100.0
COVID Training	2020-06	100.0	100.0	100.0
COVID Training	2020-07	100.0	100.0	100.0
COVID Training	2020-08	100.0	100.0	100.0
COVID Training	2020-09	100.0	100.0	100.0
COVID Training	2020-10	100.0	100.0	100.0
COVID Training	2020-11	100.0	100.0	100.0
COVID Training	2020-12	100.0	100.0	100.0
COVID Training	2021-01	100.0	100.0	100.0
COVID Training	2021-02	100.0	100.0	100.0
COVID Training	2021-03	100.0	100.0	100.0
COVID Training	2021-04	100.0	100.0	100.0
COVID Training	2021-05	100.0	100.0	100.0
COVID Training	2021-06	100.0	100.0	100.0
CHW Deaths	2020-03	0	0	0
CHW Deaths	2020-04	0	0	0
CHW Deaths	2020-05	0	0	0
CHW Deaths	2020-06	0	0	0
CHW Deaths	2020-07	0	0	0
CHW Deaths	2020-08	0	0	0

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<b>CHW Deaths</b>	2020-09	0	0	0
<b>CHW Deaths</b>	2020-10	0	0	0
<b>CHW Deaths</b>	2020-11	0	0	0
<b>CHW Deaths</b>	2020-12	0	0	0
<b>CHW Deaths</b>	2021-01	0	0	0
<b>CHW Deaths</b>	2021-02	0	0	0
<b>CHW Deaths</b>	2021-03	0	0	0
<b>CHW Deaths</b>	2021-04	0	0	0
<b>CHW Deaths</b>	2021-05	0	0	0
<b>CHW Deaths</b>	2021-06	0	0	1
<b>Contacts Isolating</b>	2020-03	-	-	-
<b>Contacts Isolating</b>	2020-04	-	-	-
<b>Contacts Isolating</b>	2020-05	2	2	2
<b>Contacts Isolating</b>	2020-06	5	5	5
<b>Contacts Isolating</b>	2020-07	7	7	7
<b>Contacts Isolating</b>	2020-08	11	112	212
<b>Contacts Isolating</b>	2020-09	3	19	34
<b>Contacts Isolating</b>	2020-10	4	4	4
<b>Contacts Isolating</b>	2020-11	3	145	287
<b>Contacts Isolating</b>	2020-12	8	22	36
<b>Contacts Isolating</b>	2021-01	4	207	410
<b>Contacts Isolating</b>	2021-02	9	250	491
<b>Contacts Isolating</b>	2021-03	12	89	166
<b>Contacts Isolating</b>	2021-04	8	11	13
<b>Contacts Isolating</b>	2021-05	0	3	6
<b>Contacts Isolating</b>	2021-06	11	17	22
<b>COVID Deaths</b>	2020-03	0	0	0
<b>COVID Deaths</b>	2020-04	0	0	0
<b>COVID Deaths</b>	2020-05	0	0	0



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COVID Deaths	2020-06	0	0	0
COVID Deaths	2020-07	0	0	0
COVID Deaths	2020-08	0	0	0
COVID Deaths	2020-09	0	0	0
COVID Deaths	2020-10	0	0	0
COVID Deaths	2020-11	0	0	0
COVID Deaths	2020-12	0	0	0
COVID Deaths	2021-01	0	0	0
COVID Deaths	2021-02	0	0	0
COVID Deaths	2021-03	0	0	0
COVID Deaths	2021-04	0	0	0
COVID Deaths	2021-05	0	0	0
COVID Deaths	2021-06	0	0	0
Suspected Cases	2020-03	-	-	-
Suspected Cases	2020-04	-	-	-
Suspected Cases	2020-05	3,432	3,432	3,432
Suspected Cases	2020-06	0	2,099	6,253
Suspected Cases	2020-07	0	2,101	8,281
Suspected Cases	2020-08	0	2,215	8,700
Suspected Cases	2020-09	0	2,038	7,894
Suspected Cases	2020-10	0	2,040	7,894
Suspected Cases	2020-11	0	1,602	6,157
Suspected Cases	2020-12	0	1,342	5,164
Suspected Cases	2021-01	0	1,182	4,510
Suspected Cases	2021-02	0	1,204	4,583
Suspected Cases	2021-03	0	1,089	4,083
Suspected Cases	2021-04	0	1,153	3,320
Suspected Cases	2021-05	0	852	2,436
Suspected Cases	2021-06	0	755	2,151

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**Table 3.** PHC descriptive statistics, including mean values of each PHC metric, displayed by metric and by quarter from Q1 2018 to Q2 2021

Metric	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021
ICCM Speed	30.71	28.24	29.29	30.21	30.66	30.59	27.16	26	26.14	22.53	31.22	23.86	22.76	23.67
Pregnancy Speed	20.26	15.45	17.50	18.39	16.90	15.16	16.96	15.95	16.86	16.66	17.29	18.36	18.35	16.23
PNC Speed	80.16	79.99	82.45	80.27	81.81	82.14	84.48	83.31	86.06	87.64	87.79	87.74	85.60	87.54
Proactive Coverage	28.96	30.94	29.27	32.26	33.88	43.01	50.67	52.97	54.86	55.96	58.74	58.65	56.80	54.07
U5 Coverage	14.37	14.02	15.39	20.79	25.25	29.99	30.91	24.63	28.07	27.33	29.83	30.96	30.04	26.01
Deliveries Coverage	93.45	91.39	91.91	93.37	93.55	93.69	94.24	93.70	94.80	95.02	94.87	93.93	92.02	95.68

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**Table 4.** Descriptive trends in numerator and denominator for PHC metrics by month from Q1 2018 to Q2 2021

	Deliveries Coverage		iCCM Speed		PNC Speed		Pregnancy Speed		Proactive Coverage		U5 Coverage	
	Num.	Den.	Num.	Den.	Num.	Den.	Num.	Den.	Num.	Den.	Num.	Den.
Jan-18	68	75	8538	27590	970	1234	426	1881	72354	247522	54605	336990
Feb-18	48	58	7928	25608	890	1101	513	2021	82684	295954	57647	372377
Mar-18	69	75	7580	25080	966	1192	487	1914	88437	297755	55940	377898
Apr-18	49	55	10435	36968	1004	1254	382	1972	67193	282952	46841	367664
May-18	89	98	12276	42535	1250	1549	420	3215	110752	317335	59199	406715
Jun-18	86	103	11363	41145	1086	1371	401	2568	117833	344777	69997	436008
Jul-18	229	247	11607	41055	1264	1526	344	2332	113052	360873	79152	453826
Aug-18	269	287	10644	35757	1274	1546	444	2646	107089	369743	75323	474703
Sep-18	289	305	12256	41080	1470	1790	482	2980	105703	384123	82599	494809
Oct-18	615	647	12916	44233	1475	1810	647	3474	140194	431760	117802	547808
Nov-18	606	642	12924	43584	1237	1546	576	3239	144840	441181	118665	561719
Dec-18	632	664	15036	47319	1307	1648	594	2819	135891	431554	116051	553735
Jan-19	606	637	14443	46996	1414	1737	608	3143	133916	433652	118507	557313
Feb-19	611	629	13568	45044	1263	1522	615	3037	147502	451934	153504	568254
Mar-19	610	643	26533	85272	1295	1598	1417	9966	249781	654199	169047	575284
Apr-19	619	652	27426	88293	1283	1546	1519	10821	267280	652239	180364	574354
May-19	703	735	29712	96998	1338	1664	1555	11534	281765	654068	185228	580554
Jun-19	592	617	33590	111632	1266	1525	1876	10438	288735	645470	162773	573282
Jul-19	626	652	37822	136056	1357	1586	1974	11509	321351	655040	177499.4	584095
Aug-19	615	637	38883	144957	1353	1602	2005	11827	342864	674979	188176.7	604670
Sep-19	667	689	39621	147572	1408	1688	2029	12087	359492	694950	196912.2	625450
Oct-19	581	605	42503	161082	1257	1508	1952	11970	391760	724511	179604	655795
Nov-19	569	600	40178	157532	1202	1433	1854	11663	393501	736703	211764	668819
Dec-19	688	758	36674	140435	1132	1369	1460	9341	371232	728938	191554	661726
Jan-20	609	647	39319	148884	1215	1440	1794	10674	387821.4	738356	190924	679628
Feb-20	550	578	40809	155734	1041	1214	1996	11854	413380.4	768586.1	206376	712054.1
Mar-20	628	656	43851	169847	1215	1380	2038	11960	444825	794194.2	213906	746319.2
Apr-20	1777	2262	41211	147861	1288	1460	1688	10444	432288	799701	205722	771371
May-20	1177	1542	37857	162130	1334	1516	1314	9813	457174	825224	229187	785223
Jun-20	1391	2033	26970	164646	1228	1415	882	4317	489650	838382	248274	801954
Jul-20	2158	3357	13650	51509	1265	1460	1258	7052	480178.8	814724.5	217437	774184.5

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<b>Aug-20</b>	1670	2509	17720	53061	1336	1509	1281	7487	454944 .5	847815 .9	250141	806160 .9
<b>Sep-20</b>	1317	1869	18963	56168	1507	1709	1854	11041	469117 .2	807430 .9	253131	768549 .9
<b>Oct-20</b>	33	1317	1869	18963	56168	1507	1709	1854	11041	487653	791628	247951
<b>Nov-20</b>	34	946	1330	18865	56645	1265	1462	1973	11039	491972	844555	255330
<b>Dec-20</b>	35	1649	2565	42909	253806	1338	1513	1961	10381	500770	847483	246715
<b>Jan-21</b>	36	1529	2420	54248	253960	1509	1710	1759	9595	496196	846592	241588
<b>Feb-21</b>	37	1062	1578	51717	244396	1135	1299	1804	9262	478823	860205	239363
<b>Mar-21</b>	38	1109	1734	52558	256153	961	1144	1821	10290	495543	873498	245411
<b>Apr-21</b>	39	1457	2365	60507	227557	1044	1222	1898	10615	510566	880119	258957
<b>May-21</b>	40	1072	1574	63841	269937	1085	1244	1852	10883	517378	889075	254464
<b>Jun-21</b>	41	1029	1374	61438	267360	1177	1330	1736	10801	510574	893683	248356

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**Table 5.** Coverage of data for PHC metrics across five sites and seven metrics from January 2018 to June 2021

Metric	Region 1	Region 2	Region 3	Region 4	Region 5	Region 1	Region 2	Region 3	Region 4	Region 5	Total
<b>Deliveries Coverage</b>	Jan-18 - Jun-21		Jul-18 - Jun-21	Jan-18 - Jun-21	Oct-18 - Jun-21	42		36	42	33	153
<b>ICCM Speed</b>	Jan-18 - Jun-21	Apr-18 - Jun-21		Jan-18 - Jun-21		42	39		42		123
<b>PNC Speed</b>	Jan-18 - Jun-21			Jan-18 - Jun-21		42			42		84
<b>Pregnancy Speed</b>	Jan-18 - Jun-21	Jan-18 - Jun-21	Jul-18 - Jun-21	Jan-18 - Jun-21	Oct-18 - Jun-21	42	42	36	42	33	195
<b>Proactive Coverage</b>	Mar-19 - Jun-21	Jan-18 - Jun-21	Jan-19 - Jun-21	Feb-18 - Jun-21	Oct-18 - Jun-21	28	42	30	41	33	174
<b>U5 Coverage</b>	Jan-18 - Jun-21	Jan-18 - Jun-21	Jan-19 - Jun-20	Jan-18 - Jun-21	Oct-18 - Jun-21	42	42	18	42	33	177
<b>Total</b>						238	165	120	251	132	

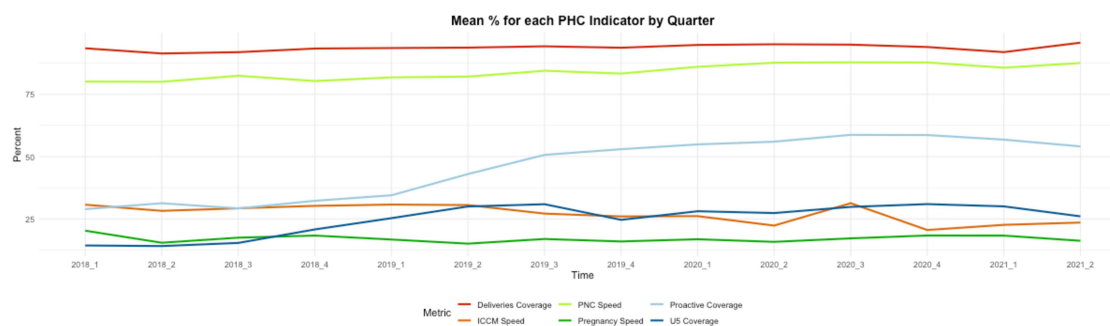
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**Table 6.** Coverage of data for COVID metrics across five sites and nine metrics from March 2020 to June 2021

	Indicator	No.	Uganda Site	Kenya Site #1	Kenya Site #2	Mali Site	Malawi Site	Uganda Site	Kenya Site #1	Kenya Site #2	Mali Site	Malawi Site	Total # of Months of Data
COVID Metrics	COVID Training	1	May 20 - Jun 21	Jun 20 - Mar 21	May 20 - Jun 21	Jul 20 - Jun 21	Mar 20 - Jun 21	14	10	14	12	16	66
	COVID Equipment	2	May 20 - Jun 21	Jun 20 - Mar 21	May 20 - Jun 21	Jul 20 - Jun 21		14	10	14	12		50
	CHW Symptoms	3	May 20 - Jun 21	Jun 20 - Mar 21	Jun 20 - Jun 21	Jul 20 - Jun 21	Mar 20 - Jun 21	14	10	13	12	16	65
	CHW infections	4	May 20 - Jun 21	Jun 20 - Mar 21	Jun 20 - Jun 21	Jul 20 - Jun 21	Mar 20 - Jun 21	14	10	13	12	16	65
	CHW deaths	5	May 20 - Jun 21	Jun 20 - Mar 21	Jun 20 - Jun 21	Jul 20 - Jun 21	Mar 20 - Jun 21	14	10	13	12	16	65
	Suspected cases	6	May 20 - Jun 21	Jun 20 - Mar 21	Jun 20 - Jun 21	Jul 20 - Jun 21		14	10	13	12		49
	COVID Deaths	7	May 20 - Jun 21	Jun 20 - Mar 21			Mar 20 - Jun 21	14	10			16	40
	Contacts traced	8		Jun 20 - Mar 21					10				10
	Contacts isolating	9	May 20 - Jun 21	Jun 20 - Mar 21			Aug 20 - Jun 21	14	10			11	35
Total								112	90	80	72	91	445

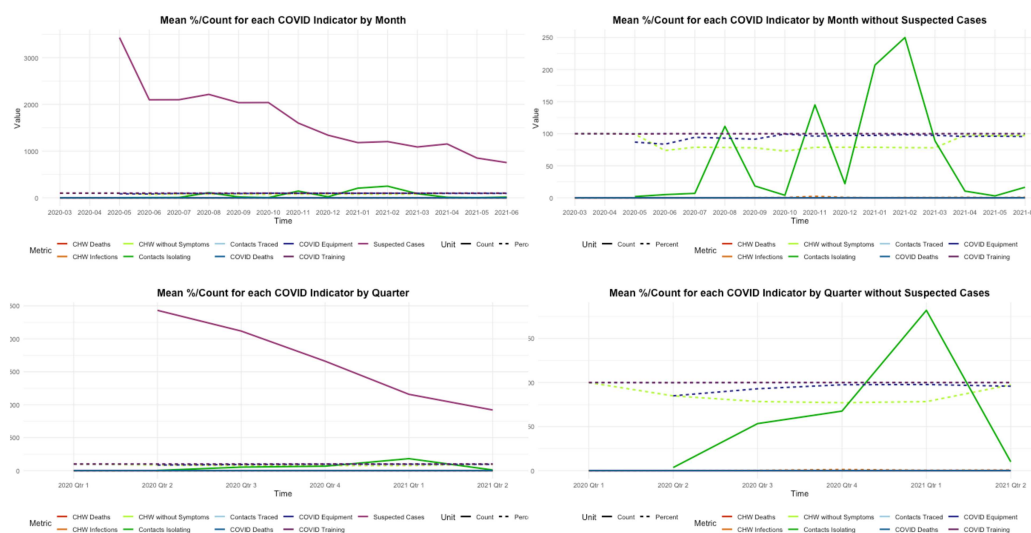
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**Figure 1.** Mean percent for each PHC indicator by quarter for Q1 2018 to Q2 2021



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**Figures 2a-d.** Descriptive trends in COVID metrics by month (a-b) and by quarter (c-d) from March 2020 to June 2021, including mean % and counts for each metric with a) and c) including all indicators and b) and d) excluding data on suspected cases





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**Figures 3 a-f.** Regression outputs for six PHC metrics including time, intervention, postslope & site



In addition to the a priori regression analysis included in the main analysis, the study team conducted exploratory sensitivity analysis. These alternate regression analyses are outlined below:

#### Alternative regression analysis #1:

$$(1) Y_t = \beta_0 + \beta_1 * \text{time} + \beta_2 * \text{pandemic} + \beta_3 * \text{postslope} + \epsilon_t$$

Where  $Y_t$  is the outcome variable at time  $t$ ; time is a continuous variable indicating time from January 2018 up to June 2021, the end of the period of observation. Intervention (i.e., the Covid-19 pandemic) is coded 0 for pre-pandemic time points and 1 for post-pandemic time points, with March 2020 as null; and postslope is coded 0 up to the last point before the intervention phase and coded sequentially thereafter.  $\beta_0$  captures the baseline level of the outcome at time 0 (January 2018, beginning of the period);  $\beta_1$  estimates the structural trend or

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growth rate in utilization, independently from the pandemic;  $\beta_2$  estimates the immediate impact of the pandemic or the change in level in the outcomes of interest after the pandemic; and  $\beta_3$  reflects the change in trend, or growth rate in outcome, after the intervention.

**Table 7.** Results of alternative regression analysis #1

Metric	Independent Variables	Coefficient	Standard Error	P-value
ICCM Speed	Constant ( $\beta_0$ )	48.93	11.62	<0.0001***
	Time ( $\beta_1$ )	0.09	0.71	0.90
	Intervention ( $\beta_2$ )	1.89	14.90	0.90
	Postslope ( $\beta_3$ )	-0.69	1.78	0.70
Pregnancy Speed	Constant ( $\beta_0$ )	48.94	12.65	0.000152***
	Time ( $\beta_1$ )	-1.40	0.49	0.004602**
	Intervention ( $\beta_2$ )	5.09	4.49	0.26
	Postslope ( $\beta_3$ )	2.68	1.18	0.024891*
PNC Speed	Constant ( $\beta_0$ )	69.85	7.84	<0.0001***
	Time ( $\beta_1$ )	0.61	0.53	0.26
	Intervention ( $\beta_2$ )	-8.99	14.08	0.53
	Postslope ( $\beta_3$ )	-1.02	1.36	0.46
Proactive Coverage	Constant ( $\beta_0$ )	19.44	13.17	0.14
	Time ( $\beta_1$ )	2.76	0.37	<0.0001***
	Intervention ( $\beta_2$ )	0.73	3.34	0.83
	Postslope ( $\beta_3$ )	-4.58	0.87	<0.0001***
U5 Coverage	Constant ( $\beta_0$ )	30.41	30.59	0.32
	Time ( $\beta_1$ )	1.84	0.24	<0.0001***
	Intervention ( $\beta_2$ )	4.61	3.03	0.13
	Postslope ( $\beta_3$ )	-5.40	0.57	<0.0001***
Deliveries Coverage	Constant ( $\beta_0$ )	91.99	1.98	<0.0001***
	Time ( $\beta_1$ )	0.08	0.12	0.49
	Intervention ( $\beta_2$ )	2.01	1.65	0.23
	Postslope ( $\beta_3$ )	-0.25	0.28	0.39
Significance codes: **** 0.001 *** 0.01 ** 0.05				

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**Figures 4a-f.** Alternative regression #1 outputs for six PHC metrics including time, intervention, and postslope



### Alternative regression analysis #2:

$$(2) Y_t = \beta_0 + \beta_1 * \text{preslope} + \beta_2 * \text{pandemic} + \beta_3 * \text{postslope} + \epsilon_t$$

Where  $Y_t$  is the outcome variable at time  $t$ ; time is a continuous variable indicating time from January 2018 up to June 2021, the end of the period of observation. Preslope is coded sequentially from the start of the study period until the start of the intervention, as which point it remains constant; intervention (i.e., the Covid-19 pandemic) is coded 0 for pre-pandemic time points and 1 for post-pandemic time points, with March 2020 as null; and postslope is coded 0 up to the last point before the intervention phase and coded sequentially thereafter.  $\beta_0$  captures the baseline level of the outcome at time 0 (January 2018, beginning of the period);  $\beta_1$  estimated the structural trend in the outcome prior to the pandemic;  $\beta_2$  estimates the immediate impact

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of the pandemic or the change in level in the outcomes of interest after the pandemic; and  $\beta_3$  reflects the change in trend, or growth rate in outcome, after the intervention.

**Table 8.** Results of alternative regression analysis #2

Metric	Independent Variables	Coefficient	Standard Error	P-value
ICCM Speed	Constant ( $\beta_0$ )	48.93	11.62	<0.0001***
	Preslope ( $\beta_1$ )	0.09	0.71	0.90
	Intervention (B2)	1.89	14.90	0.90
	Postslope ( $\beta_3$ )	-0.60	1.41	0.67
Pregnancy Speed	Constant ( $\beta_0$ )	48.94	12.65	0.000152***
	Preslope ( $\beta_1$ )	-1.40	0.49	0.004602**
	Intervention (B2)	5.09	4.49	0.26
	Postslope ( $\beta_3$ )	1.28	0.75	0.09
PNC Speed	Constant ( $\beta_0$ )	69.85	7.84	<0.0001***
	Preslope ( $\beta_1$ )	0.61	0.53	0.26
	Intervention (B2)	-8.99	14.08	0.53
	Postslope ( $\beta_3$ )	-0.41	1.21	0.73
Proactive Coverage	Constant ( $\beta_0$ )	19.44	13.17	0.14
	Preslope ( $\beta_1$ )	2.76	0.37	<0.0001***
	Intervention (B2)	0.73	3.34	0.83
	Postslope ( $\beta_3$ )	-1.82	0.54	0.000841***
U5 Coverage	Constant ( $\beta_0$ )	30.41	30.59	0.32
	Preslope ( $\beta_1$ )	1.84	0.24	<0.0001***
	Intervention (B2)	4.61	3.03	0.13
	Postslope ( $\beta_3$ )	-3.56	0.38	<0.0001***
Deliveries Coverage	Constant ( $\beta_0$ )	91.99	1.98	<0.0001***
	Preslope ( $\beta_1$ )	0.08	0.12	0.49
	Intervention (B2)	2.01	1.65	0.23
	Postslope ( $\beta_3$ )	-0.16	0.19	0.40
Significance codes: **** 0.001 *** 0.01 ** 0.05				

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**Figures 5a-f.** Alternative regression #2 outputs for six PHC metrics including preslope, intervention, and postslope



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**Alternative regression analysis #3:**

$$(3) Y_t = \beta_0 + \beta_1 * \text{time} + \beta_2 * \text{pandemic} + \beta_3 * \text{postslope} + \text{region} + \text{year} + \varepsilon_t$$

Where  $Y_t$  is the outcome variable at time  $t$ ; time is a continuous variable indicating time from January 2018 up to June 2021, the end of the period of observation. Intervention (i.e., the Covid-19 pandemic) is coded 0 for pre-pandemic time points and 1 for post-pandemic time points, with March 2020 as null; and postslope is coded 0 up to the last point before the intervention phase and coded sequentially thereafter.  $\beta_0$  captures the baseline level of the outcome at time 0 (January 2018, beginning of the period);  $\beta_1$  estimates the structural trend or growth rate in utilization, independently from the pandemic;  $\beta_2$  estimates the immediate impact of the pandemic or the change in level in the outcomes of interest after the pandemic; and  $\beta_3$  reflects the change in trend, or growth rate in outcome, after the intervention. Region is a dummy variable for each of the five regions and year is a dummy variable for each year in the data.

**Table 9.** Results of alternative regression analysis #3

Metric	Independent Variables	Coefficient	Standard Error	P-value
ICCM Speed	Constant ( $\beta_0$ )	24.68	2.16	<0.0001***
	Time ( $\beta_1$ )	0.27	0.22	0.22
	Intervention ( $\beta_2$ )	-1.59	2.17	0.47
	Postslope ( $\beta_3$ )	-0.38	0.41	0.36
	Region 2	-4.35	0.86	<0.0001***
	Region 4	55.28	0.87	<0.0001***
	Year 2019	3.09	2.87	0.28
	Year 2020	3.13	3.85	0.42
	Year 2021	3.02	4.40	0.50
Pregnancy Speed	Constant ( $\beta_0$ )	10.12	2.30	<0.0001***
	Time ( $\beta_1$ )	0.03	0.22	0.90
	Intervention ( $\beta_2$ )	4.78	3.16	0.13
	Postslope ( $\beta_3$ )	-0.29	0.44	0.50
	Region 2	3.48	2.02	0.09
	Region 3	16.54	2.13	<0.0001***
	Region 4	68.12	2.04	<0.0001***
	Region 5	17.56	2.19	<0.0001***
	Year 2019	1.68	2.81	0.55
	Year 2020	1.34	4.42	0.76
	Year 2021	1.84	5.51	0.74
PNC Speed	Constant ( $\beta_0$ )	74.69	7.23	<0.0001***
	Time ( $\beta_1$ )	1.19	0.92	0.20

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	Intervention ( $\beta_2$ )	8.81	15.86	0.58
	Postslope ( $\beta_3$ )	-0.60	1.97	0.76
	Region 3	-17.13	5.01	0.00104**
	Year 2019	-1.49	12.86	0.91
	Year 2020	-34.86	20.78	0.10
	Year 2021	-42.89	25.82	0.10
<b>Proactive Coverage</b>	Constant ( $\beta_0$ )	44.58	9.90	<0.0001***
	Time ( $\beta_1$ )	1.03	0.39	0.00863**
	Intervention ( $\beta_2$ )	-1.98	2.84	0.49
	Postslope ( $\beta_3$ )	-0.36	0.80	0.65
	Region 2	-29.65	5.87	<0.0001***
	Region 3	6.89	6.98	0.33
	Region 4	-6.77	8.36	0.42
	Region 5	23.35	9.58	0.01596*
	Year 2019	-2.03	3.30	0.54
	Year 2020	2.79	4.33	0.52
	Year 2021	-1.18	5.08	0.82
<b>U5 Coverage</b>	Constant ( $\beta_0$ )	32.71	8.60	0.000203*
	Time ( $\beta_1$ )	0.14	0.23	0.53
	Intervention ( $\beta_2$ )	-0.10	1.74	0.96
	Postslope ( $\beta_3$ )	-0.37	0.54	0.50
	Region 2	-24.03	4.41	<0.0001***
	Region 3	0.93	6.98	0.89
	Region 4	-33.94	8.33	<0.0001***
	Region 5	42.40	10.43	<0.0001***
	Year 2019	-0.27	1.72	0.88
	Year 2020	3.61	2.37	0.13
	Year 2021	2.70	2.94	0.36
<b>Deliveries Coverage</b>	Constant ( $\beta_0$ )	92.90	0.72	<0.0001***
	Time ( $\beta_1$ )	-0.04	0.08	0.59
	Intervention ( $\beta_2$ )	1.04	1.22	0.40
	Postslope ( $\beta_3$ )	0.05	0.16	0.74
	Region 3	4.62	0.58	<0.0001***
	Region 4	-4.98	0.55	<0.0001***
	Region 5	3.14	0.60	<0.0001***
	Year 2019	0.60	1.01	0.55
	Year 2020	1.05	1.67	0.53
	Year 2021	0.73	2.06	0.72
Significance codes: **** 0.001 *** 0.01 ** 0.05				

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**Figures 6a-f.** Alternative regression #3 outputs for six PHC metrics including time, intervention, postslope, site and year

