SUPPLEMENTAL MATERIAL

Supplementary methods

Focus group discussions (FGDs) at the study site: community health workers (CHWs)

N=64; 2 FGDs per each of the four selected districts, 8 participants per each FGD.

Experiences on the use of the e-ASCov application for screening and testing COVID-19 using RDTs by CHWs (perception and satisfaction of CHWs on their role).

English: Thank you for agreeing to participate today and give your informed consent. I would like to ask you about your experiences on the use of the e-ASCov application and testing COVID-19 by Community Health Workers using RDTs. All your answers will remain confidential and you do not have to answer to questions that you do not want. There is no right or wrong answer to these questions. Please feel free to ask questions anytime during the interview and we can stop at any time. Thank you again for your participation

Kinyarwanda : Murakoze kwemera kwitabira iki kiganiro uyu munsi no kwemera kugira uruhare muri ubu bushakashatsi nyuma yo gusobanurirwa. Nifuzaga kubabaza kubijyanye n'ubumenyi mufite kw'ikoreshwa ry'ikoranabuhanga mu gufata amakuru no gupima COVID-19 bikozwe n'abajyanama b'ubuzimamuri. Ibisubizo byanyu bigirwa ibanga kandi mufite uburenganzira bwo guhitamo kudasubiza bimwe mu bibazo mubazwa igihe mwumva bibabangamiye. Nta gisubizo kiri cyo cyangwa se gipfuye. Mwisanzure mubaze ikibazo cyose mwagira mugihe turi kuganira, kandi dushobora guhagarika iki kiganiro igihe icyo aricyo cyose mubyifuje. Murakoze cyane nanone kwitabira iki kiganiro.

Note: *Record the District of residence, age, sex, level of education, and occupation for each participant*
SECTION A: USE OF E-ASCOV
Knowledge of the e-ASCOV application /Ubumenyi rusange ku ikoranabunga rya e-ASCOV mu gufata amakuru no guhangana n'icyorezo cya COVID-19
1. What do you think in general on the use of digital tool (e-ASCOV application) by CHWs for COVID-19 response? Muri rusange mwadusngiza icyo mutekekereza ku ikoreshwas ry' ikoranabuhanga n'abajyanama bubuzima mu guhangana n'icyorezo cya COVID-19 ?
2. What expectations do you or did you have regarding e-ASCOV app?

Ni iki mwari mwiteze cyangwa se nubu mucyiteze ku ikoreshwa ry'ubu buryo bwa e-Ascov ?
3. How confident are you with the use of e-ASCOV app by CHWs? Mwumva mwifitiye icyizere kingana iki (Ku ruhe rugero) kw'ikoreshwa neza ry'iri koranabunga e ASCOV?
Perceived benefits, barriers and facilitators e-ASCOV **Inyungu , inzitizi n'ibishyigikira**
4. Can you describe the positive (perceived benefits) of e-ASCOV app? (Probe: contribution of e-ASCOV app in COVID-19 prevention and control) Mukurikije uko mubyumva, mwatubwira inyungu cyangwa se ibyiza mwabonye mu gukoresha ubu buryo bwa e-ASCOV? (Aha ndashaka kuvuga icyo ubu buryo bwaba bwarafashije mu kwirinda ndetse no gukurikirana abantu bafite iki cyorezo cya Covid-19 ?
5. What do you think are the negative experiences with e-ASCOV app? • **Ni iki mwumva cyangwa se mubona kitagenze neza mugihe mwakoreshaga ubu buryo bwa e-ASCOV?**
6. What are the factors hindering (barriers) the use of e-ASCOV app? Mukurikije uko mubyumva, ni izihe mbogamizi mubona ku ikoreshwa ry'ubu buryo bwa e–ASCOV ?
7. Wat are the factors facilitating (enablers) the use of e-ASCOV app? Mukurikije uko mubyumva, ni iki mubona cyaba gifasha cyane cyangwa cyoroshya ikoreshwa ry'ubu buryo bwa e ASCOV ?
Satisfaction vis-à-vis the use of e-ASCOV app **Kunyurwa n'imikoreshereze y'ikoranabuhanga e-ASCOV**
8. What do you think about the use e-ASCOV app in the future? Do you have any suggestions for improvement? • Mutekereza iki ku ikoreshwa ry'ubu buryo bwa e- ASCOV mugihe kiri imbere ? hari icyo mutekereza cyakogerwaho cyangwa cyakurwaho kuri ubu buryo bwa e-ASCOV kugirango burusheho gukora neza?
SECTION B: TESTING COVID-19 DONE BY CHWS **General perception on COVID-19 testing by CHWs /Gusuzuma COVID-19 bikozwe n'abajyanama b'ubuzima**
9. How do you see in general the testing of COVID-19 done by CHWs?

Muri rusange mubona mute uburyo bwo gusuzuma COVID-19 bikozwe n'abajyanama b'ubuzima?
10. What expectations do you or did you have regarding testing COVID-19 by CHWs? Ni iki mwari mwiteze cyangwa se nubu mucyiteze ku gusuzuma COVID-19 bikozwe n'abajyanama b'ubuzima?
11. How confident are you with COVID-19 testing done by CHWs? Mwumva mwifitiye icyizere kingana iki (kuruhe rugero) ku gupima COVID-19 bikozwe n'abajyanama b'ubuzima?
Perceived benefits, barriers and facilitators e-ASCOV **1. Inyungu , inzitizi n'ibishyigikira**
12. Can you describe the positive (perceived benefits) of testing COVID-19 by CHWs? (Probe: contribution of COVID-19 testing by CHWs to COVID-19 prevention, control, and case management) • Mukurikije uko mubyumva, mwatubwira inyungu cyangwa se ibyiza mubona mu gusuzuma COVID-19 bikozwe n'abajyanama b'ubuzima? (ahan ndashaka kuvuga icyo ubu buryo bwaba bwarafashije mu kwirinda ndetse no gukurikirana abantu bafite iki cyorezo cya Covid-19 n'akamaro bifitiye abaturaRwanda)
13. What do you think are the negative experiences with testing COVID-19 by CHWs? • Mukurikije uko mubyumva ni iki mubona kitagenze neza mu gusuzuma COVID-19 bikozwe n'abajyanama b'ubuzima?
14. What are the factors hindering (barriers) the testing COVID-19 by CHWs? • Mukurikije uko mubyumva, ni izihe mbogamizi mubona mu gusuzuma COVID-19 bikozwe n'abajyanama b'ubuzima?
15. Wat are the factors facilitating (enablers) the testing COVID-19 by CHWs? • Mukurikije uko mubyumva, ni iki mubona cyaba gifasha cyane cyangwa cyoroshya gusuzuma COVID-19 bikozwe n'abajyanama b'ubuzima
16. What do you think about the testing of COVID-19 by CHWs in the future? Do you have any suggestions for improvement? • Mutekereza iki ku gupima COVID-19 bikozwe n'abajyana b'ubuzima mugihe kiri imbere ? hari icyo mutekereza cyakogerwaho cyangwa cyakurwaho mu buryo bwo gupima COVID-19 bikozwe n'abajyana b'ubuzima kugirango burusheho gukora neza?
END OF THE INTERVIEW

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Author reflexivity statement

This study was conceptualized, designed and led in collaboration with Rwanda Biomedical Centre and Rwanda's Ministry of Health. Members of Rwanda Biomedical Centre and the Ministry of Health who led this work are included as authors. The position of first author reflects the contribution of Ladislas Nshimiyimana, NTD Research Senior Officer at Rwanda Biomedical Centre, to the work.

The study addresses local research and policy priorities in Rwanda. Rwanda's health system has a vision for decentralized COVID-19 testing and there was interest in utilizing the country's strong CHW capacity to increase access to testing. This study aimed to realize these ambitions and the team designed an intervention that utilized the country's CHW workforce to deliver decentralized COVID-19 testing.

The study has contributed to improvements in local infrastructure, through the development and updating of a mobile application ("e-ASCov") to enable community-based screening and testing for COVID-19. The project also trained CHWs on using the digital tool and rapid tests to detect COVID-19 at the household-level.

Safeguarding procedures were implemented to protect local study participants and researchers. Firstly, the screening and testing intervention was conducted as part of routine Ministry of Health programming included in the CHW package of services. Several measures were taken to minimize the risk of infection for CHWs and other members of the household during community-based testing, as described in the manuscript. All CHWs taking part in the interviews or focus group discussions signed an informed consent form before participation.

Supplementary Tables and Figures

Supplementary Table 1. Overview of study districts

District	COVID-19 positivity rate (%)*	District population	Number of CHWs in district	Number of CHWs selected for the project (%)
Gasabo (urban)	**2.0**	530,907	1731	102 (6)
Nyarugenge (urban)	**1.2**	284,561	1135	100 (9)
Kirehe (Rural)	**1.6**	382,932	2587	99 (4)
Rusizi (Rural)	**2.5**	483,615	2298	99 (4)
Rubavu (Rural)	**1.3**	403,662	1990	100 (5)
Musanze (Rural)	**5.9**	368,267	1715	99 (6)
Nyagatare (Rural)	**4.4**	530,907	2531	100 (4)
Huye (Semi-urban)	**8.3**	328,398	2016	101 (5)
Total		**3,313,249**	**16,003**	**800 (5)**

*Positivity rates as of September 2021, when the phase one commenced.
CHW, community health worker.

Supplementary Table 2. Respondent perceptions of e-ASCov

Characteristics		Number of respondents	%
Ease of using e-ASCov			
	Easy	291	83.4
	Slightly easy	49	14
	Difficult	9	2.6
Training package			
	Satisfied	315	90.2
	Somehow satisfied	31	8.9
	Not satisfied	2	0.6
Simplicity of e-ASCov application			
	Easy	297	85.1
	Slightly easy	47	13.5
	Difficult	5	1.4
Duration of the training			
	Sufficient	192	55.0
	Somehow sufficient	100	28.7
	Not sufficient	57	16.3
Equipment/supplies			
	Satisfied	315	90.2
	Somehow satisfied	28	8.0
	Not satisfied	6	1.8
Access to internet			
	Good	171	49.0
	Somehow good	190	48.7
	Poor	8	2.3
Time used to enter client's data			
	Short	161	46.1
	Somehow short	116	33.3
	Long	72	20.6
Getting support			
	Satisfied	295	84.5
	Somehow satisfied	42	12.0
	Not satisfied	12	3.5
Service delivery through e-ASCov			
	Satisfied	325	93.1
	Somehow satisfied	22	6.3
	Not satisfied	2	0.6
Need for future use of e-ASCov			
	Yes	349	100.0
Scale-up of e-ASCov to other diseases			
	Yes	348	99.7
	No	1	0.3

52 **Supplementary Table 3. Respondent perceptions of CHW-led Ag-RDT testing**

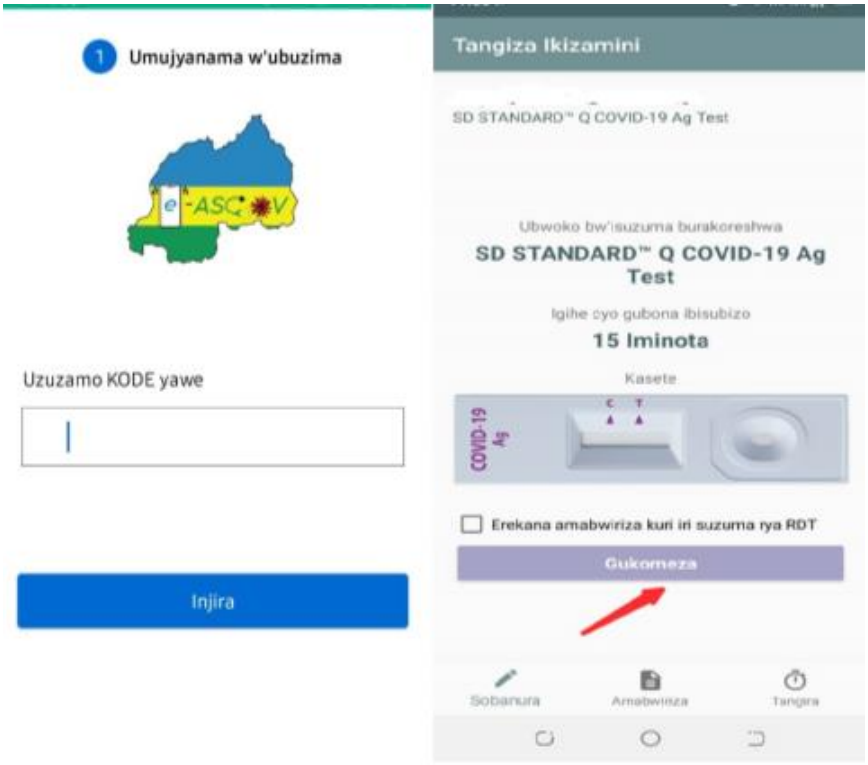
Characteristics		Frequency	%
Overall perception			
	Easy	313	89.6
	Slightly easy	33	9.5
	Difficult	3	0.9
Training package			
	Satisfied	303	86.8
	Somehow satisfied	40	11.5
	Not satisfied	6	1.7
Duration of the training			
	Sufficient	202	57.8
	Somehow sufficient	99	28.4
	Not sufficient	48	13.8
Equipment/Supplies			
	Satisfied	305	87.4
	Somehow satisfied	36	10.3
	Not satisfied	8	2.3
Reading results of Ag-RDT			
	Easy	326	93.9
	Slightly easy	17	4.9
	Difficult	4	1.2
Entering results using e-ASCov app			
	Easy	296	84.8
	Slightly easy	45	12.9
	Difficult	8	2.3
Getting support			
	Satisfied	298	85.4
	Somehow satisfied	40	11.5
	Not satisfied	11	3.1

53 Ag-RDT, antigen-based rapid diagnostic tests.

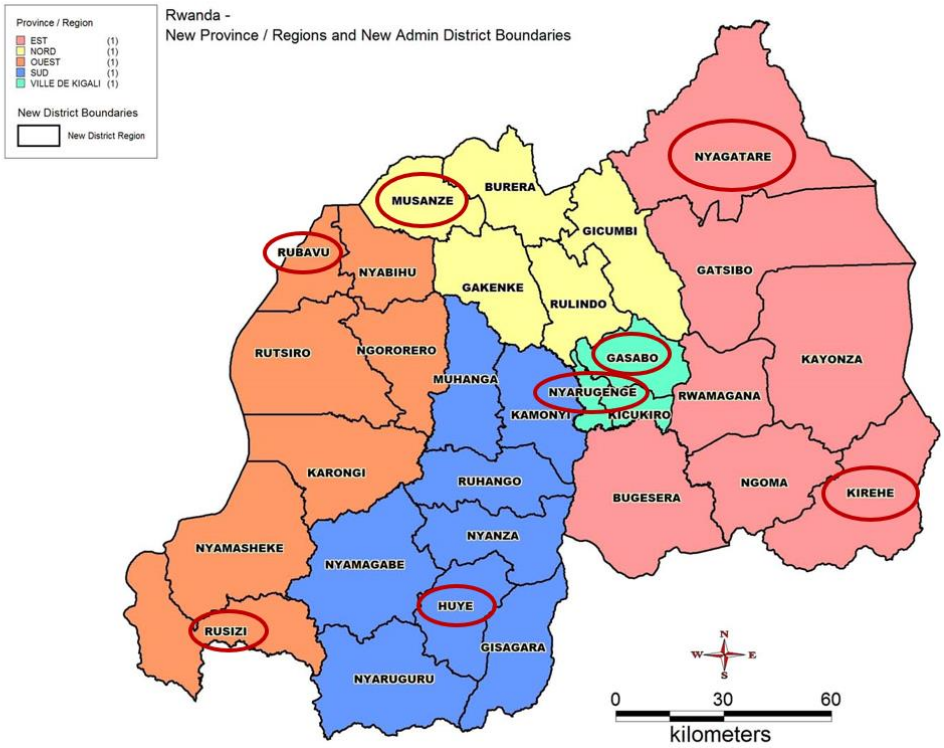
Supplementary Table 4. Number of COVID-19 cases diagnosed by study districts overall and through CHWs

DISTRICT	All screened	Positive	Positivity rate (%)	Ag-RDT per district (%)	All reported positive cases	Contribution of CHWS (%) to confirmed cases
Gasabo	1,708	14	2.3	35.0	126	11.1
Huye	1,625	4	0.9	26.8	7	57.1
Kirehe	3,009	8	1	26.2	21	38.1
Musanze	2,549	13	2.3	22.1	18	72.2
Nyagatare	2,498	1	0.2	18.6	27	3.7
Nyarugenge	2,226	21	3	31.2	135	15.6
Rusizi	3,254	1	0.3	11.0	1	100
Rubavu	2,675	24	3.6	25.2	43	55.8
TOTAL	**19,544**	**86**	**1.9**	**23.4**	**378**	**22.8**

Supplementary Figure 1. Interface of the e-ASCov application



Supplementary Figure 2. Map of Rwanda showing administrative district study sites



Map source: https://commons.wikimedia.org/wiki/File:Rwanda_Districts_Map.jpg (accessed 16 August 2024).[1]
Map edited to add study sites.

Supplementary References

1. Wikimedia Commons. File:Rwanda Districts Map.jpg. Available from: https://commons.wikimedia.org/wiki/File:Rwanda_Districts_Map.jpg (accessed 16 August 2024).