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Article

Decision-takers' Attitudes Towards SARS-CoV-2 Self-Testing in Kenya: A Qualitative Inquiry

Sophie Chabeda[1], Sonjelle Shilton[2*], Griffins Manguro[1], Sharon Omenda[1], Patricia Owira[1], and Guillermo Z. Martínez-Pérez[2]

[1] International Centre for Reproductive Health-Kenya, Mombasa, Kenya; sophie@icrhk.org; gmanguro@icrhk.org; somenda@icrhk.org; Patricia@icrhk.org
[2] FIND, Global alliance for diagnostics, Geneva, Switzerland; Sonjelle.Shilton@finddx.org; gmartinezgabas@gmail.com
* Correspondence: Sonjelle.Shilton@finddx.org; Tel.: +41 (0) 22 710 05 90

Abstract: Rapid SARS-CoV-2 self-tests have the potential to expand access to COVID-19 testing and improve community-level case detection, particularly in resource-constrained countries such as Kenya. However, prior to their introduction, their acceptability must be assessed. This qualitative study explored key decision-takers' values towards SARS-CoV-2 self-testing in Kenya. Healthcare workers, representatives of civil society, and potential implementors from Mombasa and Taita-Taveta were selected as decision-takers. Semi-structured interviews and focus group discussions were used to collect data on their values towards self-testing. A thematic analysis approach was applied. Most informants considered that the Kenyan public is equipped to accept and use self-testing safely as an approach to help to reduce workload at public healthcare facilities, and know one's COVID-19 status in a private manner. The informants emphasized the need to provide counselling to end-users, to support those needing to self-isolate, and to engage different civil society stakeholders in information provision on self-testing. Fear of stigma and of forced isolation were noted as potential deterrents to self-testing uptake for some individuals. In conclusion, there is high acceptability of self-testing in Kenya among decision-takers. However, enhanced education, counselling, and addressing deterrents to testing would be helpful to ensure effective use of SARS-CoV-2 self-testing in Kenya.

Keywords: Kenya; COVID-19; community representatives; self-testing; diagnostics; qualitative research

1. Introduction

The first case of the coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was reported in Kenya in January 2020 [1]. After the declaration of the COVID-19 pandemic by the World Health Organization [2], the Kenyan Government launched a COVID-19 strategy which, as in other countries in the continent, included restrictions to the freedom of movement as well as support for local production of face masks and personal protective equipment [3,4].

Although Kenya is one of the strongest economies in Eastern Africa, the country has a fragile healthcare system with a ratio of 0.157 physicians and 1.116 nurses per 1000 people – 10 times less than in some high-income countries [5]. This is an under-resourced health system which, throughout the first two years of the pandemic, has struggled to deal with other health conditions such as human immunodeficiency virus (HIV) and tuberculosis [6], reproductive and maternal health [7], and cancer [8]. Deviation of human and therapeutical resources to halt the pandemic has affected healthcare provision for many Kenyan patients affected by health conditions other than COVID-19, and this has been especially so for vulnerable groups such as children and the young [9], and the refugees [7].

Diagnostic testing remains an essential part of the COVID-19 response, especially with the emergence of novel, more transmissible variants like Omicron [10].

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Consequently, many countries have recognized the importance of accessible, safe and affordable screening approaches to improve COVID-19 case detection. With the intention to expand access to COVID-19 testing, at the start of 2022 some Southern economies such as Peru [11] and Brazil [12] have approved regulations to allow the general population to procure rapid SARS-CoV-2 antigen-detection self-test in private retailers. With a similar intention, in March 2022, the African Union and the African Centres for Disease Control (Africa CDC) issued a joint guidance to urge countries in the African continent to regulate and facilitate people's access to SARS-CoV-2 self-testing [13].

In under-resourced environments such as Kenya, rapid SARS-CoV-2 antigen-detection self-tests are an approach that hold the potential to expand the population's access to COVID-19 testing even in remote areas. This approach can contribute to allowing the population—vulnerable youth and children, and refugees included—to return to socioeconomic life if they test negative on self-tests or self-isolate and protect their close ones if they test positive for SARS-CoV-2 on self-tests. Further, this approach can allow Kenyan healthcare facilities to focus resources on people with symptomatic and severe COVID-19 who require medical assistance, and on patients who are affected by other life-threatening ailments.

Rapid SARS-CoV-2 antigen-detection self-testing (hereafter, self-testing) is an approach that has proven acceptable in other low- and middle-income countries such as Indonesia [14] or Nigeria [15]. However, to the best of our knowledge, no acceptability inquiry on self-testing has been carried out in Eastern Africa. It is crucial to understand the populations' values and preferences regarding self-testing, to inform the issuing of regulatory, laboratory, and public health practice recommendations for the Kenyan context in alignment with African Union and Africa CDC guidance. We subsequently conducted a qualitative inquiry in mid-2021 to explore the values and attitudes of key decision-takers around SARS-CoV-2 self-testing in Kenya.

2. Materials and Methods

2.1. Study Design and Site

This is a qualitative inquiry that used semi-structured interviewing (SSI) and focus group discussions (FGD) to collect data. The study was conducted in Kenya by the International Centre for Reproductive Health-Kenya and by FIND, the global alliance for diagnostics. This was an ancillary study to a larger population-based survey conducted in Kenya between September and October 2021 [16]. The main study assessed the values of the general public and healthcare workforce towards self-testing [17].

Two counties from the coastal region of Kenya were selected: Mombasa and Taita-Taveta. The former represented an urban site, while the latter a rural one. Mombasa County is the smallest county in Kenya geographically, covering an area of 230 km^2, and it is entirely urbanized. Mombasa Town is Kenya's second-largest city, after Nairobi, with an estimated population of 1.21 million [18]. Taita-Taveta is located approximately 140 km northwest of Mombasa and has an estimated population of 340,671 [18]. Taita-Taveta is predominantly rural, with the Tsavo National Park covering nearly two-thirds of the land area.

2.2. Population and Sampling

The study population included three groups of informants with decision-making capacity for the distribution and use of self-testing in Kenya. Healthcare workers (HCWs) were targeted because of their capacity to recommend self-testing (or not) to the communities. Representatives of different civil society organizations (RCSs) were targeted because of their capacity to influence community decision-making on the utility of self-testing (e.g., traditional community leaders, representatives of trade unions, leaders of professional councils…). Potential self-testing implementers (PSIs) were targeted because of their capacity to pool financial and human resources to procure and distribute self-testing in the workplaces they manage or in the geographies where they regulate and operate

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(e.g., directors of planning in regional departments of health…). Inclusion criteria for all groups were age 18 years or older, willingness to provide informed consent, and ability to discuss the study topic in Swahili or English.

Efforts were made to ensure diverse sampling in terms of sex, geographical origin, and professional and institutional profiling. In order to ensure diversity, a purposive sampling approach was used. The study teams produced sex-disaggregated lists of at least 50 profiles per study group. These lists were randomly reordered using RANDOM.Org. The interviewers phoned shortlisted potential informants starting with the first name in each list. Reached individuals received an explanation about the study, and those interested in participating were invited to partake in either an FGD or an SSI.

2.3. Data Collection and Processing

Written consent was sought. Before the conduct of any SSI or FGD, the consent forms were shared by email with all informants to provide individuals with sufficient time to make an informed decision on participation. Depending on the informants' preferences, data collection was conducted either online using Zoom teleconferencing software, or in-person at designated places convenient for them and the interviewers. At the scheduled date, the informants who took part in the in-person data collection signed two copies of the consent forms, and kept one copy. Informants who partook in the Zoom-based data collection were requested to electronically sign the consent forms. Informants who came for the in-person FGDs were compensated for their transportation expenses.

Each informant chose a preferred language either Swahili or English (or a mix of both) during the SSI and FGD. The SSIs and FGDs were conducted by a team of trained local interviewers. A 45-item structured guide was used for both SSI and FGD [17]. Six core themes were explored with all informants: knowledge of provider-initiated COVID-19 testing; values of self-testing; public's preferences for self-testing delivery; safe and effective use of self-testing; actions upon reactive (positive) self-testing results; and future prospects for self-testing distribution in Kenya.

Data collection was audio-recorded, with the informants' consent. The audio recordings were transcribed verbatim into Microsoft Word documents. Responses in Swahili were translated into English. All transcripts and translated sections within the transcripts were cross-checked for accuracy and completeness against the original audio recordings.

2.4. Data Analysis

All transcripts were handled using the computer-assisted qualitative data analysis software Quirkos. At first, all transcripts were coded deductively using a pre-defined coding scheme. If emerging themes were detected, new codes were created inductively. In parallel, the analysts (a Black female with an M.A in Population Studies from Kenya, and a White male historian from Spain) prepared reflexive memos to control for the risk of social desirability and of informant bias.

Iteratively with coding, a four-pronged thematic comparative analysis was applied: transcript by transcript at first; followed by a theme-by-theme sex-sensitive comparison of coded narratives across all transcripts, and by a theme-by-theme geography-sensitive comparison of coded narratives across all transcripts; and finishing with a comparison of key findings across the three study groups.

Reporting was prepared considering shared insights across the groups, as well as insights of isolated cases. Careful attention was given to the memos to ensure that the analysts' own subjective biases were not being introduced in reporting.

2.5. Ethics Approval

This research received ethical clearance by AMREF Ethics and Scientific Review Committee (Ref.: P1011/2011) and by the Kenya National Commission for Science, Technology & Innovation (NACOSTI/P/21/12458).

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3. Results

3.1. Participant Characteristics

Two FGDs (average, 120 minutes) and 10 SSIs (average, 51 minutes) were conducted with each of the three study groups (HCWs, RCSs and PSIs). A total of 59 informants (29 females, 30 males) participated in the study (Table 1). Half of the sample were either living and/or operating in Taita-Taveta. The informants' mean age was 40 years. Almost all (n=51/59, 86%) had completed higher education (i.e. diploma, bachelor's, or master's degree). Among the 19 HCWs, 37% (n=7/19) were nurses. There was diversity in terms of institutional representation and socio-professional profiles of the PSIs and RCSs. To protect anonymity, particularly for the PSIs and RCSs, Table 1 shows only aggregated data on their socio-professional profiling.

Table 1. Aggregated participant socio-demographics.

Variable		HCWs (n=19)		PSIs (n=20)		RCSs (n=20)		Sub-Total
		Females	Males	Females	Males	Females	Males	
Type of Encounter	Semi-structured interview	5	5	3	7	7	3	30
	Focus group discussion	4	5	4	6	6	4	29
Setting	Rural	4	5	3	7	7	3	29
	Urban	5	5	4	6	6	4	30
Sector (PSIs only)	Public			4	9			13
	Private			3	4			7
Age group	18–25	1						1
	26–35	4	7	4	2	2	2	21
	36–45	3	3	2	5	4	3	20
	46–55	1		1	5	6	2	15
	56 and above				1	1		2
Education	Primary						1	1
	Secondary					1		1
	Vocational training					4	1	5
	Higher education	9	10	7	13	8	5	52
Socio-professional sector (PSIs and RCSs)	Legal services					1		1
	Non-profit and community services			2	1	5	4	12
	Agriculture and trade				1	1	1	3
	Transportation				1		2	3
	Local Government				1	3		4
	Academia				2			2
	Religious services					3		3

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	Health and Public Administration			5	5	10
	Hospitality				2	2
Profession (HCWs only)	Nurses	6	1			7
	Pharmacy	1				1
	Physicians	1	5			6
	Radiographer	1				1
	Laboratory technologists	1	3			4

3.2. Barriers for Uptake of COVID-19 Testing

Informants from all groups felt that access to provider-initiated COVID-19 testing was a barrier to uptake. Though testing should be provided free of charge in the public sector in principle, there are few public testing centers, and these are oftentimes affected by a shortage of testing kits. In private testing facilities, a test could cost a minimum of 3000–7000 Kenyan shillings (Ksh) (approximately US$ 30–70). PSIs also pointed out a general lack of awareness of where testing facilities are available. In addition, HCWs and PSIs noted that lack of transportation/long distances to testing facilities, the long turnaround of PCR results, and post-testing isolation requirements could act as barriers to COVID-19 testing, particularly for those who cannot afford to lose wages. The HCWs noted that accessing COVID-19 testing is especially difficult for people from rural areas and low-income groups who cannot afford transport costs to reach free testing facilities. HCWs also shared a number of health system-related barriers to testing uptake, including the poor incentives and resources that the health system provides to HCWs, "negative" HCWs' attitudes, and the "corruption" and misuse of funds for COVID-19 programs. Some HCWs and RCSs also alluded to beliefs that "COVID-19 does not exist" as a reason why some people did not seek testing.

PSIs and RCSs felt that a barrier around COVID-19 testing for some people was related to what was described as the 'uncomfortable and painful' nose swabbing procedure. A fear of dying or never healing from COVID-19 was also mentioned as a testing barrier by RCSs. Some male RCSs also noted that the healthcare system was not reaching all people who needed testing due to its lack of capacity to deal with the pandemic, an insufficient supply of protective gear for the healthcare professionals, and because of the healthcare professionals' attitudes. In the opinion of RCSs, healthcare professionals expected people to go in-person to the health facilities to test for COVID-19 but, in actuality, many people avoided testing at health facilities due to their fear of being "branded" as having COVID-19. PSIs also noted fear of the stigma associated with being labelled as having COVID-19 as a considerable barrier. However, according to a few RCSs, stigma had reduced compared with the start of the pandemic when they noted that misinformation and rumors were shared through social media. Some rural RCSs cited the "Bill Gates conspiracy" and "other conspiracy and religious theories" as reasons why healthcare professionals could not reach all people who should be tested.

"The myths, the myths and misconceptions that this coronavirus is, is associated with like the 666 that is the anti-Christ." (Female RCS, 53 years old, Taita Taveta)

"At the beginning of this disease, when it got to the country some us who live in the rural area took it a bit easy, we believed that it won't get it, it will stay in the city but when reality struck that people were dying from it even in the rural areas, we got a better attitude." (Male PSI, 55 years old, Taita Taveta)

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3.3. Values and Preferences

No HCWs knew of SARS-CoV-2 self-tests. However, considerable support for self-tests was expressed in this study group. HCWs mentioned that one of the advantages of self-tests is that they would increase users' confidentiality, as they could choose a private, safe location to self-test at their own convenience. Some rural HCWs would recommend self-testing to scale-up COVID-19 testing and to increase linkage to COVID-19 treatment. Some urban HCWs emphasized that self-tests also had the potential to reduce the work-load of HCWs due to the pandemic. Among the disadvantages, there were concerns among the HCWs of the likelihood of incorrect usage and interpretation of the results. Some were also concerned that some users who self-test as positive for SARS-CoV-2 might feel that they do not need to notify the health authorities and thus remain "silent" about the result of the self-test.

"Some people may test and test positive then continue with home care without seeking care services from the medical personnel, just because they knew they are positive and they think that they can manage it by themselves." (Male, HCW, 31 years old, Mombasa)

In the opinion of HCWs, the general public would be interested in self-testing, especially those who travel or interact with a large number of people, such as teachers. To a few HCWs, self-testing would be valuable for students and prisoners who are in crowded classrooms and prisons, respectively. Additionally, government workers, people with disabilities and HCWs were mentioned as other populations who might be attracted to self-testing.

Most HCWs mentioned that self-tests should be provided free of charge or available at a low-cost, and accessible at health facilities, pharmacies and distributed via community health worker-led outreach. Self-tests authorized for distribution in Kenya should include instructions that are easy to read and understand, preferably accompanied with illustrations to support low-literate users. There were also mentions of other methods of receiving instructions such as toll-free hotlines, social media, TV and radio broadcasts. Nevertheless, some HCWs expressed a preference for pre-test counselling to be offered from licensed HCWs or from community health volunteers.

While no RCSs knew of SARS-CoV-2 self-tests, many expressed awareness of rapid malaria blood tests and rapid pregnancy urine tests that people could self-administer. To the RCSs, self-testing for SARS-CoV-2 had several advantages, including privacy and travel time saving for the users, and reduced workload for HCWs. In terms of disadvantages, the challenge (and cost) of educating the public on how to self-test correctly was mentioned. A few female RCSs emphasized that the lack of pre-test counselling would result in "shock" for some users if their self-test result was positive.

To some RCSs, self-test devices should have an accuracy "above 80%". Most informants in this group mentioned that self-testing would need to be easy to use, non-invasive, and affordable. There was consensus that self-testing should be either free or "reasonably priced". Rural RCSs thought that the kits should cost a maximum of 800 KSh (US$ 8) while the urban RCS thought they should cost less than 200 KSh (US$ 2). RCSs stated that dispensaries, shops and chemists should be among the places where self-tests could be made available to the public. However, concerned about the risk of corruption, a few RCSs stated that the shops and chemists should not "hoard" self-tests or show any "favoritism" when selling self-tests.

Self-testing kits' instructions for use should include clear messages in different official languages in Kenya, accompanied by diagrams or visual images on how to use them, and information on their expiry dates, how to store and dispose of them, certification marks by authorized bodies, and what to do or who to contact in case a self-test turns positive. Some urban RCSs stated that the kits should include instructions tailored for blind and deaf populations. Rural RCSs emphasized that simple and clear messaging might improve the public's usability of the self-test kits.

"Maybe it should just provide…just like the pregnancy kit, how it works, it only indicates that you are either positive or negative that's all, I don't think whether there is any need of including a lot of information and that may complicate the kit." (Male RCS, 31 years old, Mombasa)

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There was consensus among RCSs that most people would prefer to self-test at home, in their offices, or in hotel rooms, to guarantee the confidentiality of the result. It was suggested that adults could self-test unsupervised, and that some people would want to use the self-test kits on their children. Licensed HCWs and people who had previously had COVID-19 were considered as a possible source of assistance to self-test users dealing with upsetting results.

A few PSIs had heard on social media about the availability of self-testing in other countries. To the PSIs, self-tests could help to reduce queuing and waiting times at health facilities, and to facilitate an immediate knowledge of one's COVID-19 status and help inform actions like self-isolation. To the rural PSIs, self-tests could decongest health facilities. Reduction in stigma was also cited as an advantage of self-testing as many users would use it in private to ensure the confidentiality of their result. Whilst privacy and confidentiality were highlighted as major advantages of self-testing, the potential for non-disclosure of results was highlighted by PSIs as one of the disadvantages.

There was consensus among PSIs that travelers, young people and community members may be particularly interested in self-testing. To facilitate their access to self-testing, the PSIs suggested that these should be "approximately the same cost as a pregnancy test (US$ 2)", and that these should have "a high accuracy" so as to increase people's trust in them.

Chemists, schools and colleges were suggested as places where self-test kits could be accessed. Community health volunteers, teachers, religious leaders, government and village elders were mentioned as trusted individuals who could be authorized to distribute them in the community. Most PSIs expressed a preference for pre-test counselling provision from HCWs as they had been trained on counselling patients on HIV and other health issues. Regarding what information should be on the kits, PSIs mentioned that it should indicate how to use them, what specimen is needed, their expiry dates, how to dispose of used kits, and what to do in case of a positive or negative result.

"On how to use, first let's look at the quality issues, you must know when it was manufactured, when it is expiring, you must know the batch number, you must know how you can use it, the procedure of testing and how you can report." (Female PSI, 45 years old, Mombasa)

3.4. Safe Use of Self-Tests

All groups mentioned that self-test kits should not be distributed if they were not authorized; of poor quality/accuracy; expired or not properly stored; or if they were too expensive or not user-friendly. A few HCWs, of both sexes, felt that self-testing should not be distributed to the elderly, the illiterate, or to children. In ensuring that vulnerable groups are not left out, HCWs suggested the conduct of targeted outreach campaigns involving community health workers and organizations involved in helping vulnerable groups. RCSs recommended that people living with disabilities, the elderly, "those who are very sick and are helpless" and those in very remote areas should be prioritized in self-testing distribution initiatives. To ensure correct use, RCSs mentioned that trusted sources such as health facilities' personnel should explain how to collect samples in a proper way, where to dispose of used kits and what to do following a reactive result.

Rural HCWs stated that people should be given information on linkage to care before they receive the self-tests. A few urban HCWs mentioned that people should be advised to go to a health facility for confirmatory tests irrespective of whether their self-test result was positive or not. Toll-free lines and asking users to communicate the results to community-based health workers (of any cadre) were suggested as means to ensure linkage to care. PSIs agreed that there should be strong linkage between the community health volunteers and HCWs to ensure that any person who gets a reactive self-test result can ask for help immediately. While some PSIs mentioned innovative ways of contact tracing such as tracking software to maintain linkages between health facilities and community members, others felt that linking the kits to individuals would bring privacy concerns thus decreasing their usability.

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"*Maybe chief barazas [gatherings], the mosques, churches, schools any gathering that we have. Maybe weddings, funerals. We keep on stressing on the same information when somebody turns to you. They sensitize on information concerning COVID. The right information*." (Female HCW, 50 years old, Mombasa)

HCWs, PSIs and RCSs noted that "worry", "anxiety", "panic", and "shock" could be some of the possible reactions to a reactive result. To some HCWs, self-testers' reactions would depend on the presence of symptoms. Regarding positive self-test results, rural RCSs stated that some people would harbor feelings of death, while some urban RCSs felt that some people would cast doubts over the result. A few informants from this study group stated that some people will react "positively" or "laugh". Some RCSs mentioned that those who were not affected by results would seek healthcare while those afraid of stigma would not unless their symptoms worsened.

"*I'd say it depends with the gender, if it is a woman, most of them will tend to communicate to the nearest facility because they have a tendency of going maybe visiting clinics maybe if they are pregnant. But for men it is a little bit difficult for them to communicate the results*." (Male RCS, 45 years old, Taita Taveta)

To minimize occurrence of these reactions, it was commonly suggested that all users received counselling before and after taking the test. Some PSIs mentioned that people from rural areas were more likely to panic than people from urban areas as the former are perceived as less knowledgeable about COVID-19.

"*You need to develop mechanisms under which if this person turns positive, so that they cannot be able to go and kill himself or herself, therefore you must provide the counselling part of it to counselling*." (Male PSI, 43 years old, Mombasa)

However, some respondents mentioned that positive COVID-19 results were no longer as scary as compared with the beginning of the epidemic and that COVID-19 has become a "new normal".

"*Of late people don't fear it so much unlike the first time [when] people were afraid, and most of them didn't want to be close to that person, but nowadays I don't think they would be that afraid so much, though it will affect them a little bit*" (Female HCW, 42 years old, Mombasa)

Most HCWs and RCSs, and several PSIs, mentioned that self-isolation would be difficult, because of stigmatization, lack of spaces for those who live in single-or-double rooms, and the financial/opportunity costs of self-isolation. Most male RCSs stated that some people self-testing positive would adhere to measures to prevent transmission, and some female RCSs felt people would resume taking COVID-19 protocols "more seriously" if they had "relaxed" initially. Rural HCWs stated that people self-testing positive would rather adhere to hygienic measures (face mask) than to self-isolation, which would be harder to practice in extended households. Urban HCWs were more concerned with the balance of missing work as breadwinners of their families and preventing transmission: the inability to self-isolate would reduce self-testers' willingness to warn others. Whilst some male HCWs stated that those receiving a reactive self-test would warn others to enable them to take care of themselves, some female HCWs expressed that some self-testers may not warn others due to fear of being stigmatized. Most PSIs stated that after receiving a positive result, most people would wear masks and hand-wash to protect their families

3.5. Future Prospects

In addition to fear of stigma, the inability to access, afford, or use self-testing kit and interpret the results were mentioned by HCWs as some of the barriers the public could face. To minimize the difficulties, some HCWs pointed out that the self-tests need be easily available from shops and health facilities. It was emphasized that the government needs ensure constant supply to avoid shortages. Regarding policy and regulatory requirements, most HCWs mentioned that quality standards to prevent counterfeit self-tests were to be in place. Passing of policies and regulations must be accompanied by sufficient health workforce to counsel the public on self-tests, and mass awareness campaigns to dispel myths around COVID-19. Some HCW stated that mass campaigns should be

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accompanied by strengthened procurement systems to respond to a likely increased demand of self-tests.

"The public health department [needs] to do more awareness and sensitization about COVID-19, to the population and also the procurement services, cause the availability of the COVID-19 self-testing kits would be a challenge if the procurement channels stay the same." (31, Male HCW, 31 years old, Mombasa)

For the RCSs, fear and inability to afford and use the self-tests and understand the results could be some of the hindrances to self-testing. To overcome these hindrances, the RCSs suggested mass awareness campaigns on correct usage of kits and to dispel rumors about the kits; sufficient pre-counseling by HCWs before taking a self-test; sufficient number of healthcare professionals and community health volunteers who can support users; and strengthened linkages with health facilities for those receiving a reactive result. On regulations and policy, RCS mentioned that there was need to ensure the kits reached the most vulnerable. Policies should be in place for mass availability to reduce 'favoritism' on who should be authorized to distribute self-test–or, to receive them. One RCS suggested the government should have a policy that encourages people to take up vaccines after a self-test.

"The beliefs…the negative beliefs about the kit. Some will think that the kit is already programmed to give positive results." (37, Male RCS, 37 years old, Mombasa)

The PSIs also mentioned fear, distance to distribution points, costs of transport and of the kits as hindrances to consider by self-testing programmes planners. To minimize these barriers, PSIs suggested that there would be mass sensitization among the general public; provide correct information on what to do after receiving a result, provide pre-test counseling, and dispel any myths. PSIs stated that state bodies such as the Pharmacy and Poisons Board should determine the quality of self-tests before HCWs distribute them. The PSIs also stated that there should be official price standardization of the kits, alongside standards to ensure the kits are of high accuracy. Almost all PSIs stated that there was a need to strengthen the capacity of healthcare practitioners, improve their attitudes to the public, and health facilities so as to meet demand for quality health services brought about by the increase in self-testing.

Figure 1 summarizes some of the policy and regulation recommendations mentioned by informants across all study groups.

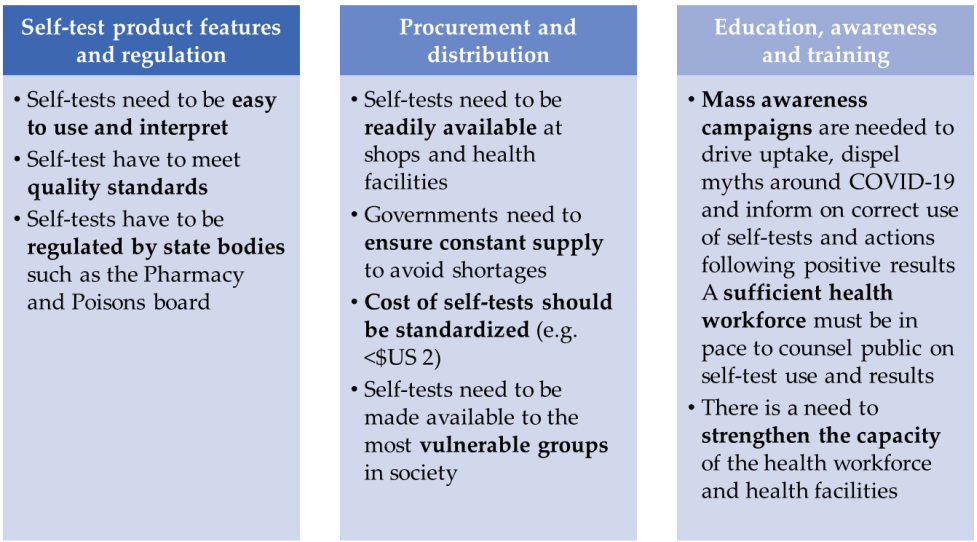

Figure 1. Shared views on policy and regulatory needs

4. Discussion

Our study set out to understand the likelihood of using SARS-CoV-2 self-testing in Kenya as an approach to empower the population through improving COVID-19 case

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detection and subsequent community-led protection of individuals most vulnerable to the disease through self-isolation. HCWs, RCSs, and PSIs in Mombasa and Taita-Taveta Counties were approached as informants who will have the ability and resources to make decisions regarding self-testing in the near future. Overall, the informants felt that the Kenyan public may be ready to accept and use self-testing, to participate in decentralized approaches to controlling the COVID-19 pandemic, and to engage with community-based organizations and lay healthcare agents in the reporting of reactive self-test results and management of the infection. As such, the Kenyan Government could opt to follow guidance on self-testing issued by the World Health Organization [16,19] and the African Union [13] to inform self-testing approaches. Nevertheless, there was consensus among our informants that potential major deterrents to the demand for and safe use of self-testing may be the difficulty of following stringent isolation requirements, lack of financial aid, and fear of stigma if labelled as COVID-19 carriers.

These findings are aligned with similar literature on self-testing from Nigeria [15], Indonesia [14], and England [20], which indicate broad acceptability of self-testing across different cultures. However, people's attitudes towards self-testing are shaped by context-specific factors. A study of perceptions of regular COVID-19 self-testing in England found that participants were motivated to regularly self-test when provided with free weekly self-testing [20]. Free packs of COVID-19 self-tests were subsequently offered to the general public in England between April 2021 and April 2022 [21]. However, serial testing was not even perceived as a possibility in our study, perhaps because of the lack of familiarity with self-testing. Instead in our study, self-testing was appreciated as a means to avoid stigma by enabling testing in private locations and to not incur the unnecessary expenditure and loss of time associated with testing at healthcare facilities. However, informants in our study noted concerns around the potential negative reactions that some self-testing users may have upon a reactive COVID-19 self-test. There were also concerns regarding the lack of education platforms and trained personnel to provide counselling before and after the use of self-tests. These concerns need to be tackled to make self-testing a feasible approach—in addition to an acceptable one—in any Kenyan region.

Beyond COVID-19, the Kenyan public appear to have generally favorable opinions of other similar decentralized approaches to testing. Other studies on oral HIV self-testing [22] and on self-collection of samples for cervical cancer screening [23] in the same geography of our study (Mombasa) reported users' high acceptability of these approaches, which reduced users' dependency on traditional testing conducted by HCWs. In fact, Kenya has a broad tradition of community-grounded strategies for conditions as varied as soil-transmitted helminths [24], malaria [25] or violence and discrimination against LGBT+ persons [26]. These strategies have in common a willingness to understand the communities' health needs and resources, and to empower both community members and cadres of healthcare practitioners other than nurses or physicians. Within this culture of patient empowerment, the Kenyan population is becoming more and more literate on self-testing and self-healthcare. Hence, it is reasonable to think that many Kenyans of any gender and age group might embrace the concept of home self-testing for SARS-CoV-2 to increase COVID-19 case detection.

This study has some implications for policy and practice. Making COVID-19 self-testing valuable to the Kenyan public will depend on investment from health authorities to integrate it alongside clinic- and laboratory-based testing for COVID-19. As suggested by some of our informants, regulatory authorities in Kenya will also need to ensure that any approved test for public health or commercial use is safe for use by lay people. In addition to ensuring the accuracy of self-testing devices, thorough attention must be paid to users' understanding of the self-test procedure. Regulations should be in place so that the public can distinguish approved devices from the counterfeit or low-quality ones. The devices' instructions for use should be easy to understand and must be prepared in several official languages, accompanied by pictorials, potentially with a QR code or detailed explanation on how to report the result. Methods for lay users to receive assistance with self-testing or reporting results, should also be in place. The informants' suggestions are

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aligned with regulations in place in other jurisdictions. The Brazil Ministry of Health [12], for instance, requests that user instructions explain that a negative result does not imply that the self-tester is not infected with SARS-CoV-2; that the sensitivity must be equal to or above 80%; and that user-friendly pictorials need to accompany the kits' instructions. If Kenya's regulations on self-testing are aligned with guidance from other countries' regulations on self-testing, particularly countries in East Africa, this approach could become a game-changer in the pandemic response in the region.

Our study findings also have implications for health practice. As expressed by our key informants, many people are deterred from seeking COVID-19 testing due to fear of stigma associated with COVID-19, in addition to delays in turnaround time for results, the costs associated with transport, and waiting for results. In this respect, healthcare practitioners and community health volunteers are vital to identify what people's fears are around COVID-19 testing more broadly and to work to allay such fears. Healthcare practitioners also need be prepared to provide education on self-testing and to provide post-test counselling in a non-judgmental manner, should a self-tester arrive for a consultation reporting a reactive self-test result.

This research also highlights certain areas of knowledge that are not well explored and which would merit further exploration in quantitative studies. The impact of self-testing on COVID-19 case detection and incidence rates in Kenya can only be assessed if strong monitoring and evaluation systems are in place. The proper evaluation of the contribution of self-testing to the management of the pandemic in Kenya will rely on collecting information on how people report their results, access (and benefit from) counselling and confirmatory testing, and receive post-testing treatment (if needed), and the social safety nets in place for self-isolation. Future studies relating to these points would therefore be valuable.

This research also highlights the need to further explore the drivers of stigma around COVID-19 testing and diagnosis, so that in preparation for future emerging and reemerging epidemics, health and education authorities in Kenya can have context-relevant information to plan sensitization activities for the public to address stigma and improve testing and care. If anti-stigma strategies are in place and integrated in health and education programs, there is greater chance of the public accepting testing in future epidemics.

Some limitations of the study must be noted. This is qualitative research which does not intend to be representative of the whole Kenyan population – generalizability is not within the intrinsic values of qualitative research. Sampling was a challenge, especially concerning the HCW informants. There is fatigue among this population as a result of their ongoing engagement in the COVID-19 response, but also because of constant requests to participate in research. Whilst it was relatively easy to sample PSIs and RCSs, the difficulties and discontent experienced by these groups as a result of the COVID-19 pandemic may have affected some of their narratives, and should be taken into account when evaluating their responses. Nevertheless, this study provides the first assessment of decision-takers' attitudes towards COVID-19 self-testing in Kenya.

5. Conclusions

In conclusion, key decision-takers believe that the implementation of SARS-CoV-2 self-testing in Kenya would be acceptable by the general population, who would welcome community-grounded, time- and cost-saving patient empowerment initiatives. However, decision-takers shared a number of key critical factors that need to be in place for feasible and valuable COVID-19 self-testing in Kenya. These included support from regulatory authorities, post- and pre-test counselling interventions, and mass awareness campaigns for the public and health practitioners to combat stigma around COVID-19 and financial burden of having to self-isolate following a reactive result. Ensuring these measures are in place will enable members of the Kenyan public to safely and effectively use SARS-CoV-2 self-tests once they are approved by Kenyan authorities.

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