

# Stigma, Trust, and Procedural Integrity: Covid-19 Testing in Malawi

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## Abstract

An emerging consensus in public health views testing for Covid-19 as key to managing the pandemic. It is often assumed that citizens have a strong desire to know their Covid-19 status, and will therefore take advantage of testing opportunities. This may not always be the case, however, especially when citizens perceive stigma associated with Covid-19, have low trust in health institutions, and doubt the procedural integrity of the testing process. This article explores willingness to receive a free Covid-19 test via a vignette experiment (conjoint design) embedded in a phone survey conducted in Malawi in May, 2020. The experiment varied test provider (public clinic versus international health organization), proximity to illness, and a confidentiality reassurance. We find that Malawians expect higher uptake of testing in their community when the international health organization offered the test rather than a public clinic, an effect we attribute to higher trust in the organization and/or perceptions of greater capacity to ensure procedural integrity. The confidentiality reassurance did not substantially alter beliefs about the privacy of results but did increase doubts about the willingness of community members to get tested in a public health clinic. Our findings suggest the importance of considering the demand side of testing in addition to well-known challenges of supply.

Key Words: Covid-19, disease testing, stigma, institutional trust, Malawi

## Introduction

An emerging consensus in public health views testing for Covid-19 as key to managing the pandemic (Jha et al., 2020; Allen et al., 2020; Soy, 2020). Without knowledge of infection rates, governments and other health actors struggle to design public health interventions and citizens lack information about the risks of various behaviors. Most studies of Covid-19 testing focus on technical properties of the tests (Abbasi, 2020; Wang et al., 2020), roll out efforts (Jha et al., 2020), or low supply. We consider a different factor: willingness to get tested, which is a form of compliance – like washing hands, limiting social contacts, or adhering to lockdown measures – that shapes the course of the disease.

Implicit in the testing literature is an assumption that citizens will take advantage of testing opportunities when offered, a narrative driven by the epidemic in the ‘Global North.’ This may not be the case for all populations, however. We explore two factors identified in previous literature that could reduce willingness to be tested: anxiety about disease stigma and lack of trust in public health actors. We also consider a third factor: perceptions about the procedural integrity of testing, defined here as the confidentiality and accuracy of the testing process. Where citizens do not trust public health actors, doubt the integrity of the process, and fear stigma, they may see little value to getting tested. Low supply might hide these issues in the short term, only for them to emerge as significant later on.

We report results from a telephone survey of 4,641 Malawians in May, 2020. At the time of fielding, incidence of Covid-19 was low in Malawi, but awareness of and anxiety about the disease were high. Covid-19 was fresh in the minds of our respondents, but very few had had the opportunity to get tested. Malawi resembles other low-income countries experiencing the early stages of the pandemic and provides insights into barriers to widespread testing in these contexts.

The survey asked Malawians about their knowledge, fears, and perceptions about Covid-19 as well as their opinions about the ability of public health actors to handle the pandemic. It included a pre-registered experiment that explored receptivity to Covid-19 testing through a hypothetical vignette. (See pre-analysis plan in Appendix D.) The vignette randomized three factors: the identity of the agency offering the test (a local health clinic or the World Health Organization); an assurance about the confidentiality of test results; and the proximity of contagion. It then asked respondents how likely they would be, under the circumstances detailed in the vignette, to accept the test; whether they thought others in their community would accept it; and their perceptions about the procedural integrity of the process.

The Covid-19 pandemic played out in Malawi against a backdrop of political crisis, precipitated by a controversial election in May 2019 and the subsequent annulment of election results in February 2020. These events potentially reduced trust in the sitting government and, by association, the public health clinics it operates. International health organizations, like the WHO, play a significant role in public health interventions in Malawi, funding a substantial portion of the domestic health budget and engaging in active interventions. International actors bring resources and capacity, but do not always understand local preferences and priorities (Dionne,2018) and, like domestic governments, do not always have the trust of the populations they serve. It was an open question when we designed the experiment whether Malawians would trust domestic or international public health actors more, but we expected feelings of trust to influence whether and from whom Malawians would accept a free test and their perceptions about the procedural integrity of the process.

We explored stigma concerns and procedural integrity with the randomized confidentiality assurance. We expected the assurance to increase both willingness to get tested and expectations that test results would remain private. We also expected the confidentiality treatment to narrow

differences between organizations offering the test. The final treatment, on proximity, specified risk of exposure, reducing chances that underlying variations in perception about risk would confound other treatments.

We find no treatment effects for personal willingness to be tested, in spite of high levels of reported anxiety about disease stigma. We suspect that social desirability bias induced nearly all respondents to report they would accept the free test. Beliefs about whether *others* in the community would accept a free test was lower and did respond to treatments, however. Compared to the public health clinic, the WHO treatment significantly increased expectations of community uptake of testing. We also found a significant interaction between the confidentiality treatment and testing provider, albeit not the interaction expected. When reassured about confidentiality, respondents paradoxically reduced willingness to be tested by a public clinic (but not the WHO) and reduced estimates of the accuracy of a public clinic test (but not a WHO test). We do not believe these results reflect poor understanding of the concept of ‘confidentiality’ in our study population as the term translates clearly into local languages and is familiar to respondents from their previous experience of the HIV-AIDS epidemic. Instead we speculate that the confidentiality reassurance primed respondents to think about the capacity of the provider to ensure the overall integrity of the testing process.

Our findings underscore the importance of considering the social and political aspects of testing and not simply assuming that ‘if you build it, they will come.’ Malawians expressed doubts about the willingness of their neighbors to get tested and these doubts seemed to center around the ability of public health clinics to offer confidential and accurate tests. We do not conclude from these findings that the WHO should take over testing in Malawi but rather that governments and public health agencies should pay careful attention to factors like stigma, trust, and beliefs about procedural integrity that shape responses to testing in their communities. We also echo the advice

of [Blair et al.\(2017\)](#) that international organizations might best contribute to disease management in Africa by working to improve the capacity of domestic actors.

## **Stigma, Institutional Trust, and Testing**

Previous work on stigma suggests that disease can come to be negatively associated with groups ([Parker and Aggleton, 2003](#); [Mahajan et al., 2008](#); [Lieberman, 2009](#); [Adida et al., 2018](#)). Studies have also noted that compliance with public health directives depends critically on trust in government and health care actors ([Blair et al., 2017](#); [Alsan and Wanamaker, 2017](#); [Vinck et al., 2008](#); [Wong et al., 2020](#)). We speculate that these factors could also shape responses to Covid-19 testing. Stigma might generate perceived costs to learning one's status, particularly in contexts where confidentiality is lacking. Lack of trust in public health actors could exacerbate fears if people believe testing agencies will not preserve their privacy. Where stigma is high and citizens lack faith in public health systems, costs of testing may outweigh benefits. A report on a Covid-19 outbreak in Nigeria, for example, noted that citizens believed a diagnosis is a 'death sentence' and did not want neighbors to know they were infected, 'so they avoid being tested.'[\(Maclean, 2020\)](#).

Public health campaigns in Africa involve domestic and international actors. International actors fund public health initiatives, shape domestic priorities, and engage in health interventions. While they supply resources, they do not always understand the preferences of the local population and, like their domestic counterparts, may face challenges with distrust. [Blair et al.\(2017\)](#), studying the 2014-15 Ebola epidemic in Liberia, find that 1) citizens had more trust in international non-governmental organizations (INGOs) than in their own government, and 2) individual variations in government trust drove compliance with Ebola-related measures, while trust in INGObore no relation to such behaviors. We build on this study and those on stigma, to explore trust in domestic

and international actors in Malawi, fears about stigma associated with Covid-19, and how these shape willingness to get tested.

## **Covid-19 Testing in Malawi**

In response to the Covid-19 global pandemic, Malawi declared a state of national disaster on 20 March 2020, before the first cases were recorded. Under this declaration, the government introduced public safety measures to curb the spread of the virus, including free testing for symptomatic individuals or those identified through contact tracing (See advertisement from the Medical Aid Society of Malawi in Appendix E).

Malawi established its first Covid-19 testing center in Lilongwe in late March. Eleven Covid-19 testing centers operated in the country by the end of May and 4,490 tests had been conducted. Notwithstanding the increased pace, the number of Covid-19 tests remained low during our survey fielding period. Unlike neighboring South Africa, which used door-to-door testing, Malawi focused on suspected cases, their immediate contacts, and travelers entering the country.

Supply side challenges therefore posed the most immediate and obvious barrier to Covid-19 testing in Malawi in the early stages of the pandemic. Supply challenges do not imply the absence of demand side barriers to testing, however. Low supply may in fact conceal testing reluctance on the part of some citizens. Our experiment was designed to probe whether such reluctance might exist in the population and factors that might alleviate it.

## **Sampling, Design, & Data**

We conducted a phone survey in Malawi in May 2020 with 4,641 respondents from 27 districts across all three regions. We obtained phone numbers from surveys we conducted in 2016 and 2019.

About half (54%) of the respondents came from the 2019 study, which drew random samples from the capital city, Lilongwe, and a region along the Zambian border. Because the 2019 study did not include the Southern Region, we contacted Southern respondents from the 2016 study. (Response rate was 62%. See Appendix [A](#) for more details.)

The resulting sample is not a random sample of the Malawian population but does include respondents in all three regions and is broadly representative. The proportions of most ethnic groups are roughly on target with national demographics from the census. In addition, 41% report being employed in agriculture compared with World Bank estimates of 44%.

Our sample is 56% female and the average age is 37. Less than 40% of respondents had schooling beyond primary school. Three quarters had lived in their current neighborhood for at least 10 years. Most said the household had enough water (94%) and soap or hand sanitizer (74%) for everyone to wash hands frequently. A staggering 83% feared going hungry and 65% reported that they had already experienced loss of income due to the pandemic.

To investigate citizens' willingness to get tested for Covid-19, we embedded a vignette experiment (also known as a single-profile conjoint experiment) in the survey. The experiment presented each respondent with a hypothetical scenario that described an organization offering free Covid-19 tests. The experiment randomly varied the proximity of the illness, the organization offering the test, and whether or not the results of the test would be kept confidential. Each respondent viewed a single scenario. The vignettes read as follows (items in bold are randomly-assigned treatment factors):

“Testing for the Novel Coronavirus and Covid-19 involves inserting a long swab into the nostril for 15 seconds and rotating the swab several times. This swabbing is then repeated for the other nostril. If **[you/someone in your household/someone in your neighborhood or village]** fell ill with

Covid-19 symptoms, and [a public health clinic/the World Health Organization] offered free Covid-19 testing, [with results that would remain confidential/NULL].”

We then asked four follow-up questions (Yes/No responses):

1. Would you agree to be tested?
2. Do you think most others in your community would agree to be tested?
3. Do you think that others would find out the results?
4. Do you think the test would be accurate?

The experiment occurred in the middle of the survey after questions about knowledge and attitudes toward Covid-19. Respondents would have been primed on Covid-19, but not about testing or any of the organizations involved in it. Using this experiment, we test three, pre-registered hypotheses:

**Hypothesis 1** *Willingness to get tested should be higher under the WHO treatment (relative to the local clinic).*

**Hypothesis 2** *Willingness to get tested should be higher under the confidentiality reassurance treatment (relative to the ‘blank’ treatment).*

**Hypothesis 3** *Willingness to get tested is not likely to differ across local and WHO clinics if local clinics can guarantee confidentiality.*

Additional factors that could drive testing not manipulated in the experiment include test cost, insufficient knowledge about how to get tested, fear of getting infected while being tested, and anxiety about the physical discomfort of the test. The design of the experiment and its timing mitigate these as confounds. We resolve the first two by stipulating that the test was free and offered by a specific organization. The timing of the survey – before extensive viral spread – should have



minimized fear of exposure during testing. And we began the experiment with a description of the process, ensuring that all respondents were equally aware of the discomforts involved regardless of which treatments they received. We focused on confidentiality of results rather than the confidentiality of testing itself (i.e. whether others would know that an individual had been tested) because agencies might not have leeway to keep the act of testing itself private; much Covid-19 testing happens in public venues, for example. Additional dimensions of confidentiality might be a useful avenue for future work.

## Results

Our respondents reported significant anxieties about stigma: 81% felt they would be treated poorly if they contracted Covid-19 (Figure 1(a)). Roughly one third had concerns about the ability of the government (which was voted out in June 2020) to manage the pandemic, and 63% feared it would be more difficult to access healthcare due to the pandemic (Figure 1(b)). They also professed more trust in the WHO (53%) than their own government (48%) or the Covid-19 Special Committee (29%; Figure 2). With concerns about stigma, healthcare access, and low trust in their government's Covid-19 response, Malawians might have reasonably questioned the personal utility of getting tested.

We follow the procedure for causal conjoint analysis outlined by [Hainmueller et al. \(2013\)](#). We estimate the Average Marginal Component Effect (AMCE), i.e. the marginal effect of a specific factor, and the Average Component Interaction Effect (ACIE) between two factors. Ordinary Least Squares (OLS) regression provides consistent estimates of both quantities of interest. We use the following model to obtain AMCE estimates:

$$y = \beta_1 \text{Household} + \beta_2 \text{Neighbor} + \beta_3 \text{WHO} + \beta_4 \text{Confidential} + \beta \mathbf{d} + E \quad (1)$$

Figure 1: Stigma and Anxiety over Covid-19

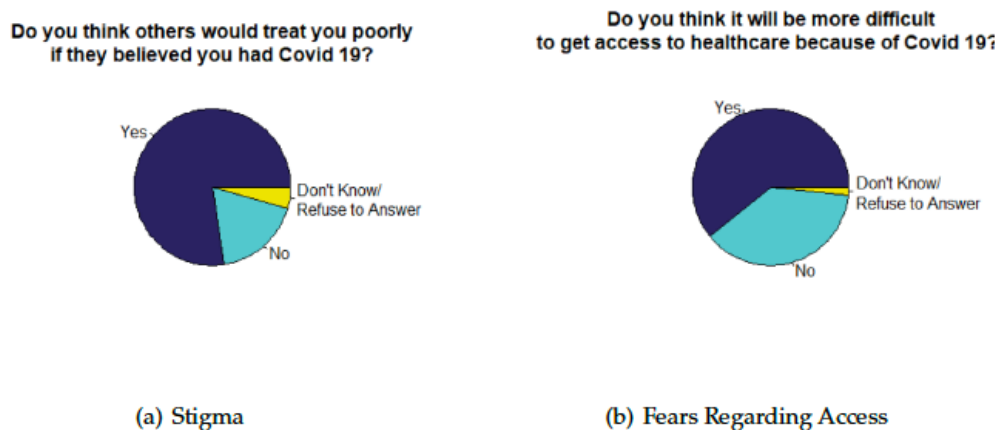
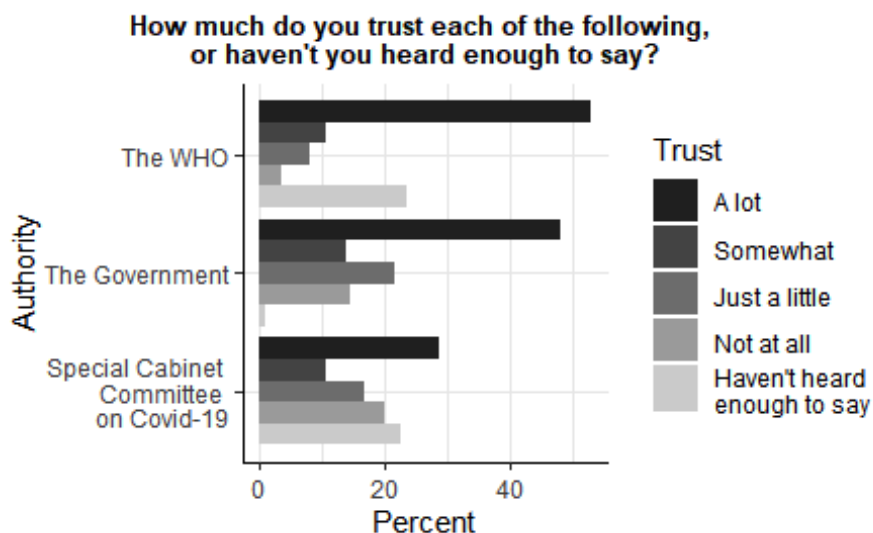


Figure 2: Trust in Institutions



The outcome,  $y$ , is the perceived willingness of others to seek a test. Each  $\beta_i$  in Equation (1) represents the AMCE for the associated factor. For example,  $\beta_3$  estimates the effect of a test being offered by the WHO (relative to a local clinic; a test of Hypothesis 1) while averaging across the remaining factors (confidentiality and who has symptoms) in the experiment. The  $\beta d$  term represents a vector of district fixed effects. We focus on the AMCE rather than the ATE (average treatment

effect, which estimates the effects of each of the 12 treatments/individual vignettes) because we seek to understand how each experimental factor influences the likelihood of seeking a test, while controlling for all other factors.

To estimate the ACIEs, we use the same model as for the AMCE, adding the interactions between all factors:

$$\begin{aligned}
 y = & \beta_1 \text{Household} + \beta_2 \text{Neighbor} + \beta_3 \text{WHO} + \beta_4 \text{Confidential} & (2) \\
 & + \beta_5 \text{WHO} * \text{Confidential} + \beta_6 \text{Household} * \text{WHO} \\
 & + \beta_7 \text{Household} * \text{Confidential} + \beta_8 \text{Neighbor} * \text{WHO} \\
 & + \beta_9 \text{Neighbor} * \text{Confidential} + \beta d + E
 \end{aligned}$$

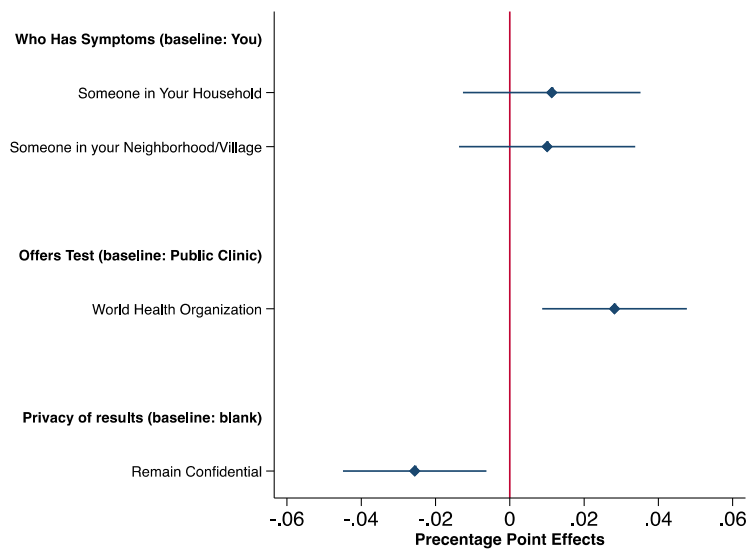
This ‘long’ model (Muralidharan et al., 2020) allows us to estimate the effect of each factor conditional on each of the other factors presented in the experiment. We are particularly interested in  $\beta_5$  as it provides a test of Hypothesis 3. For this model,  $y$  is either the likelihood of others to seek a test or the expected accuracy of the test. We estimate robust standard errors for all models.

Figure 3 reports ACME estimates for the outcome “Do you think most others in your community would agree to be tested.” The reference categories in all models are ‘you fell ill’, ‘a public health clinic’, and no mention confidentiality. Estimates for the other outcomes are reported in Appendix B. As noted above, social desirability is likely limiting variation in respondent’s own willingness to get tested and thus the null effects for that outcome.

We find support for Hypothesis 1. Respondents expect modestly higher (around 3 percentage points) community uptake of testing when the WHO offers the test. We find a significant effect for the confidentiality treatment (Hypothesis 2), but not in the expected direction: when reassured about confidentiality, respondents expect reduced community uptake of testing. We also find surprising results for the interaction between confidentiality and WHO treatments. Hypothesis 3 anticipated a negative interaction, i.e. that the confidentiality treatment would *narrow* differences between the

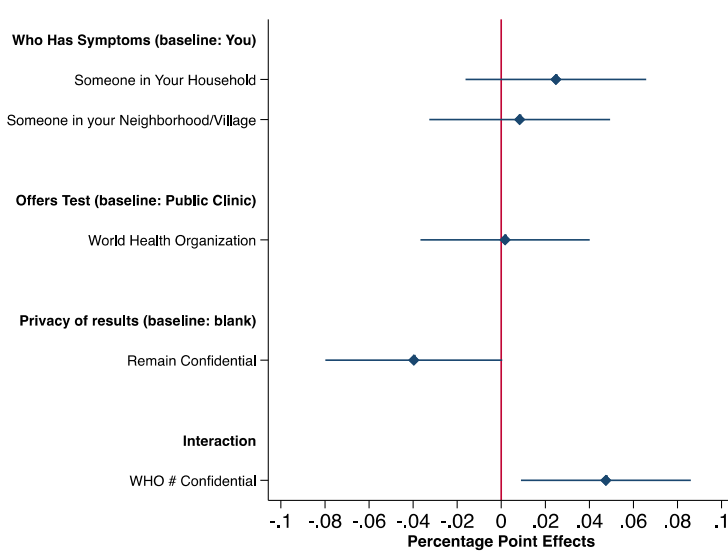
public health clinic and WHO. The results reported in Figure 4 suggest that the confidentiality treatment actually *accentuated* differences.

Figure 3: Effect on response to ‘Do you think most others in your community would agree to be tested?’ (Yes/No response, Average = 0.85)



The figure plots coefficient estimates along with their 95% confidence intervals from estimating Equation (1).

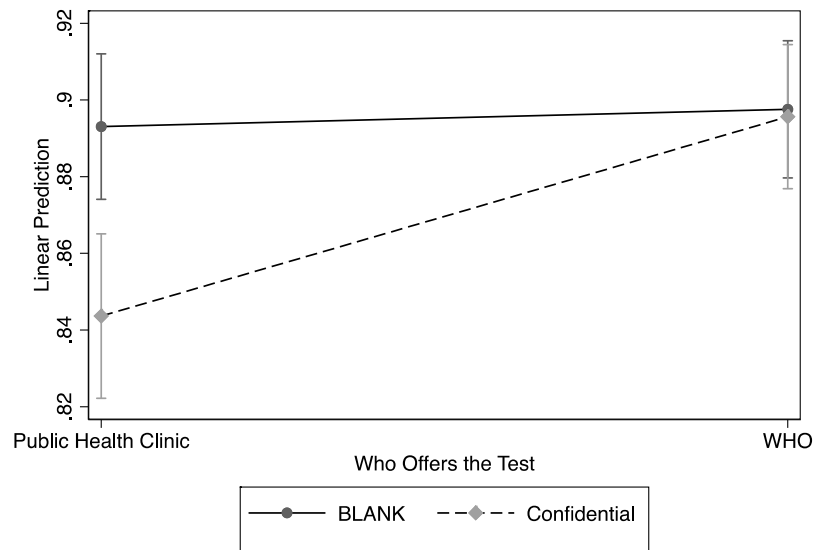
Figure 4: Interaction Model: Effect on response to ‘Do you think most others in your community would agree to be tested?’ (Yes/No response, Average = 0.85)



The figure plots coefficient estimates along with their 95% confidence intervals from estimating Equation (2). Only the interaction of interest is reported here; see Appendix B for full regression output.

Figure 5 plots the marginal effects of the confidentiality assurance by the institution offering the test to further explore the interaction between these treatments. The results indicate that the positive WHO-confidentiality interaction effect is driven by a backlash from respondents receiving the public clinic and confidentiality assurance treatments. When no reassurance was given, we observe identical outcomes for the public health and WHO treatments. With the reassurance, however, respondents reduced their estimation of community uptake for the public health clinic (but not the WHO).

Figure 5: Marginal Effects for ‘Others Seeking a Test’ Outcome



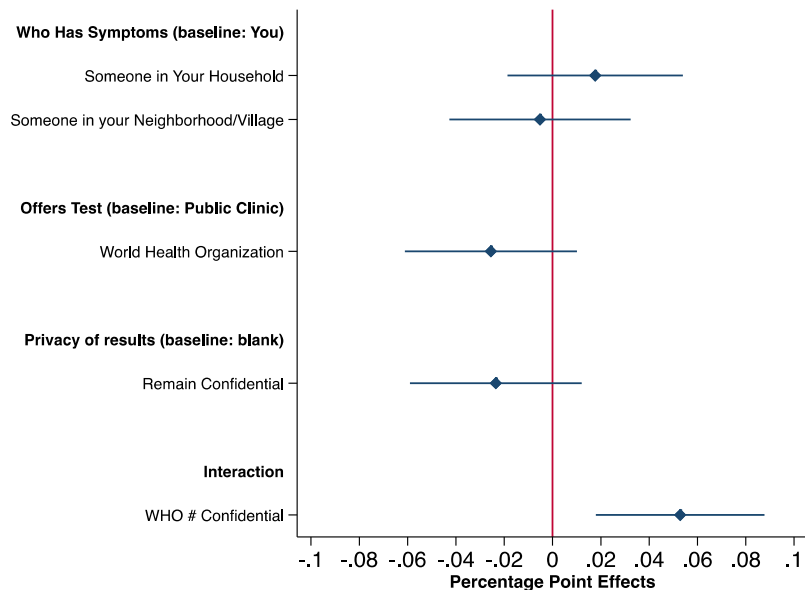
Effects were generated by estimating Equation (2) and calculating marginal effects for the variables in question while holding all other variables at their means.

These results seem counter-intuitive at first glance. Why would a confidentiality reassurance induce respondents to believe others in their community would eschew testing from a public clinic? We do not believe the results reflect a problem with comprehension or translation of ‘confidentiality.’ We allowed respondents to take the survey in English, Chichewa, or Chitumbuka. ‘Confidentiality’ did not present a problem for translation, as it has clear and commonly understood analogs in the local languages. Moreover, Malawians are familiar with the concept of medical

confidentiality from their experience with HIV-AIDS. The term confidentiality is also used in the consent agreements for surveys without problems.

We speculate instead that the confidentiality assurance primed respondents to think about the overall process of testing and the capacity of the provider to ensure credible results. Where respondents had lower trust in the testing provider to begin with (e.g. public clinics linked to the government), this assessment led to a downgrading of expectations about test integrity. Bolstering this interpretation, when we examine beliefs about the accuracy of results (this analysis was not pre-registered), we find a similar interaction between testing provider and the confidentiality treatment: respondents who received the confidentiality and public health clinic treatments were substantially less likely to think the test would be accurate than respondents who received the confidentiality and WHO treatments.

Figure 6: Interaction Model: Effect on response to ‘Do you think the test would be accurate?’ (Yes/No response, Average = 0.90)



The figure plots coefficient estimates along with their 95% confidence intervals from estimating Equation (2). Only the interaction of interest is reported here; see Appendix B for full regression output.

In summary, Malawians expect higher community uptake of testing when the agency offering the tests is the WHO rather than a public health clinic. The effect may reflect greater trust in the WHO and its ability to ensure the procedural integrity of the process. Previous work argued that trust in institutions shaped behavioral responses to public health crises (Blair et al.,2017;Alsan and Wanamaker,2017;Vinck et al.,2008;Wong et al.,2020). Our findings indicate the value of moving beyond undifferentiated conceptualizations of trust to studying related or component factors like technical capacity and procedural integrity.

## **Conclusion**

This study provides timely information about public willingness to comply with Covid-19 testing in Malawi. Testing is not widespread there, but as the pandemic proceeds, it could become an important aspect of Malawi’s public health response.

Malawi provides insight into other cases where populations might have concerns about stigma, lack trust in government public health efforts, and doubt the procedural integrity of the testing process. We believe these are not uncommon conditions. In a companion survey in Zambia (n=1900), we find comparable levels of stigma associated with Covid-19 (56%) and doubts about confidentiality of tests (49%). One limitation of our study is that it was fielded early in the epidemic. Our findings might not generalize to later stages, when experience with Covid-19 become more widespread. It is nonetheless important to understand these early stages for their own sake, as they represent a crucial period of time for intervention. Moreover, the factors we identify – stigma, trust, and beliefs about procedural integrity – likely remain significant over the course of the pandemic.

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# Appendices

## A 2019 and 2016 Survey Details

For the 2020 respondents who participated in the 2016 or 2019 survey, we have a rich set of previously collected data on both the individual respondent and their community. Both the 2016 and 2019 were implemented to allow local-level indicators; for the 2016 survey the sample was drawn in villages and for 2019 it was drawn in 1 sq km areas. Both surveys were also coupled with factual and local elite surveys, which give additional information on the nature of the community and its leadership.

### A.1 Survey Response Rate

The surveys had a 62% response rate. This response rate is for those phone numbers that were operational. This estimate does not include the 18% of phone numbers that were either copied incorrectly, did not exist, or were no longer registered. We do include in our denominator those numbers that were operational but no one answered (28% of the sample). We expect that many calls were not answered because respondents lived in rural areas with poor network coverage and/or electricity challenges (e.g. respondents could not charge their phones). If we do not include these non-reachable phone numbers (but continue to exclude those no longer in operation) in the denominator, our response rate is 94% as only 6% of those reached refused to participate.

### A.2 Locating 2019 participants

The sample included 5100 phone numbers that had been collected from participants in the 2019. (Regarding the sampling strategy implemented in the 2019 survey, see below.) At the end of that survey, in preparation for a panel study, we had asked individuals if they would be willing to participate in a follow-up survey.

We created a dataset that included the individual's name, telephone number(s), how long the individual had lived in the area, gender, age, and education. These questions were used to verify whether the individual answering the phone was the same respondent from 2019. Where the respondent existed but was not available, enumerators set a call-back time and re-contacted the individual. Where the respondent was not available but the individual was over 18 years of age, the individual was asked if s/he wanted to participate in the study. Where the individual was under 18 years of age and the initial respondent was not available, the enumerator asked if an adult was available. That adult was then given the chance to participate in the survey. At the end of the survey all respondents were asked if they are willing to participate in future studies.

### A.3 Revisiting 2016 villages

The phone numbers collected in the 2019 survey included respondents only in districts from the north and central regions; thus, to include the south, we sent teams to the southern regions and to two southern central region districts that had not been included in the 2019 sample. They were given and instructed to wear masks, use hand sanitizers, and maintain social distancing measures and were sent to the same villages that were included in the 2016 survey.

For each village, they were given the lists of the first names of the adults who were in the household in 2016 and their ages, and the name of the original respondent chosen. They met with the village head who then helped them to contact and hire a person from the village. This person went to village houses to ask previous respondents if they would be willing to be contacted. The telephone numbers were collected from those who were willing. Where an individual was not willing or available, another adult in the household was asked to participate and, if s/he agreed, demographic information and the phone number was collected. If no one existed in the original household (e.g., the family had moved or passed away) or if no one agreed to be contacted, the village contact was asked to find another household in the village willing to be contacted. Telephone numbers and demographics were entered into a database for use in the survey.

#### **A.4 Malawi 2019 survey**

The Malawi 2019 survey was carried out between May and October of 2019 in 2 regions of Malawi (BLINDED 2019), where each region was an independent sample. The regions included the capital city and an area along the border between Zambia and Malawi. Samples were stratified. Border regions were divided into strata that were 0-50 km from the border and 50-100 km from the border, and each of these areas was divided into five subareas. Urban areas were divided into two concentric circles: 0-25 km from the urban center and 25-50 km from the urban center, and each was divided into four areas. The goal was to ensure that the respondents were distributed across the region and to include more and less urban and border areas. We aimed to divide the samples evenly across these regions and strata.

Satellite imagery data was employed for selecting sampling units. To do so, we divided the regions/bins into 1 sq km areas, and selected these areas using a randomized, probability proportionate to size (PPS) method based on WorldPop estimates of population density. We then divided chosen areas into hectares. The hectares were randomly numbered, and enumerators were asked to begin interviewing in the 1 km sq areas in the hectares, moving from those with the lowest to highest numbers. They were asked to complete not more than 5 interviews in the hectare before moving onto the next one, and to complete 30 interviews in each square kilometer. The aim of this strategy was to ensure that enumerators spread out across the 1 km sq unit.

Enumerators were instructed to enter sampling units using tablets to track their locations and confirm they were in the correct area. They were asked to go to the center of each hectare and then to move outward, in separate directions to additional houses. Within each household, one participant was randomly selected using the Kish method. Survey weights were designed to take into account sampling and to correct for imbalances between the sample and census demographics for the area.

#### **A.5 Malawi 2016**

The survey was conducted in Malawi during March and April 2016. We implemented the survey using tablet computers.

This survey seeks to measure and better understand governance and service delivery at the local level. Importantly, this is a highly clustered survey, which facilitates measurement and inference at the local (in this case, village) level. The survey covers the following topics: political participation, social norms and institutions, education, health, security, welfare, corruption, land, and dispute resolution.

The sample was stratified on region (North, Central, South), the presence of matrilineal and patrilineal ethnic groups, and the urban/rural divide. Because patrilineal groups are rare in Malawi

and we wanted to maximize variation in matrilineal and patrilineal heritage, we oversampled Primary Sampling Units (PSUs) from the patrilineal stratum. We sampled 22 PSUs, namely 'Traditional Authorities' (TAs). These 22 sampled TAs are located in 15 of Malawi's 28 districts. Districts are the largest sub-national administrative units in Malawi. Within each TA (i.e., PSU), we selected randomly four enumeration areas (EAs) as Secondary Sampling Units (SSUs). EAs are comparable to census tracts. Both PSUs and SSUs were selected without replacement according to the principle of Probability of Selection Proportional to Measure of Size (PPMS). Within each EA, we sampled four villages, based on known geographical points provided on the maps of the EAs produced for Malawi's latest population census. Once in the village, enumerators followed a random walk pattern to select households. After they entered the household, the interviewer collected the necessary data about composition of the household. Both the contact questionnaire and the main questionnaire we programmed on digital tablets, including the selection of the final respondent in the household through a digital version of the Kish grid. The target was to interview 22 respondents in each village. This process produced a sample of 8,100 respondents. See Table 1 for a list of the districts and TAs included in the sample and Table 2 for a list of the villages.

While the sampling procedures were planned as presented, of course in practice this was not always the case. In total the research team had to draw 11 replacement EAs. One replacement EA was drawn because enumerators were chased out of a village and forced to withdraw from the EA. In the remaining 10 cases, EAs were not accessible (e.g. in one instance our team was unable to reach the designated EA because a bridge had washed away during heavy rains). In these instances, backup enumeration areas were randomly selected within the same EAs (excluding already selected and inaccessible zone) and were used as replacements. In total, only 11 of the 99 sampled EAs are replacement EAs. In addition, given that multiple enumerators conducted surveys in the same village, the target number of 22 respondents per village (neighborhood in urban areas) was not always reached precisely. In some instances more were surveyed and in others slightly fewer than 22 households were surveyed. In addition, the boundaries between villages and neighborhoods were not always clear, which also caused our teams to deviate from the target of 22 per village/neighborhood.

## B Main Results Full Output

Table 1: Full Regression Output for OLS Models and All Outcome Variables

	Seek Test	Others Seek Test	Others Find Out	Accurate
Someone in Your Household	-0.008 (0.008)	0.011 (0.012)	0.006 (0.016)	0.007 (0.011)
Someone in your Neighborhood/Village	-0.002 (0.008)	0.010 (0.012)	0.018 (0.015)	0.014 (0.011)
World Health Organization	-0.004 (0.006)	0.028*** (0.010)	0.019 (0.013)	0.014 (0.009)
Remain Confidential	-0.004 (0.006)	-0.026*** (0.010)	-0.007 (0.013)	-0.004 (0.009)
District Fixed Effects	Yes	Yes	Yes	Yes
Constant	1.006*** (0.010)	0.989*** (0.014)	0.994*** (0.016)	0.986*** (0.011)
R <sup>2</sup>	.02	.02	.02	.03
N	4633	4246	4422	4192

Significance levels: \* 10% \*\* 5% \*\*\* 1%

Robust Standard Errors in Parenthesis

Table 2: Interaction Models: Full Regression Output for OLS Models and All Outcome Variables

	Seek Test	Others Seek Test	Others Find Out	Accurate Out
Someone in Your Household	-0.001 (0.013)	0.025 (0.021)	0.028 (0.028)	0.018 (0.019)
Someone in your Neighborhood/Village	0.002 (0.013)	0.008 (0.021)	0.020 (0.027)	-0.005 (0.019)
World Health Organization	-0.008 (0.012)	0.002 (0.020)	0.015 (0.025)	-0.026 (0.018)
Remain Confidential	-0.004 (0.013)	-0.040* (0.020)	-0.007 (0.026)	-0.024 (0.018)
WHO × Confidential	0.011 (0.013)	0.047** (0.020)	0.019 (0.025)	0.053*** (0.018)
Household × WHO	-0.010 (0.016)	0.010 (0.024)	-0.001 (0.031)	0.013 (0.022)
Household × Confidential	-0.005 (0.016)	-0.036 (0.025)	-0.043 (0.032)	-0.033 (0.022)
Neighbor × WHO	0.005 (0.016)	-0.001 (0.024)	-0.017 (0.031)	0.028 (0.022)
Neighborhood × Confidential	-0.013 (0.016)	0.006 (0.024)	0.014 (0.031)	0.013 (0.022)
District Fixed Effects	Yes	Yes	Yes	Yes
Constant	0.991*** (0.012)	0.953*** (0.021)	0.727*** (0.035)	0.973*** (0.018)
R <sup>2</sup>	.02	.02	.02	.03
N	4633	4246	4422	4192

Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

Robust Standard Errors in Parenthesis

## C Heterogeneous Treatment Effects

The measures of trust in these models come from direct questions asking respondents how much they trust the Malawian government, the WHO, and a number of other institutions/organizations. The ‘Confident in Gov.’ variable is measured using a question that asks respondents how confident they are in the ability of the Government of Malawi to handle the current Covid-19 pandemic.

In the second table, we seek to determine if access to health care moderates our effects for the WHO and confidentiality. To measure access to health care, we use a survey question that asked if people were worried that it would be more difficult to access healthcare due to the Covid-19 pandemic. We find that this does not impact the WHO finding above as the interaction between WHO and health care access is insignificant. This suggests that the greater willingness to seek a test offered by the WHO is not do to local scarcity of health care. There is some evidence that access to health care does condition the confidentiality finding although this effect is only significant at the 10% level and thus we do not place much stalk in it. Although it does suggest that if respondents are worried about access to health care, a confidentiality guarantee does lead respondents to be more likely to believe others will seek a test.

Table 3: OLS Models: Heterogeneous Treatment Effects by Trust (DV: Others Seek Test)

Someone in Your Household	0.011 (0.012)	0.011 (0.012)	0.011 (0.012)
Someone in your Neighborhood/Village	0.009 (0.012)	0.013 (0.012)	0.011 (0.012)
World Health Organization	0.036* (0.019)	0.038* (0.021)	0.045** (0.018)
WHO × Trust Gov.	-0.012 (0.022)		
WHO × Confidence in Gov.		-0.015 (0.024)	
WHO × Trust The WHO			-0.027 (0.022)
Trust Gov	0.059*** (0.016)		
Confidence in Gov.		0.060*** (0.018)	
Trust The WHO			0.057*** (0.016)
Remain Confidential	-0.027*** (0.010)	-0.027*** (0.010)	-0.028*** (0.010)
District Fixed Effects	Yes	Yes	Yes
Constant	0.902*** (0.021)	0.900*** (0.022)	0.907*** (0.021)
R <sup>2</sup>	.03	.03	.02
N	4168	4154	4207

Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

Robust Standard Errors in Parenthesis

Table 4: OLS Models: Heterogeneous Treatment Effects by Health Care Access  
(DV: Others Seek Test)

Someone in Your Household	0.011 (0.012)	0.010 (0.012)
Someone in your Neighborhood/Village	0.011 (0.012)	0.010 (0.012)
World Health Organization	0.017 (0.016)	0.028*** (0.010)
Diff. Access Health Care	-0.022 (0.015)	-0.030** (0.013)
Remain Confidential	-0.026*** (0.010)	-0.048*** (0.016)
WHO × Diff. Access Health Care	0.017 (0.020)	
Confidential × Diff. Access Health Care		0.034* (0.020)
District Fixed Effects	Yes	Yes
Constant	0.960*** (0.019)	0.966*** (0.018)
R <sup>2</sup>	.02	.02
N	4178	4178

Significance levels: \*; 10% \*\*; 5% \*\*\*; 1%

Robust Standard Errors in Parenthesis



## D Pre-Analysis Plan

This pre-analysis plan was registered with the Open Science Framework (OSF) on May 22, 2020. Data gathering for the current analysis completed on (and data was not viewed by the researchers until) May 25, 2020. We provide the PAP here in order to maintain blind review.

Reluctance to get tested for a disease associated with contagion and stigma can hinder public health responses, particularly where trust in the institution doing the testing is lacking. International organizations in particular have struggled to establish trust within African populations when dealing previous infectious disease outbreaks (Ebola for example). At the same time, African citizens do not always trust their own governments, and trust in the current government of Malawi is low. In this context, can an international or domestic actor more successfully encourage testing? We consider these issues through the lens of Covid-19.

We ask:

1. Are Malawians willing to be tested, if offered a test for free? Does their willingness reflect their likelihood of being exposed and their perceptions of risk?
2. Do they associate stigma with the disease (or a chance that they will be treated poorly if they are known to have it)? Does this reduce their willingness to be tested?
3. Does an assurance that the test will remain private and confidential mitigate these concerns?
4. Do they associate higher/lower/equal competency (accuracy of test) to an international versus domestic organization? Do they associate greater/less/equal protection of privacy to an international versus domestic organization?
5. Are they more/less/same willing to be tested by an international versus domestic organization? Do they think others in their community are more/less/same willing to be tested by an international versus domestic organization?
6. Do perceptions of trust and competency of the national government vs. international organizations shape willingness to be tested by them?

Hypotheses:

1. Proximity of symptoms determines risk perception of having disease (Q62). Respondents will be most likely to believe they have the disease if they are symptomatic, followed by someone in their house, and then someone in the community. This is more or less a treatment check. (ATE)

1a. Effects should be greatest in respondents with greater knowledge of the illness. (Number of incorrect answers to Covid-Awareness questions on symptoms q51 and sources of disease q52).  
HTE.

1b. Difference between “in household” and “in community” will be largest in less densely settled area. For individuals who are returning in the sample, and for whom we have GPS coordinates, we can use density as measured by Facebook data to examine

HTEs. We can also examine individuals who are more connected to others in the area, using answers from the 2016 and 2019 on how frequently they visit others and how many others they know. HTE.

2. Willingness to be tested is a function of proximity of symptoms (and risk perception, assuming 1 holds). Compared to someone in the neighborhood/village being sick, respondents will be most likely to seek testing if they themselves are ill and second most likely if someone in their household is ill. As proximity to the sick person increases, the likelihood of getting tested should increase. (ATE)

2a. Vulnerability. Effect will be strongest for those most vulnerable to disease (age of respondent, multigenerational households, pre-existing illness). (Q106 on health probs in the household, those having elderly living with them at home q31, 2019/2016 Chronic illness or illness in last year response hlthq5, age (demoq2)) (HTE)

2b. Fear. Effect will be strongest for those most worried about contracting disease (q84).

2c. Knowledge. Effects should be greatest in respondents with greater knowledge of the illness. (Number of incorrect answers to Covid-Awareness questions on symptoms q51 and sources of disease q52). (HTE).

3. The confidentiality treatment should decrease respondent's perceptions that others would find out about test results (Q61). Treatment check. ATE.

4. Given stigma associated with disease, we expect the confidentiality assurance treatment to increase willingness to get tested of respondent and respondent's perceptions of willingness of others in the community to get tested. (ATE)

4a. This effect should be largest for respondents who are themselves long-term residents of the community (Q28) and for those who do not consider themselves outsiders (from 2019 Q101). Significant positive interaction effects between length of residence treatment and long-term resident (Q28) and length of residence treatment and feeling like an insider (Q101). HTE.

4b. This is conditional on believing the confidentiality assurance treatment decreases the chances that others will find out about the result. (Conditional on hypothesis 3 holding).

5. We will run observational analyses of individuals who are more concerned about disease stigma (Q63 "others treat you poorly", q105-3, which checks for prejudice against living next to someone with Covid-19, and hlthq64 "What are the reasons you are unable to attend to your needs regarding General health?" fear of social stigma in the community) will be less likely to agree to be tested. But the effect of stigma will be lower for those who get the confidentiality assurance treatment (HTE). (We expect an interaction effect between the confidentiality treatment and stigma concerns (Q63) in explaining willingness to get tested.) For those who get the confidentiality treatment, the correlation between stigma concerns and willingness to get tested should be weaker, or a negative correlation between confidentiality treatment and stigma concerns on the outcome willingness to get tested.

6. Given the current crisis in confidence in the Malawian government, we expect respondents to believe testing by the WHO to be more accurate and more likely to be confidential than testing in a public health clinic.

6a. This should vary by relative trust in the Malawian government vs. WHO from current survey. Malawians who trust the government more than the WHO should be more likely to see it as accurate and ensuring confidentiality. The opposite is true if they trust the WHO more than the government. Interaction between (trust gov  $\zeta$  trust WHO) and institution offering test treatment (HTE).

6b. It should also vary by views of competence of the Malawian government in handling crisis (Q95 and Q98). Positive interaction between public health clinic treatment and approval rating of Malawian government on accuracy and confidentiality of test HTEs.

6c. And views of corruption of health care system from 2019. For example, hlthq62 Do you expect that the order would be followed, or could some people exchange a few words with personnel and get treated before their turn in line? Hlthq16 Did you have to pay extra money or give a gift to get this service? Hlthq23 Since month survey was taken of last year, have you/your household ever turned to someone for help or used personal connections for health service? Hlthq34 Would you say that you used personal connections in order to obtain access that you otherwise would not have received, or to obtain faster/better service, or for some other reason? Where there is higher corruption we would expect less trust in local institutions to do things like keep results confidential. HTEs. Negative interaction between public health clinic treatment and corruption measures on accuracy and confidentiality of test. HTEs.

6d. And views of competence of health care system from 2019. Question Hlthq59 asks about how good the quality of care is at the nearest public clinic/health center/ dispensary with options of very bad to excellent. Hlthq63 asks Do you or anyone else in your family have any health care needs that you are not able to attend to, regarding... general health, which if answered no suggests the person does not feel there are public services available to help them. Negative interaction between public health clinic treatment and needs not met on accuracy and confidentiality of test. HTEs.

7. Given the current crisis in confidence in the Malawian government, we expect respondents to be more likely to agree to testing by the WHO versus the Malawi govt.

7a. This should vary by relative trust in the Malawian government vs. WHO from current survey. Malawians who trust the government more than the WHO should be more likely to see it as accurate and ensuring confidentiality. The opposite is true if they trust the WHO more than the government. Interaction between (trust gov  $\zeta$  trust WHO) and institution offering test treatment on willingness to get tested (HTE).

7b. It should also vary by views of competence of the Malawian government in handling crisis (Q95 and Q98). Positive interaction between public health clinic treatment and approval rating of Malawian government on willingness to get tested. HTEs.

7c. And views of corruption of health care system from 2019. For example, hlthq62 Do you expect that the order would be followed, or could some people exchange a few words with personnel and get treated before their turn in line? Hlthq16 Did you have to pay extra money or give a gift to get this service? Hlthq23 Since month survey was taken of last year, have you/your household ever turned to someone for help or used personal connections for health service? Hlthq34 Would you say that you used personal connections in order to obtain access that you otherwise would not have received, or to obtain faster/better service, or for some other reason? Negative interaction between public health clinic treatment and corruption measures on willingness to get test. HTEs.

7d. And views of competence of health care system from 2019. Question Hlthq59 asks about how good the quality of care is at the nearest public clinic/health center/ dispensary with options of very bad to excellent. Hlthq63 asks Do you or anyone else in your family have any health care needs that you are not able to attend to, regarding... general health, which if answered no suggests the person does not feel there are public services available to help them. Negative interaction between public health clinic treatment and needs not met on willingness to get test. HTEs.

8. Given the current crisis in confidence in the Malawian government, we expect respondents to think that others in their community will be more likely to agree to testing by the WHO versus the Malawi govt.

8a. This should vary by relative trust in the Malawian government vs. WHO. Malawians who trust the government more than the WHO should be more likely to see it as accurate and ensuring confidentiality. The opposite is true if they trust the WHO more than the government. Interaction

between (trust gov ; trust WHO) and institution offering test treatment and community willingness to get test (HTE).

8b. It should also vary by views of competence of the Malawian government in handling crisis (Q95 and Q98). Positive interaction between public health clinic treatment and approval rating of Malawian government on community willingness to get tested. HTEs.


8c. And views of corruption of health care system from 2019. For example, hlthq62 Do you expect that the order would be followed, or could some people exchange a few words with personnel and get treated before their turn in line? Hlthq16 Did you have to pay extra money or give a gift to get this service? Hlthq23 Since month survey was taken of last year, have you/your household ever turned to someone for help or used personal connections for health service? Hlthq34 Would you say that you used personal connections in order to obtain access that you otherwise would not have received, or to obtain faster/better service, or for some other reason? Where there is higher corruption we would expect less trust in local institutions to do things like keep results confidential. Negative interaction between public health clinic treatment and corruption measures on community willingness to get test. HTEs.

8d. And views of competence of health care system from 2019. Question Hlthq59 asks about how good the quality of care is at the nearest public clinic/health center/dispensary with options of very bad to excellent. Hlthq63 asks Do you or anyone else in your family have any health care needs that you are not able to attend to, regarding . . . general health, which if answered no suggests the person does not feel there are public services available to help them. Negative interaction between public health clinic treatment and needs not met on community willingness to get test. HTEs.

## E Medical Aid Society of Malawi Advertisement

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**THE MEDICAL AID SOCIETY OF MALAWI**

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**UPDATE ON COVID -19 COVERAGE**

Due to the increase in the number of confirmed COVID-19 cases, MASM has experienced a rise in queries concerning cover for COVID-19 from its membership in the past week or so. The main area for concern for our members is that they want to know whether or not the Society covers testing and treatment for COVID-19. Given the above, we would like to advise our members as follows:

1. The Government of Malawi declared a public health emergency/disaster; hence all health facilities (Private and Public) by law are required to follow procedures provided by the government.
2. All suspected and confirmed cases of Covid-19 are channelled to designated and dedicated centres that deal with the management of the condition.
3. MASM is subject to all local authority emergency directives regarding prevention of COVID-19 infection, handling of suspected and confirmed COVID19 cases.
4. Since COVID-19 is a pandemic, all issues of voluntary testing are covered by the Government of Malawi, because the government already is shouldering the cost for voluntary testing, the Society is not providing cover on this.
5. The government has established testing centres for COVID-19 where all voluntary testing is taking place.
6. At present, the only designated treatment isolation centres are at Mzuzu Central Hospital, Kamuzu Central Hospital (Old Lepira Department), Queen Elizabeth Central Hospital (Ward 3A) and Blantyre DHO Kameza Isolation Centre.
7. Also note that COVID-19 testing centres are at College of Medicine in Blantyre, Queen Elizabeth Central Hospital, Kamuzu Central Hospital, DHO Office - CHISU Lilongwe and Mzuzu Central Hospital.

However, the Society is aware that a few private hospitals are conducting tests for COVID-19, and others have isolation facilities for the management of COVID-19. In light of this, MASM would like to advise its members that currently the Society is in discussion with these service providers and once they obtain the necessary certification from Government, members will be communicated on the scheme procedures just as in other general illnesses. For example, for the Society to pay for COVID-19 tests, they will have to be requested by a doctor as it is with any other disease.

The Society is also aware of the concerns raised by members on the unavailability of MASM EMS to evacuate patients suffering from COVID-19. The challenge MASM is facing within the provision of this service is that of capacity. As the Society has a limited number of emergency response vehicles, the current fleet countrywide is already overwhelmed with general conditions. Nevertheless, since the Society's primary reason for existence is to save lives, we are exploring the best measures to put in place so that the ambulance units do not become a harbinger for infection, and within reasonable time members will be updated on progress.

**Sydney B. Chikoti**  
CHIEF EXECUTIVE OFFICER

**BRANCH OFFICE**

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