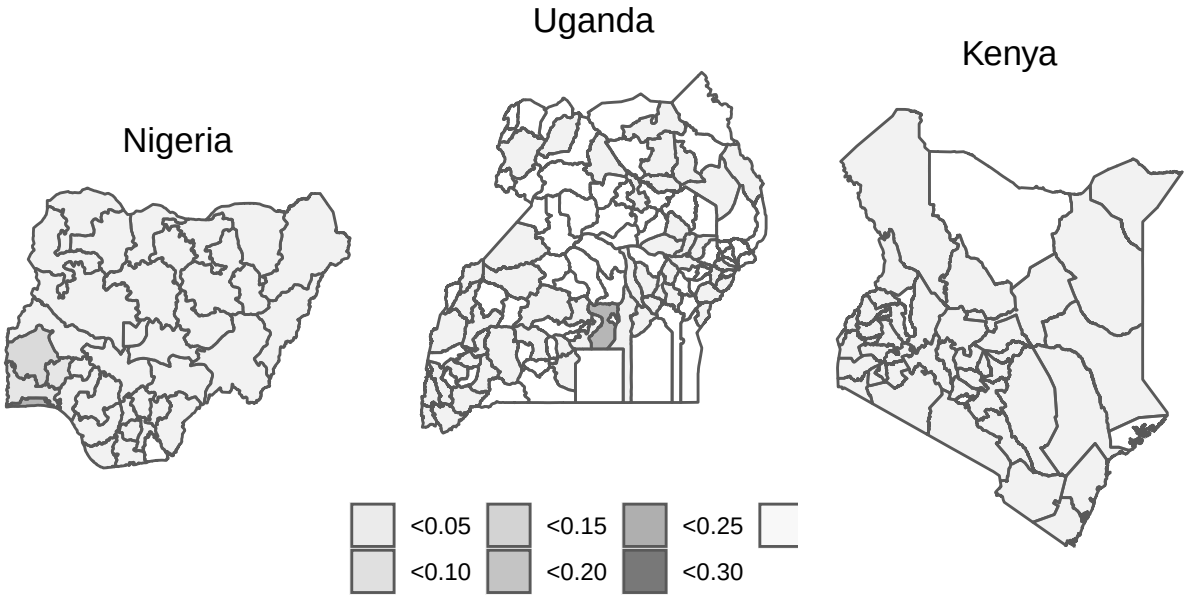
Replication - SI

Clara Bicalho, Melina Platas, Leah Rosenzweig

List of Tables

1 Sample

1.1 Map of Respondents



1.2 Comparing demographics, attitudes, and behaviors of respondents who did not correctly identify that 'maintaining a distance of 1-2 meters from others' as a way to reduce the spread of COVID-19.

2 Factual Knowledge

2.1 Responses to True/False Question

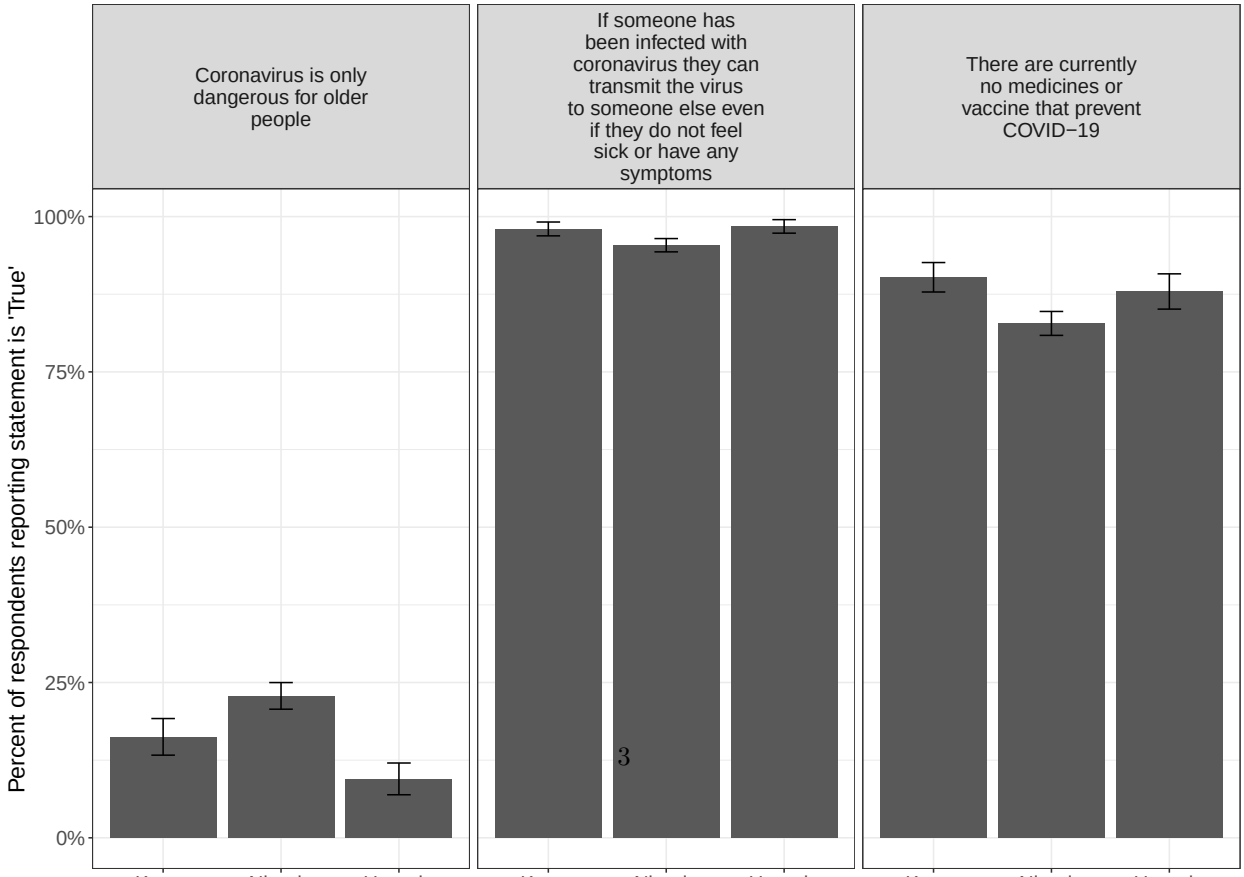
```
## pdf
##   2
```

Table 1: Demographics of respondents who did not and did know maintaining physical distance helps reduce the spread of COVID-19

Variable	NOT know distancing helps	Know distancing helps	pval
Copartisan	0.467	0.424	0.762
Age	26.981	26.890	0.791
Schooling Level	7.755	8.135	0.000
Religiosity	2.636	2.792	0.018
Female	0.253	0.270	0.472
Urban	0.768	0.785	0.474
Occupation-Manual	0.092	0.051	0.010
Occupation-Mid-level	0.084	0.106	0.164
Occupation-Never employed	0.087	0.087	0.997
Occupation-student	0.283	0.349	0.010
Occupation-upper level	0.090	0.103	0.420
Religion:Catholic	0.226	0.228	0.902
Religion:Evangelical	0.304	0.319	0.580
Religion:Muslim	0.245	0.158	0.000
Religion:Other	0.063	0.076	0.345
Religion:protestant	0.160	0.219	0.006
Voted for incumbent Pres.	0.329	0.334	0.855

Table 2: Attitudes and behaviors of respondents who did not and did know maintaining physical distance helps reduce the spread of COVID-19

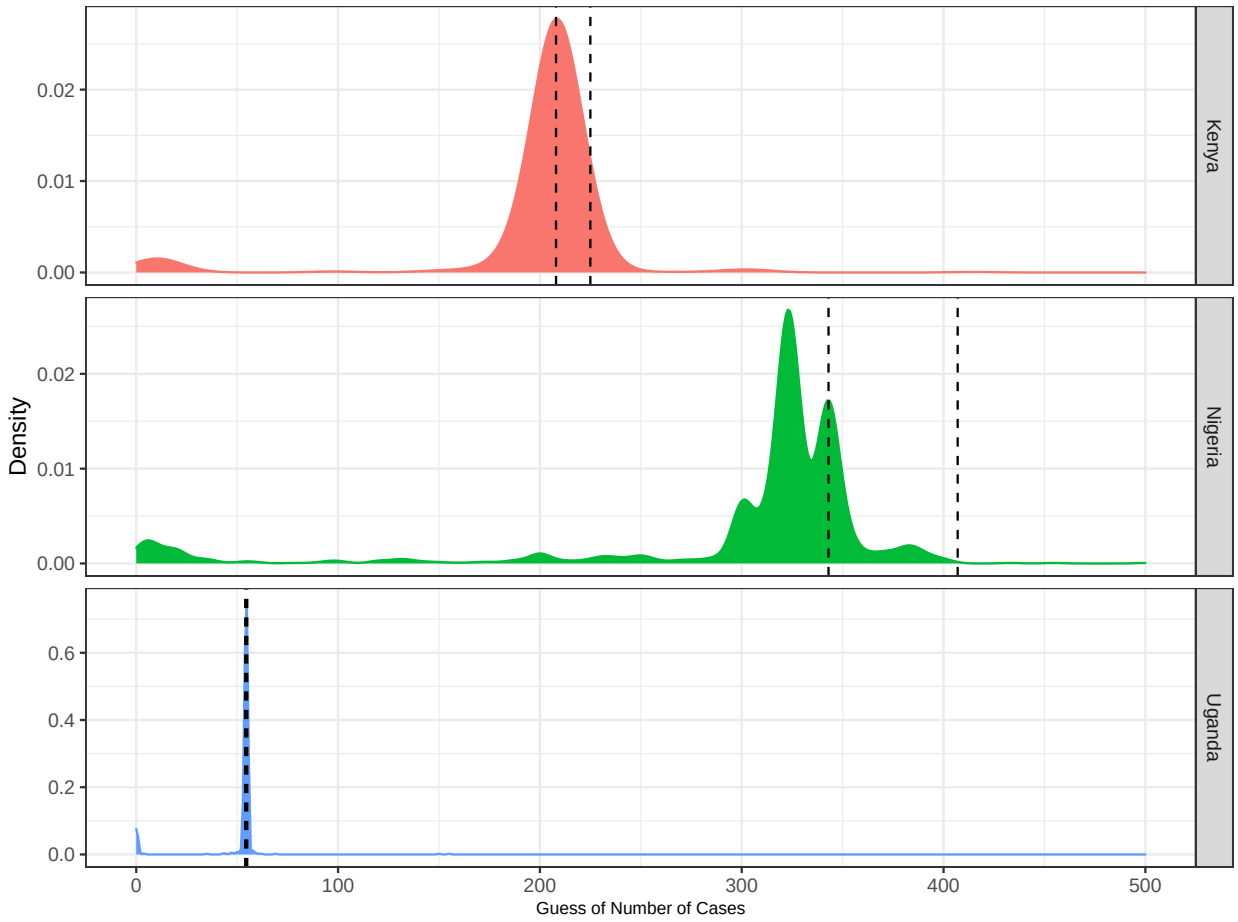
Variable	NOT know distancing helps	Know distancing helps	pval
Support lockdown	0.519	0.598	0.005
Guess others support lockdown	4.973	4.781	0.230
Wrote message	0.516	0.544	0.319
Wore a mask when last left house	0.204	0.448	0.000
Vignette response	3.253	3.543	0.000



2.2 Knowledge of Number of Cases

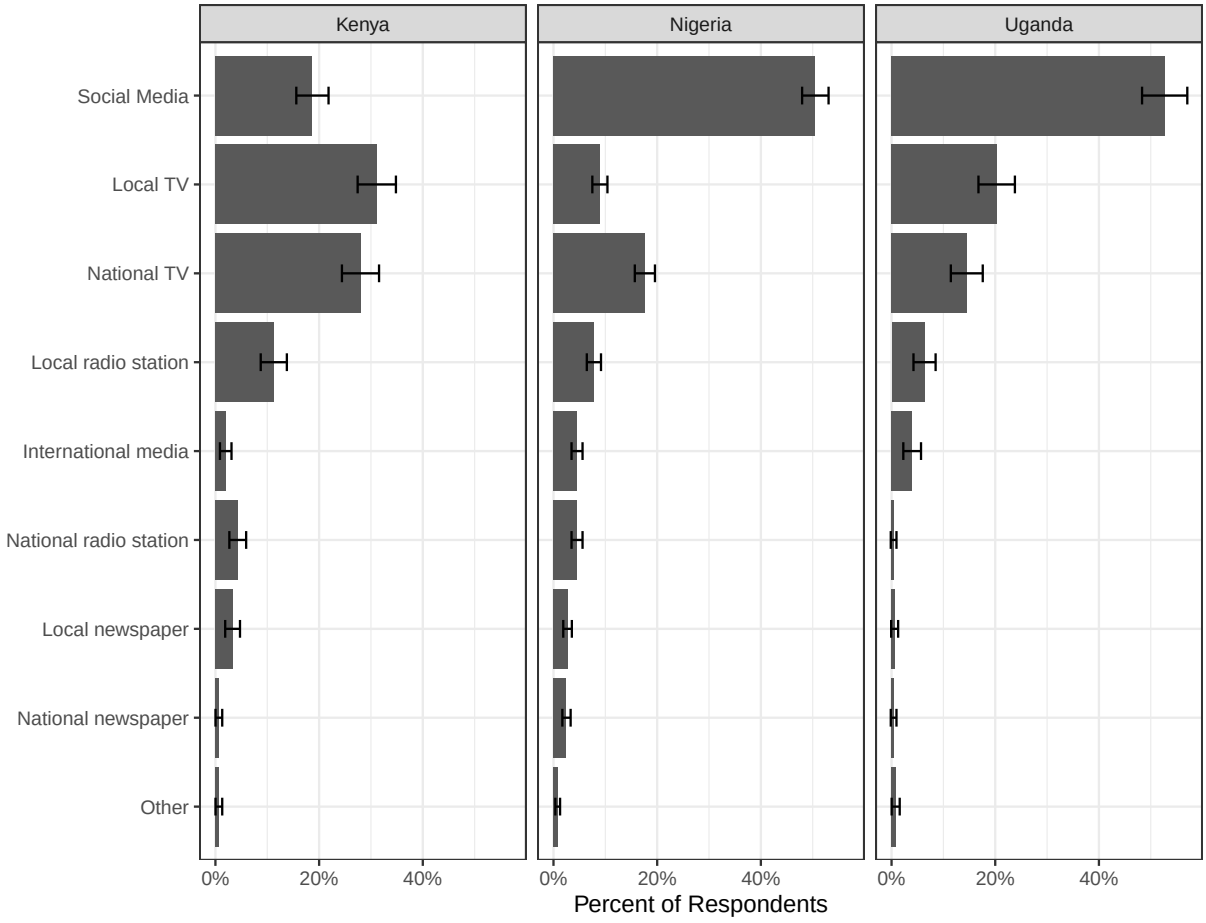
```
## # A tibble: 3 x 4
## # Groups:   country, cases_start [3]
##   country cases_start cases_end pct90_110
##   <chr>         <dbl>     <dbl>     <dbl>
## 1 Kenya           208       225     0.907
## 2 Nigeria         343       407     0.755
## 3 Uganda           54        55     0.904
```

```
## pdf
##   2
```



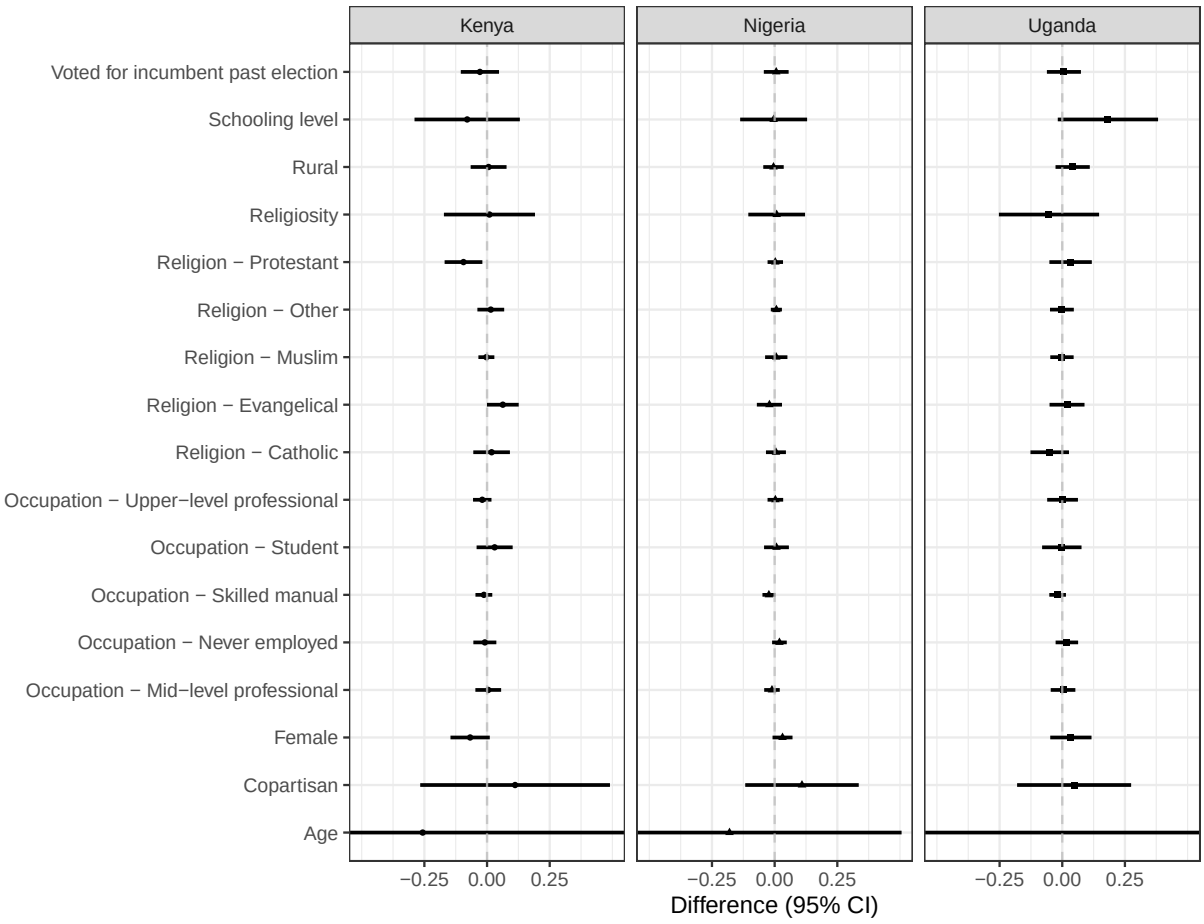
2.3 Source of Information

```
## pdf
##   2
```



3 Balance of List Experiment

```
## pdf
##   2
```



4 Main Results

4.1 Difference in Means Estimates

4.1.1 Treatment 1: Social Pressure

Table 3: Difference in Means Estimates for T1 (Social Pressure)

	Outcome		
Sample	Y1: Expected Behavior	Y2: Message Writing	Y3: Externality Content
	(1)	(2)	(3)
Pooled	-0.098	-0.005	0.013
	(0.074)	(0.026)	(0.03)
Kenya	-0.308*	-0.308*	-0.562**
	(0.127)	(0.127)	(0.174)
Nigeria	-0.019	-0.015	0.132
	(0.084)	(0.084)	(0.122)
Uganda	0.032	0.035	-0.07
	(0.161)	(0.161)	(0.204)

Note: We display difference-in-means estimates between social pressure (T1) and the control condition in the vignette experiment. Country rows refer to average treatment effects of country samples. The pooled results report a difference in means with weights adjusted such that countries are weighted equally (rather than individuals being weighted equally). This avoids that results are driven primarily by Nigerian respondents, which comprise a majority (56 percent) of our sample. Column (1) outcome refers to the scaled answer to the vignette experiment for respondent beliefs about how likely the hypothetical individual is to accept a dinner invitation from a friend (1-very unlikely, 5 - very likely). Column (2) outcome is whether the respondent wrote a message encouraging others to practice physical distancing. Column (3) outcome refers to whether the content of the message written appealed to coordinated collective effort (e.g., included terms such as 'collaboration', 'together', 'union'). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

4.1.2 Treatment 2: Material Cost

Table 4: Difference in Means Estimates for T2 (Material Cost)

	Outcome		
Sample	Y1: Expected Behavior	Y2: Message Writing	Y3: Externality Content
	(1)	(2)	(3)
Pooled	0.049	-0.006	0.017
	(0.073)	(0.027)	(0.03)
Kenya	-0.153	-0.155	-0.339
	(0.127)	(0.128)	(0.18)
Nigeria	-0.027	-0.031	0.156
	(0.087)	(0.087)	(0.122)
Uganda	0.325*	0.328*	0.237
	(0.158)	(0.158)	(0.202)

Note: We display difference-in-means estimates between material cost (T2) and the control condition in the vignette experiment. Country rows refer to average treatment effects of country samples. The pooled results report a difference in means with weights adjusted such that countries are weighted equally (rather than individuals being weighted equally). This avoids that results are driven primarily by Nigerian respondents, which comprise a majority (56 percent) of our sample. Column (1) outcome refers to the scaled answer to the vignette experiment for respondent beliefs about how likely the hypothetical individual is to accept a dinner invitation from a friend (1-very unlikely, 5 - very likely). Column (2) outcome is whether the respondent wrote a message encouraging others to practice physical distancing. Column (3) outcome refers to whether the content of the message written appealed to coordinated collective effort (e.g., included terms such as 'collaboration', 'together', 'union'). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

4.2 Lin Estimates

Table 5: Covariate Adjusted Lin Estimates

		Outcome		
Sample	Condition	Y1: Expected Behavior	Y2: Message Writing	Y3: Externality Content
		(1)	(2)	(3)
Pooled	T1	-0.089	-0.001	0.012
		(0.053)	(0.026)	(0.03)
	T2	0.031	-0.004	0.023
		(0.053)	(0.026)	(0.03)
	R^2	0.036	0.061	0.052
	Adj. R^2	0.019	0.044	0.021
	N	2576	2568	1382
Kenya	T1	-0.222*	-0.01	0.055
		(0.096)	(0.05)	(0.054)
	T2	-0.128	-0.02	0.102
		(0.098)	(0.049)	(0.059)
	R^2	0.093	0.11	0.104
	Adj. R^2	0.037	0.055	-0.006
	N	604	603	323
Nigeria	T1	-0.024	-0.029	-0.033
		(0.063)	(0.032)	(0.034)
	T2	-0.033	0.02	-0.017
		(0.066)	(0.032)	(0.033)
	R^2	0.041	0.04	0.052
	Adj. R^2	0.016	0.015	0.001
	N	1467	1461	739
Uganda	T1	-0.019	0.053	0.036
		(0.109)	(0.051)	(0.065)
	T2	0.229*	0.007	0.001
		(0.106)	(0.05)	(0.064)
	R^2	0.115	0.142	0.127
	Adj. R^2	0.049	0.078	0.02
	N	505	504	320

Note: We display coefficients from linear models interacting centered covariates with treatment conditions (see Lin (2013) for details on estimation method). Coefficients therefore refer to the adjusted average treatment effect of each of the two treatment conditions: social pressure (T1) and material cost (T2). Covariates include age, gender, education level, religiosity, occupation, self-reported urban/rural location, a dummy for whether the respondent voted for the incumbent in previous election or is copartisan with incumbent's party, a dummy for whether respondent under lockdown policy. Country rows refer to regression coefficients from country samples. The pooled regression includes country fixed effects and observations are reweighted such that countries are weighted equally (rather than individuals being weighted equally). This avoids that results are driven primarily by Nigerian respondents, which comprise a majority (56 percent) of our sample. Column (1) outcome refers to the scaled answer to the vignette experiment for respondent beliefs about how likely the hypothetical individual is to accept a dinner invitation from a friend (1-very unlikely, 5 - very likely). Column (2) outcome is whether the respondent wrote a message encouraging others to practice physical distancing. Column (3) outcome refers to whether the content of the message written appealed to coordinated collective effort (e.g., included terms such as 'collaboration', 'together', 'union'). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

5 Attitudes Toward Lockdown

5.1 Own preferences versus expectations of others' preferences toward a lockdown policy

Table 6: Percent of respondents who favor lockdown themselves and their guess of what percent of others favor it, by Country

Country	Own Mean	Guess Mean	p-value
Kenya	0.502	0.436	0.005
Nigeria - no lockdown	0.531	0.472	0.006
Nigeria - lockdown	0.582	0.475	0.000
Uganda	0.775	0.555	0.000
Full Sample	0.587	0.481	0.000

Table 7: Percent of respondents who favor lockdown themselves and their guess of what percent of others favor it, by country and urban residency

Country	Urban/Rural	Obs.	Own Mean	Guess Mean	Difference	p-value
Kenya	Rural	169	0.479	0.423	-0.056	0.204
Kenya	Urban	434	0.509	0.441	-0.068	0.012
Nigeria - no lockdown	Rural	139	0.432	0.434	0.002	0.965
Nigeria - no lockdown	Urban	572	0.554	0.481	-0.073	0.002
Nigeria - lockdown	Rural	155	0.555	0.446	-0.108	0.017
Nigeria - lockdown	Urban	607	0.590	0.482	-0.108	0.000
Uganda	Rural	96	0.740	0.524	-0.216	0.000
Uganda	Urban	410	0.783	0.563	-0.220	0.000

5.2 Social Desirability Bias

5.3 Predicting attitudes toward lockdown policy

Table 8: Percent of respondents who favor lockdown in rural and urban areas, by country

Country	Obs.	Rural support	Urban Support	Difference	p-value
Kenya	604	0.479	0.510	-0.031	0.494
Nigeria - no lockdown	711	0.432	0.554	-0.123	0.010
Nigeria - lockdown	764	0.558	0.589	-0.031	0.486
Uganda	506	0.740	0.783	-0.043	0.382

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Thu, Dec 03, 2020 - 13:32:28

Table 9: Predicting Attitudes Toward Lockdown Policy

	Attitude Toward Lockdown			
	Pooled	Kenya	Nigeria	Uganda
	(1)	(2)	(3)	(4)
Guess Lockdown Attitudes	0.207^{***}	0.228^{***}	0.212^{***}	0.128^{***}
	(0.013)	(0.025)	(0.012)	(0.028)
Trust in President		0.205^{**}		0.181
		(0.097)		(0.133)
Trust in Ministry of Health	0.193^{***}	−0.054	0.193^{***}	0.084
	(0.043)	(0.115)	(0.038)	(0.127)
Trust in media	0.171^{***}	0.176^{*}	0.148^{***}	0.231^{**}
	(0.045)	(0.101)	(0.040)	(0.090)
Voted incumbent	−0.042	0.002	0.075	0.008
	(0.074)	(0.134)	(0.067)	(0.165)
Primary source - Social media	−0.057	−0.063	0.023	−0.032
	(0.071)	(0.174)	(0.063)	(0.124)
Under lockdown			0.067	
			(0.061)	
Believe cure exists	−0.079	−0.201	-0.178^{**}	−0.045
	(0.093)	(0.224)	(0.081)	(0.190)
Urban	0.052	0.082	0.071	0.156
	(0.082)	(0.139)	(0.077)	(0.160)
Female	0.088	0.329^{**}	0.141^{*}	0.158
	(0.075)	(0.132)	(0.078)	(0.132)
Age	0.004	0.006	−0.005	0.004
	(0.006)	(0.011)	(0.005)	(0.012)
Schooling	0.067^{**}	0.065	0.087^{***}	0.053
	(0.027)	(0.052)	(0.025)	(0.057)
Religion - Catholic	−0.106	-0.620^{**}	0.148	0.239
	(0.193)	(0.250)	(0.220)	(0.326)
Religion - Protestant	−0.002	-0.564^{**}	0.082	0.254
	(0.193)	(0.249)	(0.229)	(0.319)
Religion - Evangelical	−0.144	-0.639^{**}	0.165	0.239
	(0.190)	(0.259)	(0.213)	(0.334)
Religion - Muslim	−0.250	−0.175	0.075	−0.082
	(0.201)	(0.392)	(0.217)	(0.373)
Religion - Hindu	0.353	−0.719	2.221^{*}	−0.130
	(0.624)	(0.655)	(1.181)	(1.310)
Religion - Animist	−0.026	−0.633	0.229	−0.431
	(0.486)	(0.517)	(0.613)	(1.289)
Religion - Other	−0.201	−0.275	0.122	0.118
	(0.259)	(0.451)	(0.281)	(0.440)
Nigeria	0.345^{***}			
	(0.095)			
Uganda	0.382^{***}			
	(0.107)			
(Intercept)	-2.081^{***}	-1.846^{***}	-2.103^{***}	-1.898^{***}
	(0.312)	(0.572)	(0.299)	(0.670)
Observations	1,289	459	1,463	412
R^2	0.265	0.201	0.293	0.147
Adjusted R^2	0.254	0.168	0.284	0.108
Residual Std. Error	1.186 (df = 1269)	1.330 (df = 440)	1.151 (df = 1444)	1.235 (df = 393)
F Statistic	24.063^{***} (df = 19; 1269)	6.132^{***} (df = 18; 440)	33.203^{***} (df = 18; 1444)	3.753^{***} (df = 18; 393)
Note:				*p<0.1; **p<0.05; ***p<0.01

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Thu, Dec 03, 2020 - 13:32:29

Table 10: Predicting own lockdown attitudes among respondents first asked to guess about others' attitudes

	Attitude Toward Lockdown			
	Pooled	Kenya	Nigeria	Uganda
	(1)	(2)	(3)	(4)
Guess Lockdown Attitudes	0.207***	0.218***	0.211***	0.180***
	(0.013)	(0.034)	(0.017)	(0.036)
Trust in President		0.295**		0.190
		(0.137)		(0.167)
Trust in Ministry of Health	0.193***	−0.076	0.208***	0.117
	(0.043)	(0.164)	(0.054)	(0.169)
Trust in media	0.171***	0.173	0.184***	0.211*
	(0.045)	(0.143)	(0.058)	(0.114)
Voted incumbent	−0.042	−0.033	−0.018	−0.044
	(0.074)	(0.195)	(0.095)	(0.223)
Primary source - Social media	−0.057	−0.309	0.064	−0.062
	(0.071)	(0.236)	(0.091)	(0.168)
Under lockdown			0.037	
			(0.087)	
Believe cure exists	−0.079	−0.422	−0.083	0.099
	(0.093)	(0.309)	(0.113)	(0.237)
Urban	0.052	0.079	−0.024	0.160
	(0.082)	(0.202)	(0.109)	(0.210)
Female	0.088	0.049	0.193*	−0.038
	(0.075)	(0.185)	(0.109)	(0.178)
Age	0.004	−0.004	0.008	−0.003
	(0.006)	(0.015)	(0.007)	(0.017)
Schooling	0.067**	0.030	0.091**	0.080
	(0.027)	(0.072)	(0.036)	(0.075)
Religion - Catholic	−0.106	−0.439	0.408	0.046
	(0.193)	(0.384)	(0.327)	(0.402)
Religion - Protestant	−0.002	−0.344	0.591*	0.044
	(0.193)	(0.373)	(0.343)	(0.399)
Religion - Evangelical	−0.144	−0.626	0.426	0.057
	(0.190)	(0.389)	(0.317)	(0.417)
Religion - Muslim	−0.250	−0.143	0.260	−0.088
	(0.201)	(0.551)	(0.322)	(0.495)
Religion - Hindu	0.353	−0.505	2.393**	
	(0.624)	(0.854)	(1.215)	
Religion - Animist	−0.026	−0.393	0.022	
	(0.486)	(0.707)	(0.876)	
Religion - Other	−0.201	−0.613	0.347	0.323
	(0.259)	(0.637)	(0.384)	(0.646)
Nigeria	0.345***			
	(0.095)			
Uganda	0.382***			
	(0.107)			
(Intercept)	−2.081***	−1.198	−2.716***	−2.054**
	(0.312)	(0.812)	(0.442)	(0.894)
Observations	1,289	226	725	209
R^2	0.265	0.216	0.295	0.227
Adjusted R^2	0.254	0.148	0.277	0.163
Residual Std. Error	1.186 (df = 1269)	1.320 (df = 207)	1.152 (df = 706)	1.159 (df = 192)
F Statistic	24.063*** (df = 19; 1269)	3.173*** (df = 18; 207)	16.415*** (df = 18; 706)	3.534*** (df = 16; 192)
Note:				*p<0.1; **p<0.05; ***p<0.01

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Thu, Dec 03, 2020 - 13:32:29

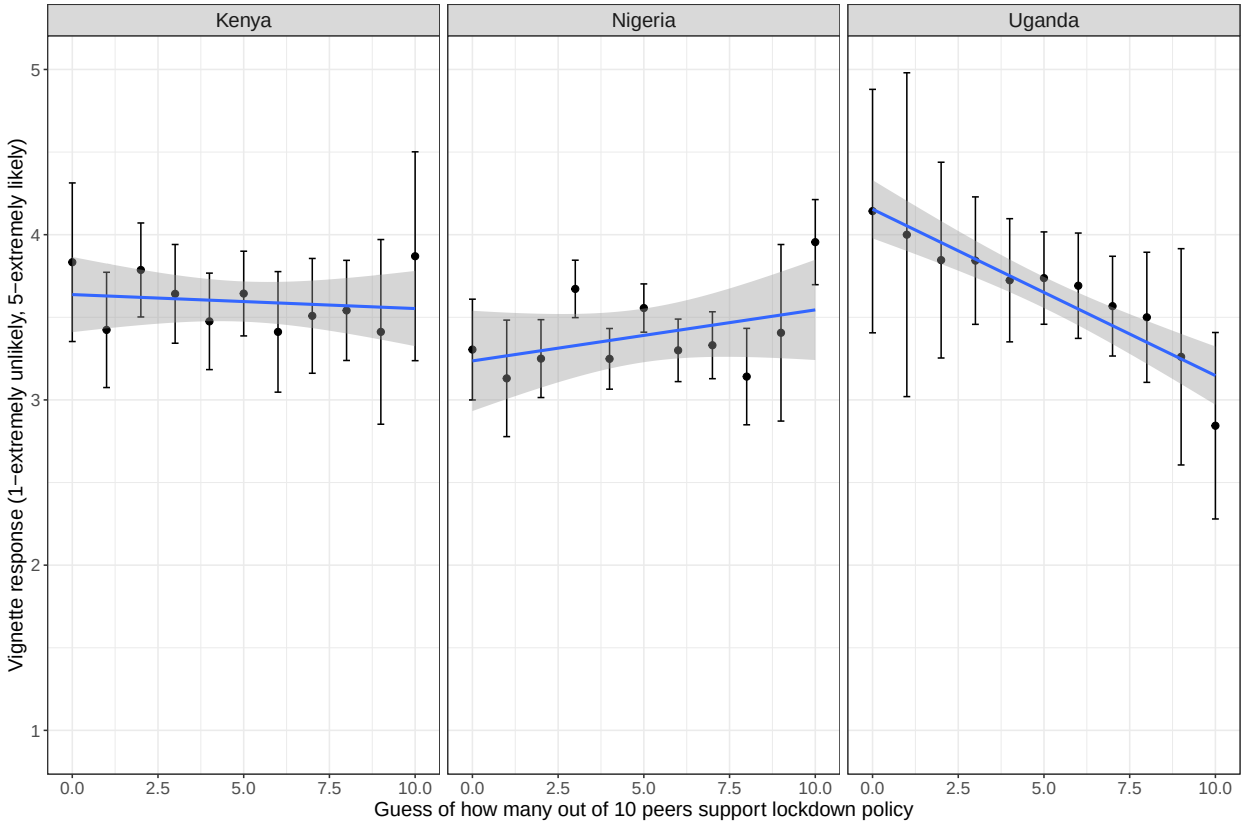
Table 11: Predicting own lockdown attitudes with guess and question order

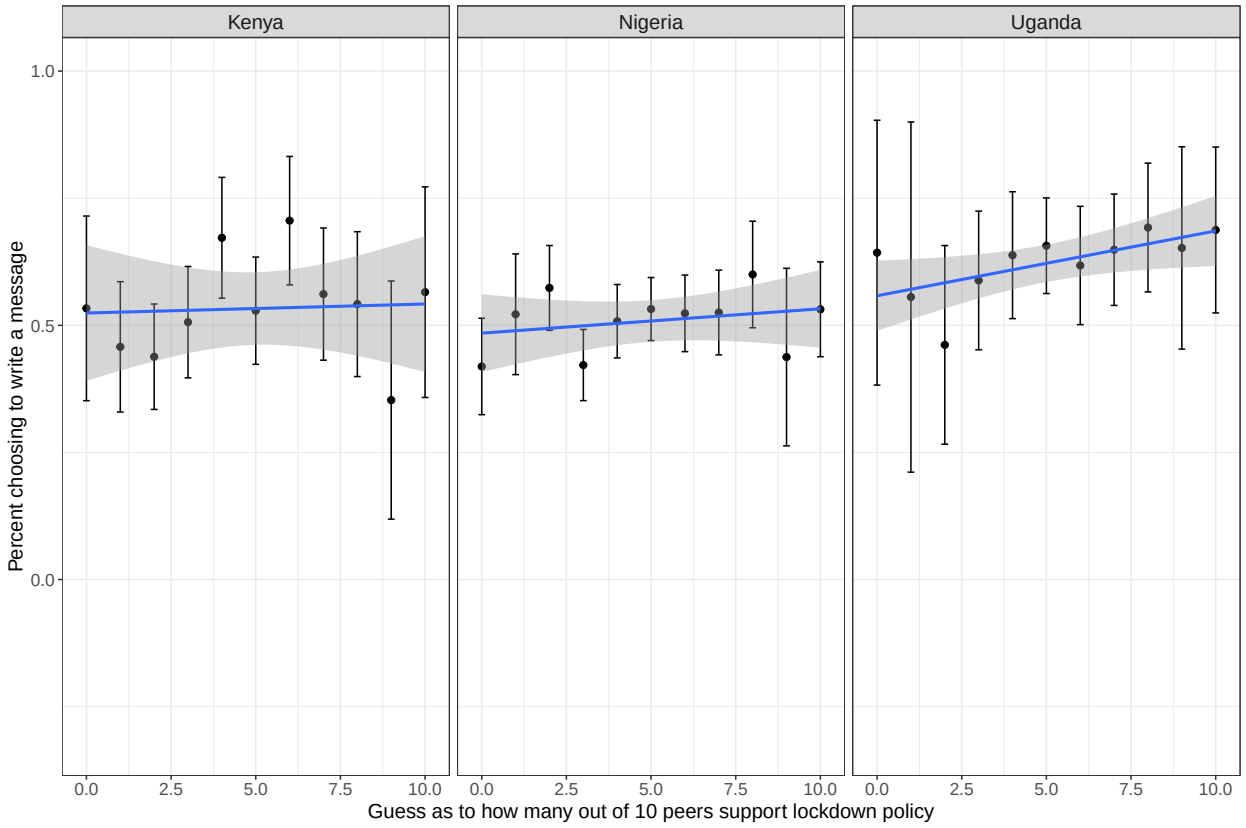
	Attitude Toward Lockdown			
	Pooled	Kenya	Nigeria	Uganda
	(1)	(2)	(3)	(4)
Guess Lockdown Attitudes	0.210^{***}	0.233^{***}	0.216^{***}	0.054
	(0.013)	(0.034)	(0.017)	(0.040)
Guess first	0.107	0.337	0.123	-0.799^{**}
	(0.100)	(0.239)	(0.123)	(0.318)
Trust in President		0.227^{**}		0.220^{*}
		(0.097)		(0.132)
Trust in Ministry of Health	0.170^{***}	−0.071	0.192^{***}	0.050
	(0.031)	(0.115)	(0.038)	(0.126)
Trust in media	0.146^{***}	0.194^{*}	0.149^{***}	0.241^{***}
	(0.033)	(0.100)	(0.040)	(0.088)
Voted incumbent	0.034	0.010	0.076	0.028
	(0.053)	(0.132)	(0.066)	(0.161)
Primary info source - Social media	−0.013	−0.079	0.023	−0.034
	(0.051)	(0.173)	(0.062)	(0.122)
Under lockdown			0.063	
			(0.061)	
Believe cure exists	-0.145^{**}	−0.197	-0.176^{**}	−0.054
	(0.069)	(0.223)	(0.081)	(0.187)
Urban	0.090	0.083	0.068	0.148
	(0.059)	(0.137)	(0.077)	(0.157)
Female	0.164^{***}	0.281^{**}	0.143^{*}	0.176
	(0.055)	(0.131)	(0.078)	(0.129)
Age	0.001	0.006	−0.005	0.006
	(0.004)	(0.011)	(0.005)	(0.011)
Schooling	0.072^{***}	0.086^{*}	0.083^{***}	0.042
	(0.019)	(0.051)	(0.025)	(0.056)
Religion - Christian	0.021	-0.420^{**}	0.074	0.285^{*}
	(0.056)	(0.164)	(0.067)	(0.168)
Nigeria	0.309^{***}			
	(0.064)			
Uganda	0.520^{***}			
	(0.077)			
Guess Lockdown:Guess First	−0.006	−0.020	−0.006	0.128^{**}
	(0.018)	(0.047)	(0.023)	(0.053)
(Intercept)	-2.259^{***}	-2.369^{***}	-2.055^{***}	-1.443^{**}
	(0.195)	(0.545)	(0.233)	(0.633)
Observations	2,567	459	1,463	412
R^2	0.263	0.203	0.292	0.159
Adjusted R^2	0.259	0.178	0.285	0.130
Residual Std. Error	1.204 (df = 2551)	1.322 (df = 444)	1.150 (df = 1448)	1.220 (df = 397)
F Statistic	60.804^{***} (df = 15; 2551)	8.091^{***} (df = 14; 444)	42.622^{***} (df = 14; 1448)	5.377^{***} (df = 14; 397)

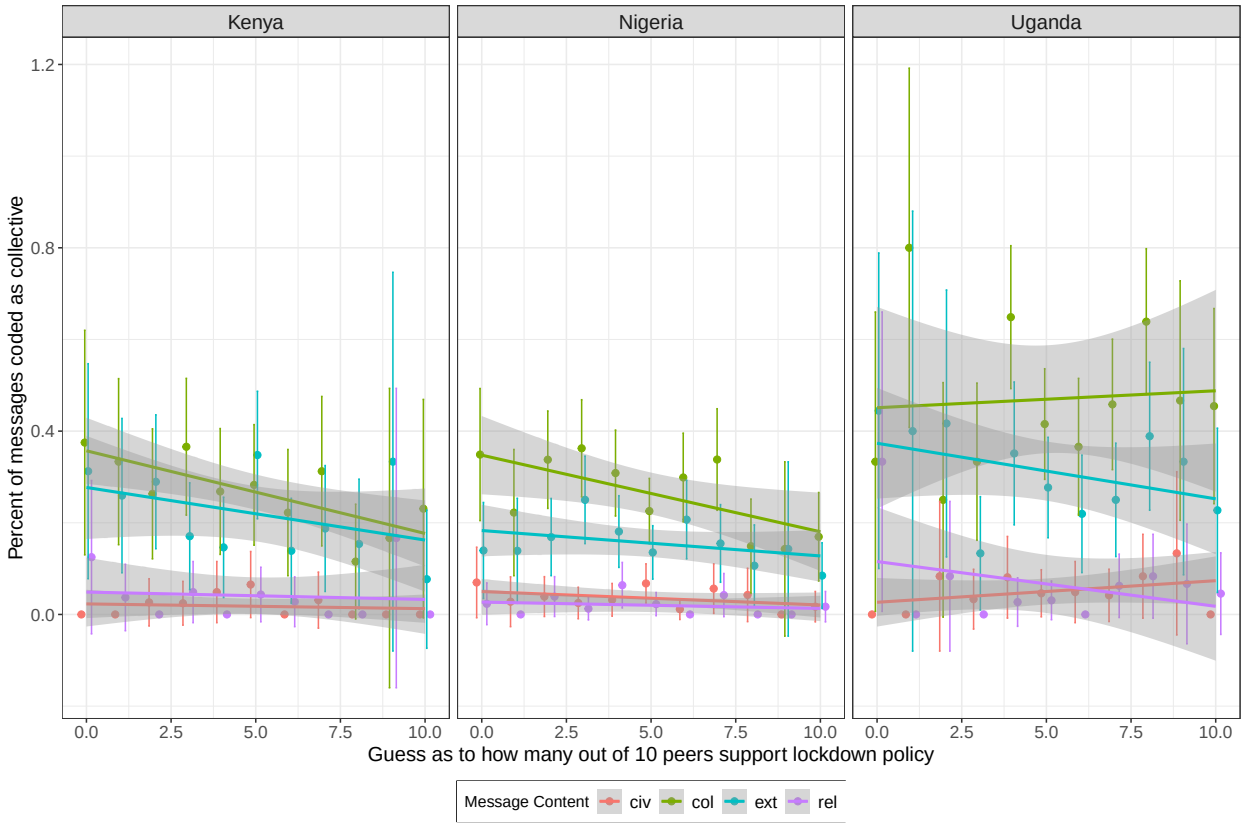
Note: *p<0.1; **p<0.05; ***p<0.01

5.4 Correlates of guesses of others' support for a lockdown policy

pdf 2 pdf 2 pdf 2




Kenya
Nigeria
Uganda
Percent choosing to write a message
1.0
0.5
0.0
0.0
2.5
5.0
7.5
10.0
Guess as to how many out of 10 peers support lockdown policy


Kenya
Nigeria
Uganda
Percent of messages coded as collective
1.2
0.8
0.4
0.0
0.0
2.5
5.0
7.5
10.0
Guess as to how many out of 10 peers support lockdown policy
Message Content
civ
col
ext
rel

6 Behavior as Measured by the List Experiment

6.1 Physical Distancing

Table 12: Physical Distancing List Experiment, by Country

Country	lockdown	Control	Treatment	Diff	p-value
Kenya	0.000	1.974	2.433	0.460	0.000
Nigeria	0.000	2.207	2.691	0.484	0.000
Nigeria	1.000	2.411	2.683	0.272	0.001
Uganda	1.000	1.961	2.329	0.368	0.000

Test difference in means between control and treated conditions for respondents in Nigeria experiencing lockdown or not.

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Thu, Dec 03, 2020 - 13:32:31

Table 13: List experiment results by lockdown status in Nigeria

	Dependent variable:
	le_count
lockdown	0.204^{**}
	(0.083)
le_condition	0.484^{***}
	(0.084)
lockdown:le_condition	-0.211^{*}
	(0.117)
Constant	2.207^{***}
	(0.060)
Observations	1,477
R^2	0.031
Adjusted R^2	0.029
Residual Std. Error	1.127 (df = 1473)
F Statistic	15.589^{***} (df = 3; 1473)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 14: Correlation between likely 'non-distancers' and expected distancing behaviors of others, and own attitudes toward lockdown

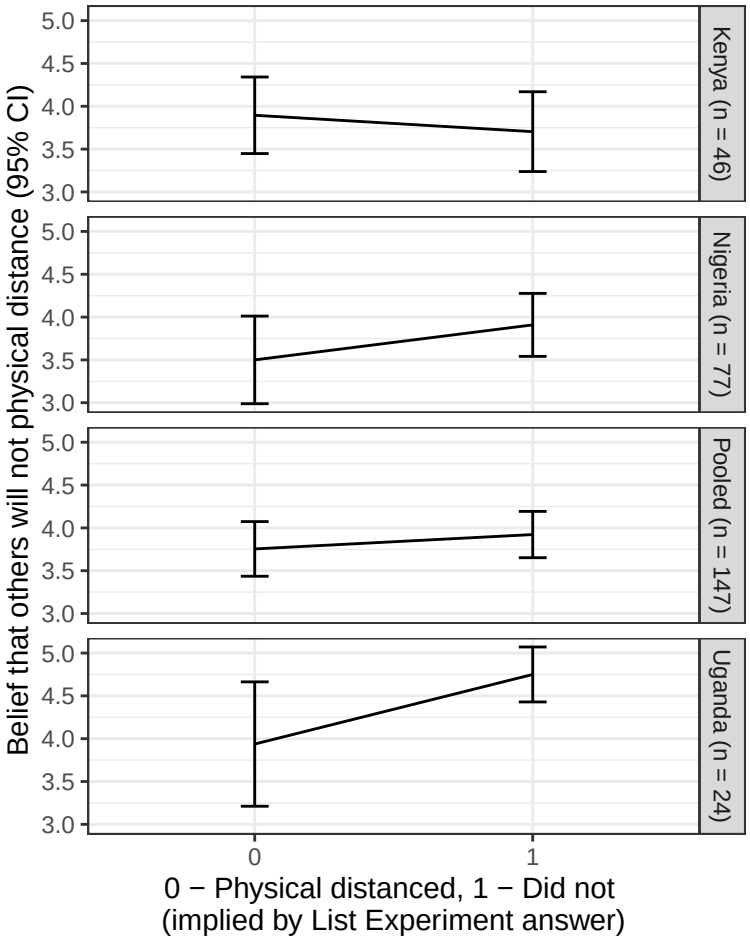
	Expected Behavior						
	Pooled	Kenya	Nigeria	Uganda	Pooled	Kenya	Nigeria
Likely Non-Distancer	0.27	−0.19	0.41	0.81	0.25	0.19	0.33
	(0.21)	(0.33)	(0.32)	(0.41)	(0.27)	(0.48)	(0.37)
(Intercept)		3.89***	3.50***	3.94***		−0.16	0.36
		(0.23)	(0.26)	(0.37)		(0.37)	(0.31)
R^2	0.02	0.01	0.02	0.09	0.05	0.00	0.01
Adj. R^2	0.00	−0.02	0.01	0.05	0.03	−0.02	−0.00
Observations	147	46	77	24	147	46	77
RMSE	1.27	1.14	1.35	1.25	1.53	1.61	1.48

Coefficients report differences between 'likely non-distancers' and 'likely distancers'. Columns 1-4 outcome refers to the expected behavior of a fellow cou

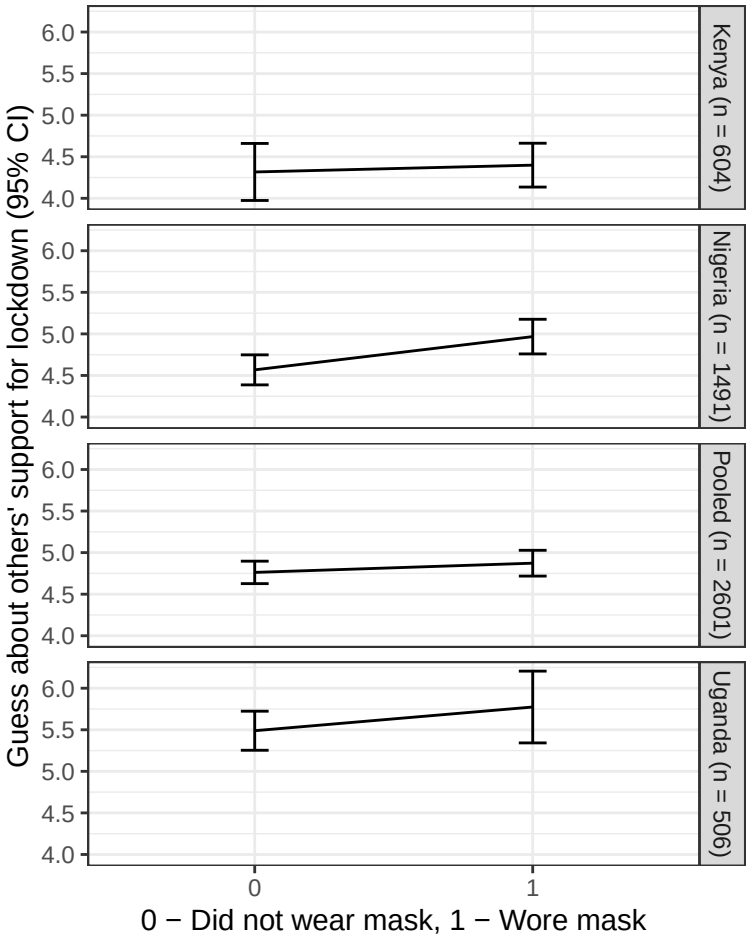
6.1.1 Relationship with Attitudes and Beliefs

0 1 57 90

```
## pdf
##   2
```


Belief that others will not physical distance (95% CI)
5.0
4.5
4.0
3.5
3.0
Kenya (n = 46)
Nigeria (n = 77)
Pooled (n = 147)
Uganda (n = 24)
0
1
0 − Physical distanced, 1 − Did not
(implied by List Experiment answer)

```
## pdf
##   2
```


Guess about others' support for lockdown (95% CI)
6.0
5.5
5.0
4.5
4.0
Kenya (n = 604)
Nigeria (n = 1491)
Pooled (n = 2601)
Uganda (n = 506)
0
1
0 − Did not wear mask, 1 − Wore mask

7 Power calculation

7.1 Design Declaration

We simulate a parsimonious version of our design design with sample size `N` with binary draws of the potential outcomes. These binary draws are independent for each treatment condition, and are drawn from from a cummulative distribution function of with $\mu = 0 \; \forall \; Z \in \{C, T1, T2\}$ and standard deviations given by `latent_sds` *plus* an additional probability defined `outcome_means`. Importantly, we do not account for block- or country-level correlation in outcomes, and assume sample size for each study site is the same.

```
covid_designer <- function(N, outcome_means = c(0,.2,0),
                           latent_sds = c(1,1,1)){

  # M: Model
  population <- declare_population(N = N,
                                   p_C = rnorm(N, 0, latent_sds[1L]),
                                   p_T1 = rnorm(N, 0, latent_sds[2L]),
                                   p_T2 = rnorm(N, 0, latent_sds[3L]))

  potential_outcomes <- declare_potential_outcomes(
    Y_Z_C = draw_binary(N = N, latent = pmin(pnorm(p_C) + outcome_means[1], 1)),
    Y_Z_T1 = draw_binary(N = N, latent = pmin(pnorm(p_T1) + outcome_means[2], 1)),
    Y_Z_T2 = draw_binary(N = N, latent = pmin(pnorm(p_T2) + outcome_means[3], 1))
    )

  # I: Inquiry
  estimand  <- declare_estimands(ate_Y_T1_C = mean(Y_Z_T1 - Y_Z_C),
                                 ate_Y_T2_C = mean(Y_Z_T2 - Y_Z_C),
                                 ate_Y_T2_T1 = mean(Y_Z_T2 - Y_Z_T1))

  # D: Data Strategy
  assignment <- declare_assignment(num_arms = 3,
                                   conditions = c("C", "T1", "T2"),
                                   assignment_variable = Z)

  reveal_Y <-  declare_reveal(assignment_variables = Z)

  # A: Answer Strategy
  estimator <- declare_estimator(handler = function(data) {
    estimates <- rbind.data.frame(
      ate_Y_T1_C = difference_in_means(formula = Y ~ Z,
                                       data = data, condition1 = "C",
                                       condition2 = "T1"),
      ate_Y_T2_C = difference_in_means(formula = Y ~ Z, data = data,
                                       condition1 = "C", condition2 = "T2"),
      ate_Y_T2_T1 = difference_in_means(formula = Y ~ Z, data = data,
                                       condition1 = "T1", condition2 = "T2"))
    names(estimates)[names(estimates) == "N"] <- "N_DIM"
    estimates$estimator_label <- c("DIM (Z_T1 - Z_C)", "DIM (Z_T2 - Z_C)",
                                   "DIM (Z_T2 - Z_T2)")
    estimates$estimand_label <- rownames(estimates)
    estimates$estimate <- estimates$coefficients
    estimates$term <- NULL
    return(estimates)
  })
```

```
  # Design
  covid_design <-
    population + potential_outcomes + assignment + reveal_Y + estimand +  estimator

  covid_design
}
```

7.2 Diagnostic Table

We then focus our power analyis on the ATE of T1. We vary `outcome_means` by simulating different values of treatment effect ranging from 2.5% to 20% in increments of 2.5%. We also consider different variances of our latent variable in `latent_sds` used to draw binary potential outcomes of under T1 between .5-2 standard deviations. And ultimately, we vary our sample size between 1200 and 2100.

Assuming the simple data-generating process defined above, we are able to observe how well powered we are to detect a given effect under different variance levels for our treatment-level distribution of latent treatment outcomes and for different sample sizes.

Below is a sample of the table showing a sample of the designs, along with bootstrap estimates of power of our estimate under each design.

8 Survey Instrument