Institutional mistrust and child vaccination coverage in Africa
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Supplement

Contents

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Appendix 1. Demographic and Health Surveys

The DHS are nationally representative periodic surveys administered in most African countries. After registration, they are freely available for download (https://dhsprogram.com/Data/).

There were 22 countries with at least one overlapping Afrobarometer and DHS survey. We matched the two surveys using information on the sub-national region recorded in both surveys. As most vaccinations are recommended to be taken in the first months of life (WHO, 2019), we matched the information on children in the DHS survey to the most recent Afrobarometer survey conducted in their sub-national region before their birth. Children for whom no Afrobarometer survey was conducted in their sub-national region in the three years before their birth were omitted from the final sample. In total, we have data on 166,953 children aged 12-59 months, from 41 DHS surveys administered in 22 countries covering 216 sub-national regions. Together, these countries represent 44 % of the total population in sub-Saharan Africa.

Up until DHS phase 6, the DHS surveys collected information on the vaccination status for children under 5 years of age. From DHS phase 7 onwards, the vaccination status was collected for children under 3 years of age (ICF 2019). Table A.1 provides an overview of the DHS surveys included in our sample, for each one detailing the DHS phase; the number of children aged 12-59 months; the percentage of children that had received none of the basic vaccinations; and the percentage of children that had received all basic vaccinations. The sample is restricted to children for which we have full information on vaccination status and the other covariates included in the analysis (see Appendix 3).

Table A.1 Child vaccination status in the DHS surveys included in the sample

Country	Survey year	DHS phase	Nr. of children aged 12-59 months	% of children with none of the basic vaccinations	% of children with all basic vaccinations
Benin	2011-12	6	8,962	12.7	39.1
Benin	2017-18	7	4,367	12.6	55.5
Burkina Faso	2010	6	4,792	2.4	81.4
Burundi	2016-17	7	4,614	0.3	85.3
Cameroon	2018	7	2,789	10.8	51.8
Ghana	2008	5	1,900	2.8	72.6
Ghana	2014	6	4,014	2.2	73.0
Guinea	2018	7	2,360	24.4	24.5
Kenya	2014	6	7,179	2.0	70.6
Lesotho	2004	4	532	2.2	67.4
Lesotho	2009	5	2,409	4.6	63.4
Lesotho	2014	6	1,447	1.4	68.9
Liberia	2013	6	4,567	3.9	49.0
Malawi	2004	4	2,067	3.4	65.2
Malawi	2010	5	14,071	2.9	76.4
Malawi	2015-16	7	5,404	1.9	74.8

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Country	Survey year	DHS phase	Nr. of children aged 12-59 months	% of children with none of the basic vaccinations	% of children with all basic vaccinations
Mali	2006	5	6,078	15.0	46.2
Mali	2012-13	6	7,316	15.7	35.0
Mali	2018	7	3,406	14.4	41.6
Mozambique	2011	6	7,323	6.8	61.5
Namibia	2006-07	5	1,595	3.2	67.4
Namibia	2013	6	1,893	4.5	65.2
Niger	2012	6	965	6.4	47.6
Senegal	2005	4	2,461	4.0	59.5
Senegal	2010-11	6	8,187	3.4	59.2
Senegal	2017	7	3,966	2.8	70.5
Sierra Leone	2013	6	2,980	4.0	71.8
South Africa	2016	7	233	5.4	58.9
Tanzania	2004-05	4	1,454	4.7	70.5
Tanzania	2010	5	5,534	3.0	78.3
Tanzania	2015-16	7	3,431	2.8	75.0
Togo	2013-14	6	2,573	3.8	59.5
Uganda	2006	5	3,435	5.8	47.1
Uganda	2011	6	5,283	3.6	52.3
Uganda	2016	7	4,779	1.9	56.6
Zambia	2007	5	3,665	6.3	66.8
Zambia	2013-14	6	8,872	3.1	71.2
Zambia	2018	7	2,875	1.3	75.0
Zimbabwe	2005-06	5	1,660	24.6	51.2
Zimbabwe	2010-11	6	3,569	13.4	68.6
Zimbabwe	2015	7	1,946	10.7	77.0

Note: When calculating the child vaccination status in this Table, we applied the DHS survey-specific sampling weights.

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Appendix 2. Public trust indicators in Afrobarometer

The Afrobarometer surveys have been periodically administered in 37 African countries since 1999. The surveys are representative at the national and the highest sub-national administrative levels. The Afrobarometer data are publicly available (https://www.afrobarometer.org/) and have been widely used to measure trust in economics and political science fields (e.g. Nunn and Wantchekon 2011; Besley and Reynal-Querol 2014; Robinson 2020). We build on this literature to construct trust indicators from the Afrobarometer surveys.

The Afrobarometer surveys asked respondents how much they trust public institutions of their country: the head of state, parliament, the electoral system, courts and local government. Specifically, respondents were asked "How much do you trust each of the following, or haven't you heard enough about them to say". Answer categories ranged from 0 to 3: (0) not at all; (1) just a little; (2) somewhat; (3) a lot. Respondents also had the option to refuse to answer or to indicate that they did not have enough knowledge to answer the question.

We used this information to construct a measure of mistrust in public institutions. Applying the sampling weights provided in the Afrobarometer surveys, we calculated the share of respondents in each sub-national region that indicated they did 'not at all' trust that particular institution. We then matched the information on children in the DHS survey to the mistrust variables from the most recent Afrobarometer survey conducted in their sub-national region before their birth. Children for whom no Afrobarometer survey was conducted in their sub-national region in the three years before their birth were omitted from the final sample. Table A.2 presents summary statistics for mistrust in public institutions for the children in our final sample. Table A.3 shows that the 5 dimensions of institutional trust are highly correlated with each other.

Table A.2 Mistrust in public institutions

	Obs	Mean	Std. Dev.	Min	Max
Mistrust in head of state	166,953	0.14	0.12	0	0.70
Mistrust in parliament	166,953	0.17	0.11	0	0.63
Mistrust in electoral system	166,953	0.20	0.14	0	0.81
Mistrust in courts	166,953	0.14	0.11	0	0.80
Mistrust in local government	166,953	0.18	0.11	0	0.67

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Table A.3 Correlation matrix of institutional mistrust variables

	head of state	parliament	electoral system	courts	local government
head of state	1				
parliament	0.70	1			
	(0.00)				
electoral system	0.69	0.65	1		
	(0.00)	(0.00)			
courts	0.45	0.49	0.54	1	
	(0.00)	(0.00)	(0.00)		
local government	0.59	0.75	0.61	0.45	1
	(0.00)	(0.00)	(0.00)	(0.00)	

Note: p-values are indicated between brackets

To account for the high correlation across these dimensions of institutional trust, we applied a principal components analysis method to construct a single index of mistrust in public institutions in each sub-national region. Table A.4 shows that five principal components were identified, but that the first one accounts for 73% of the variation in the mistrust variables. Hence, component 1 was retained as an index for mistrust in public institutions. Table A.5 shows that the index is strongly and positively correlated with all 5 dimensions of mistrust in public institutions.

Table A.4 Principal Components

Component	Eigenvalue	Difference	Proportion	Cumulative
Component 1	3.68	3.19	0.73	0.73
Component 2	0.49	0.11	0.10	0.83
Component 3	0.39	0.14	0.08	0.91
Component 4	0.25	0.06	0.05	0.96
Component 5	0.19	.	0.04	1.00

Table A.5 Correlations between the mistrust index and its five dimensions

	Component 1 “mistrust in public institutions”
Mistrust in head of state	0.84
	(0.00)
Mistrust in parliament	0.88
	(0.00)
Mistrust in electoral system	0.86
	(0.00)
Mistrust in courts	0.71
	(0.00)
Mistrust in local government	0.82
	(0.00)

Note: p-values are indicated between brackets

Table A.6 shows summary statistics for the index of mistrust in public institutions, which ranges from -3 to 8. Since the units of the index are not intuitive to interpret, we use the standardized version of the index in the regressions, so that a unit-increase in the standardized index is equal to the standard deviation.

Table A.6 Summary statistics for the index of mistrust in public institutions

	Obs.	Mean	Std. Dev.	Min	Max
mistrust in public institutions	166,953	-0.10	1.63	-2.94	8.17
mistrust in public institutions (standardized)	166,953	0	1	-1.70	4.96

Table A.7 provides an overview of the Afrobarometer surveys included in our sample. For each survey, it details with how many children aged 12-59 months from the DHS survey it was matched; as well as the average value of the mistrust variables.

Table A.7 Mistrust in public institutions in the Afrobarometer (AB) surveys included in the sample

				% of population indicating having 'no trust at all' in:					mistrust in public institutions (standardized)
Country	AB round	survey year	nr. of children	president	parliament	electoral system	courts	local government	
Benin	3	2005-06	1,873	18.9%	21.3%	25.1%	24.0%	15.9%	0.44
Benin	4	2008-09	6,817	11.9%	15.1%	19.9%	16.8%	15.4%	-0.09
Benin	5	2011-13	272	8.3%	10.7%	14.6%	12.0%	12.6%	-0.52
Benin	6	2014-15	2,056	27.2%	17.2%	23.9%	17.6%	18.8%	0.41
Benin	7	2016-18	2,311	22.3%	20.2%	21.4%	20.6%	20.8%	0.45
Burkina Faso	4	2008-09	4,792	7.4%	9.4%	11.2%	11.4%	10.9%	-0.67
Burundi	5	2011-13	133	4.3%	8.8%	12.8%	11.7%	6.0%	-0.81
Burundi	6	2014-15	4,481	6.6%	11.5%	8.0%	9.7%	6.1%	-0.83
Cameroon	6	2014-15	337	9.9%	23.8%	27.3%	27.4%	25.6%	0.64
Cameroon	7	2016-18	2,452	13.3%	21.6%	26.1%	24.7%	25.2%	0.57
Ghana	2	2002-03	585	11.6%	15.5%	12.5%	17.0%	18.2%	-0.16
Ghana	3	2005-06	1,315	10.2%	11.2%	8.5%	12.3%	20.8%	-0.40
Ghana	4	2008-09	1,081	9.8%	12.7%	10.5%	14.2%	17.5%	-0.37
Ghana	5	2011-13	2,933	17.1%	16.9%	12.7%	12.7%	20.1%	-0.07
Guinea	5	2011-13	232	10.2%	7.8%	11.4%	16.8%	17.5%	-0.39
Guinea	6	2014-15	401	20.5%	21.5%	27.8%	30.0%	20.8%	0.76
Guinea	7	2016-18	1,727	30.6%	31.4%	42.7%	45.2%	25.2%	1.87
Kenya	4	2008-09	2,408	16.7%	19.6%	55.9%	20.7%	25.6%	1.04
Kenya	5	2011-13	4,771	10.8%	14.5%	9.6%	10.9%	23.7%	-0.27
Lesotho	2	2002-03	577	16.9%	22.1%	23.6%	15.5%	19.8%	0.29
Lesotho	3	2005-06	1,715	11.6%	18.6%	14.8%	8.4%	19.9%	-0.20
Lesotho	4	2008-09	1,027	26.7%	25.9%	25.8%	15.0%	33.2%	0.87
Lesotho	5	2011-13	1,069	28.4%	26.4%	27.0%	21.4%	35.4%	1.12
Liberia	4	2008-09	3,038	15.2%	25.7%	30.0%	23.4%	26.4%	0.76
Liberia	5	2011-13	1,529	10.2%	17.6%	22.9%	20.0%	18.4%	0.12
Malawi	2	2002-03	2,067	17.9%	27.4%	23.1%	8.0%	31.0%	0.48

Country	AB round	survey year	nr. of children	% of population indicating having 'no trust at all' in: president	parliament	electoral system	courts	local government	mistrust in public institutions (standardized)
Malawi	3	2005-06	8,293	17.6%	28.3%	31.0%	8.2%	26.1%	0.54
Malawi	4	2008-09	5,778	7.4%	20.1%	8.9%	6.5%	13.3%	-0.53
Malawi	5	2011-13	2,850	15.8%	12.7%	11.3%	5.2%	4.9%	-0.69
Malawi	6	2014-15	2,554	44.8%	22.4%	18.1%	10.2%	18.5%	0.60
Mali	2	2002-03	4,402	7.6%	9.4%	20.3%	21.4%	16.9%	-0.16
Mali	3	2005-06	1,694	8.3%	10.2%	16.9%	23.8%	12.0%	-0.24
Mali	4	2008-09	5,501	14.1%	13.4%	16.4%	29.5%	16.2%	0.15
Mali	5	2011-13	1,797	30.4%	27.0%	32.3%	29.4%	23.6%	1.20
Mali	6	2014-15	298	12.9%	12.6%	11.0%	25.1%	20.9%	0.01
Mali	7	2016-18	3,108	18.8%	21.1%	20.7%	36.7%	18.2%	0.69
Mozambique	3	2005-06	2,230	5.7%	7.1%	8.6%	6.8%	10.2%	-0.92
Mozambique	4	2008-09	5,093	9.4%	10.1%	11.3%	8.4%	12.1%	-0.65
Namibia	2	2002-03	1,030	7.2%	17.1%	24.0%	19.2%	9.2%	-0.14
Namibia	3	2005-06	565	6.2%	8.4%	12.1%	7.9%	11.0%	-0.77
Namibia	4	2008-09	1,144	7.2%	13.3%	18.4%	7.5%	17.0%	-0.42
Namibia	5	2011-13	749	7.5%	8.9%	13.2%	5.9%	13.5%	-0.71
Niger	5	2011-13	965	8.9%	9.1%	11.9%	7.1%	8.0%	-0.79
Senegal	2	2002-03	2,461	0.0%	0.0%	0.0%	0.0%	0.0%	-1.70
Senegal	3	2005-06	3,788	10.3%	17.0%	13.7%	9.4%	18.6%	-0.29
Senegal	4	2008-09	4,399	36.1%	40.0%	39.2%	14.3%	36.9%	1.67
Senegal	6	2014-15	2,555	15.7%	24.5%	17.2%	12.4%	15.6%	0.05
Senegal	7	2016-18	1,411	8.0%	21.8%	19.3%	10.3%	19.2%	-0.09
Sierra Leone	5	2011-13	2,980	11.9%	15.5%	19.5%	19.9%	24.0%	0.16
South Africa	5	2011-13	43	12.4%	12.4%	8.6%	8.0%	21.6%	-0.41
South Africa	6	2014-15	190	39.9%	25.4%	15.8%	12.1%	32.3%	0.86
Tanzania	2	2002-03	1,454	10.6%	12.5%	16.2%	14.4%	14.2%	-0.31
Tanzania	3	2005-06	3,854	1.2%	2.2%	3.2%	3.1%	7.5%	-1.35
Tanzania	4	2008-09	1,680	4.7%	6.7%	8.9%	7.3%	10.4%	-0.92
Tanzania	5	2011-13	1,754	9.2%	6.5%	13.4%	6.8%	8.6%	-0.81
Tanzania	6	2014-15	1,677	6.5%	9.7%	9.4%	8.1%	7.8%	-0.85
Togo	5	2011-13	2,573	21.5%	31.3%	34.0%	28.7%	33.8%	1.35
Uganda	2	2002-03	2,624	8.7%	8.4%	41.6%	9.1%	3.8%	-0.32
Uganda	3	2005-06	2,458	7.4%	6.9%	9.9%	4.8%	5.6%	-1.00
Uganda	4	2008-09	3,636	11.6%	12.2%	25.0%	12.5%	12.6%	-0.22
Uganda	5	2011-13	708	13.0%	9.0%	21.9%	9.1%	9.8%	-0.45
Uganda	6	2014-15	4,071	6.3%	10.5%	18.2%	12.3%	15.5%	-0.43
Zambia	2	2002-03	2,048	12.3%	21.4%	35.2%	13.9%	42.2%	0.82
Zambia	3	2005-06	1,617	15.2%	12.4%	17.1%	14.0%	21.7%	-0.07
Zambia	4	2008-09	4,602	27.7%	20.3%	32.2%	11.3%	29.1%	0.71
Zambia	5	2011-13	4,270	8.4%	12.4%	11.5%	9.3%	20.3%	-0.43
Zambia	6	2014-15	283	16.9%	22.7%	18.3%	13.2%	27.7%	0.32
Zambia	7	2016-18	2,592	17.0%	23.6%	22.9%	14.2%	23.6%	0.36

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Country	AB round	survey year	nr. of children	% of population indicating having 'no trust at all' in: president	parliament	electoral system	courts	local government	mistrust in public institutions (standardized)
Zimbabwe	2	2002-03	1,633	10.9%	13.9%	21.3%	8.3%	17.7%	-0.25
Zimbabwe	3	2005-06	1,694	34.8%	23.6%	36.4%	12.5%	29.9%	1.04
Zimbabwe	4	2008-09	1,902	37.4%	11.7%	46.8%	18.6%	19.5%	0.94
Zimbabwe	5	2011-13	1,203	17.5%	10.2%	30.2%	11.8%	17.6%	0.03
Zimbabwe	6	2014-15	743	14.1%	16.9%	25.2%	10.8%	18.9%	0.02

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Appendix 3. Description of variables used in the analyses

The DHS surveys collect rich information on child health, including the vaccination status for all children 5 years and younger. Moreover, the surveys provided us with a wide range of variables that could be correlated with child's vaccinations status and institutional mistrust. Tables A.8-A.10 provide summary statistics for the DHS variables used in our analysis.

Table A.8 presents summary statistics at the level of children, parents and households. Most of these variables are self-explanatory. The variables related to household access to and utilization of health care require some explanation. The DHS records information on potential hurdles to visiting a health facility. These include: not knowing where to go; getting permission; finding money to pay for the treatment; the distance to the health centre; and not wanting to go alone. For each of these potential hurdles, mothers indicate whether they present 'no problem', 'a small problem' or 'a big problem'. We constructed dummy variables that indicate mothers who find these hurdles 'a big problem'. Moreover, we constructed variables that indicate the share of mothers, at the DHS cluster level, that find these hurdles 'a big problem' and also control for those in the regressions.

Both birth order and the time between births may influence child's vaccination status. Following the example of Antai (2010) we merged the DHS variables "birth order" and "preceding birth interval" into one variable, creating 7 categories: (1) first births; (2) birth order 2-4 with short birth interval (<24 months); (3) birth order 2-4 with medium birth interval (24-47 months); (4) birth order 2-4 with long birth interval (48+ months); (5) birth order 5+ with short birth interval (<24 months); (6) birth order 5+ with medium birth interval (24-47 months); and (7) birth order 5+ with long birth interval (48+ months). Summary statistics are presented in Table A.9.

Besides fixed effects at the level of the DHS survey year and the first sub-national administrative region, our regressions also include fixed effects at the level of child age cohorts. Table A.10 presents the distribution of our sample across the four age cohorts we consider.

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Table A.8 Summary statistics at the level of the child, parents and household

	Obs	Mean	Std. Dev.	Min	Max
Vaccination					
None of the basic vaccinations	166,953	0.06	0.24	0	1
All basic vaccinations	166,953	0.62	0.48	0	1
bcg	166,953	0.91	0.28	0	1
polio1	166,953	0.91	0.29	0	1
polio2	166,953	0.86	0.34	0	1
polio3	166,953	0.72	0.45	0	1
measles	166,953	0.83	0.38	0	1
dpt1	166,953	0.90	0.30	0	1
dpt2	166,953	0.87	0.34	0	1
dpt3	166,953	0.80	0.40	0	1
Child					
child is male	166,953	0.50	0.50	0	1
Parents					
age of mother	166,953	29.20	6.77	15	49
age of mother at 1st birth	166,953	19.07	3.55	6	46
mother can read	166,953	0.38	0.48	0	1
years of schooling mother	166,953	4.04	4.14	0	22
years of schooling father	166,953	5.12	4.74	0	23
Household					
household head is male	166,953	0.82	0.38	0	1
wealth quintile	166,953	2.76	1.38	1	5
nr. children <=5 years in hh	166,953	2.10	1.29	0	10
nr. hh members	166,953	7.13	4.08	1	26
urban survey cluster	166,953	0.26	0.44	0	1
HH-level access to and use of healthcare					
visited health facility last 12 months	166,953	0.64	0.48	0	1
big problem: get permission to get medical help	166,953	0.14	0.35	0	1
big problem: money for medical treatment	166,953	0.51	0.50	0	1
big problem: distance to health facility	166,953	0.44	0.50	0	1
big problem: not wanting to go alone	166,953	0.22	0.41	0	1

Abbreviations: bcg = Bacillus Calmette–Guérin vaccine; polio1 = 1st dose of polio vaccine; polio2 = 2nd dose of polio vaccine; polio3 = 3rd dose of polio vaccine; measles = 1 dose of measles vaccine; dpt1 = 1st dose of diphtheria, pertussis, and tetanus vaccine; dpt2 = 2nd dose of diphtheria, pertussis, and tetanus vaccine; dpt3 = 3rd dose of diphtheria, pertussis, and tetanus vaccine.

Table A.9 Child birth-order and -interval categories

	Freq.	Percent
first births	32,183	19.28
birth order 2-4 with short birth interval (<24 months)	16,078	9.63
birth order 2-4 with medium birth interval (24-47 months)	44,699	26.77
birth order 2-4 with long birth interval (48+ months)	22,049	13.21
birth order 5+ with short birth interval (<24 months)	10,554	6.32
birth order 5+ with medium birth interval (24-47 months)	28,974	17.35
birth order 5+ with long birth interval (48+ months)	12,416	7.44
Total	166,953	100

Table A.10 Child age cohorts

	Freq.	Percent
12-23 months	62,689	37.55
24-35 months	53,085	31.80
36-47 months	28,011	16.78
48-59 months	23,168	13.88
Total	166,953	100

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Appendix 4. Correlations between institutional mistrust and child vaccination coverage

Figure A.1 plots the relationship between the degree of institutional mistrust and child vaccination coverage at the highest sub-national administrative level, based on the most recent available data for each country. We found that regional mistrust in public institutions was positively correlated with the percentage of children having received none of the basic vaccinations (correlation coefficient: 0.23; p-value <0.001) and negatively correlated with the percentage of children having received all 8 basic vaccinations (correlation coefficient: -0.26; p-value <0.001). These scatter plots also reveal a small number of sub-national regions with high institutional mistrust and very low child vaccination coverage raising a concern that our main results are driven by few unusual sub-national regions or countries. In Appendix 9, we show that our results are robust to omitting entire countries or regions from the sample.

These simple correlations are also present at the DHS survey level. Panels A and B of Figure A.2 show that institutional mistrust is positively correlated with the percentage of children having received none of the basic vaccinations (correlation coefficient: 0.32; p-value=0.04) and negatively correlated with the percentage of children having received all 8 basic vaccinations (correlation coefficient: -0.32; p-value=0.04). Moreover, when we split our data in two time periods, 2004-2011 (Panel C and E) and 2012-2018 (Panel D and F), we find that the correlations are stronger in the later period. However, it is worth noting that the number of observations in these graphs is small and that the composition of countries varies across the two time periods. Therefore, we should be extremely cautious in drawing strong conclusions from this analysis.

Finally, we remind the reader that the analysis presented in the main text is not based on differences between countries or sub-national regions. Instead, our regression approach exploits temporal variation *within* subnational regions to assess the degree to which *changes* in child vaccination coverage varies with *changes* in institutional mistrust in the sub-national region.

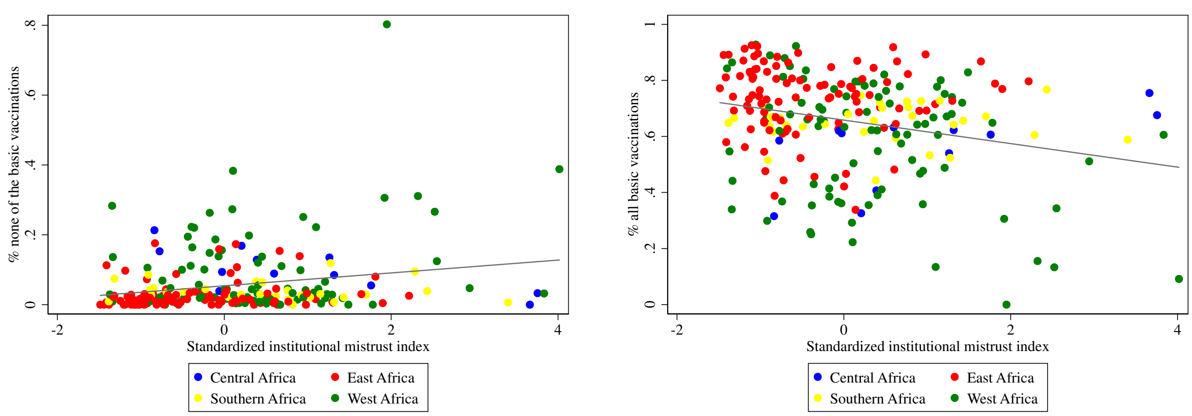

Figure A.1 Correlation between regional institutional mistrust and child vaccination coverage

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

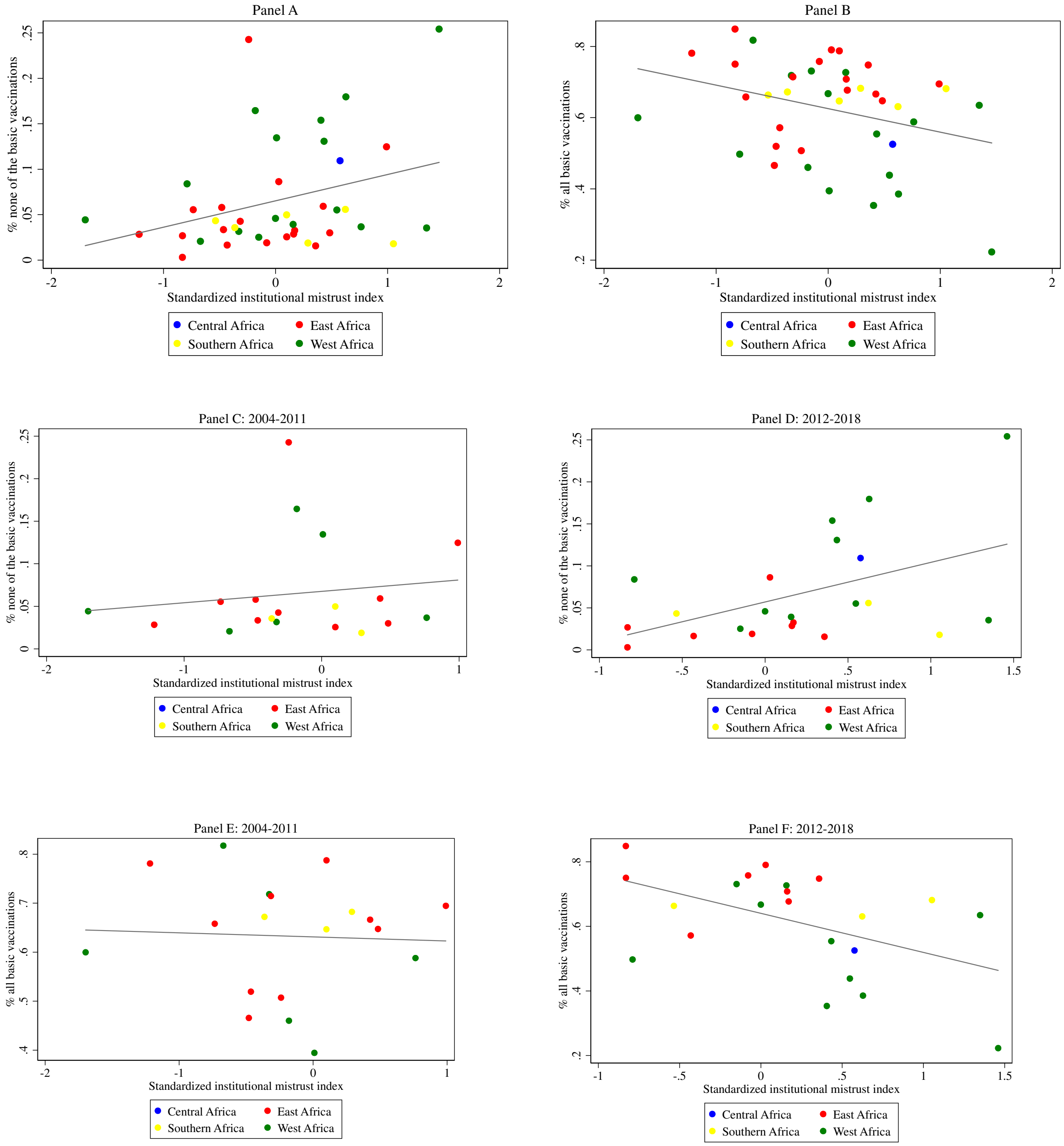

Figure A.2 Correlation between country-survey institutional mistrust and child vaccination coverage

Appendix 5. Robustness to different subsets of control variables and fixed effects

In the main text, we present results from the most inclusive model specifications. Below we test the robustness of our findings to controlling for different subsets of control variables and fixed effects.

In Table A.11 we present a range of different model specifications for each outcome variable. We gradually move from a parsimonious unconditional correlation between institutional mistrust and child vaccination status, to the most inclusive model specification including all control variables and fixed effects. The findings are robust to all specifications. Moreover, the coefficients on the control variables correspond to previous literature that explores determinants of vaccine uptake using DHS data. For example, parental education levels, household wealth and access to health care services are consistently found to be positively correlated with child vaccine uptake (e.g., Abadura, Lerebo, Kulkarni, & Mekonnen, 2015; Acharya, Kismul, Mapatano, & Hatløy, 2019; Adedokun, Uthman, Adekanmbi, & Wiysonge, 2017; Wiysonge, Uthman, Ndumbe, & Hussey, 2012).

The various fixed effects used in our regression models control for unobserved spatial and temporal variation that may be correlated with both vaccine uptake and institutional mistrust. However, these fixed effects absorb a sizable amount of variation in our institutionalized mistrust variable raising a concern that the relationship we document in the main text could be driven by even a small amount of measurement error. Therefore, in Table A.12 we show that our results are robust to using no fixed effects at all as well as to using less restrictive sets of fixed effects.

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Table A.11 Robustness to different subsets of control variables

	None of the basic vaccinations				All basic vaccinations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mistrust in public institutions (standardized)	1.17*	1.11**	1.11**	1.10**	0.86***	0.94***	0.94***	0.94***
	[1.02,1.34]	[1.03,1.19]	[1.04,1.19]	[1.03,1.18]	[0.80,0.93]	[0.91,0.97]	[0.91,0.96]	[0.92,0.97]
child is male			1.00	1.00			1.01	1.01
			[0.96,1.05]	[0.96,1.05]			[0.99,1.03]	[0.99,1.03]
Birth order-interval category (reference category=first births):								
birth order 2-4 with short birth interval (<24 months)			1.20***	1.20***			0.85***	0.85***
			[1.11,1.31]	[1.11,1.31]			[0.81,0.89]	[0.81,0.89]
birth order 2-4 with medium birth interval (24-47 months)			0.96	0.97			1.02	1.01
			[0.90,1.03]	[0.91,1.04]			[0.98,1.07]	[0.97,1.06]
birth order 2-4 with long birth interval (48+ months)			0.96	0.96			1.09***	1.09**
			[0.86,1.07]	[0.86,1.06]			[1.04,1.15]	[1.03,1.14]
birth order 5+ with short birth interval (<24 months)			1.39***	1.41***			0.81***	0.80***
			[1.21,1.59]	[1.23,1.62]			[0.75,0.87]	[0.74,0.87]
birth order 5+ with medium birth interval (24-47 months)			0.96	0.98			1.02	1.01
			[0.85,1.08]	[0.87,1.11]			[0.96,1.09]	[0.95,1.07]
birth order 5+ with long birth interval (48+ months)			0.86*	0.87*			1.07	1.06
			[0.75,0.97]	[0.77,0.99]			[0.99,1.16]	[0.98,1.15]
age of mother			0.99	0.99			1.01***	1.01***
			[0.99,1.00]	[0.99,1.00]			[1.00,1.01]	[1.00,1.01]
age of mother at 1st birth			1.00	1.00			1.01*	1.01*
			[0.99,1.01]	[0.99,1.01]			[1.00,1.01]	[1.00,1.01]
mother can read			0.79**	0.81**			1.18***	1.16***
			[0.68,0.91]	[0.71,0.94]			[1.13,1.23]	[1.11,1.21]
years of schooling mother			0.95***	0.96***			1.02***	1.02***
			[0.93,0.97]	[0.94,0.98]			[1.02,1.03]	[1.02,1.03]
years of schooling father			0.95***	0.96***			1.02***	1.02***
			[0.94,0.96]	[0.95,0.97]			[1.02,1.02]	[1.01,1.02]
household head is male			0.94	0.93			1.15***	1.15***
			[0.87,1.02]	[0.87,1.01]			[1.10,1.19]	[1.11,1.20]
Wealth quintile (reference category =wealth quintile 1):								
wealth quintile 2			0.77***	0.82***			1.19***	1.16***
			[0.69,0.86]	[0.74,0.91]			[1.13,1.25]	[1.10,1.22]
wealth quintile 3			0.67***	0.76***			1.28***	1.21***
			[0.58,0.77]	[0.67,0.87]			[1.20,1.36]	[1.14,1.29]

Table continues on next page

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wealth quintile 4			0.51***	0.62***			1.36***	1.26***
			[0.43,0.60]	[0.53,0.72]			[1.27,1.45]	[1.19,1.35]
wealth quintile 5			0.51***	0.64***			1.39***	1.29***
			[0.40,0.64]	[0.52,0.78]			[1.26,1.54]	[1.18,1.41]
nr. children <=5 years in hh			1.05***	1.05***			1.03**	1.03**
			[1.02,1.08]	[1.02,1.08]			[1.01,1.05]	[1.01,1.05]
nr. hh members			0.99	0.99			0.99***	0.99***
			[0.98,1.00]	[0.98,1.00]			[0.98,0.99]	[0.98,0.99]
urban cluster			0.90	1.04			0.94*	0.89***
			[0.80,1.02]	[0.92,1.18]			[0.89,1.00]	[0.84,0.95]
HH-level access to healthcare variables								
visited health facility last 12 months				0.55***				1.27***
				[0.51,0.60]				[1.22,1.32]
getting medical help for self - big problem: get permission to go				1.33***				0.88***
				[1.21,1.45]				[0.83,0.94]
getting medical help for self - big problem: money for treatment				1.03				0.98
				[0.95,1.11]				[0.94,1.01]
getting medical help for self - big problem: distance to health facility				1.01				1.00
				[0.95,1.08]				[0.96,1.03]
getting medical help for self - big problem: not wanting to go alone				1.13**				0.97
				[1.03,1.23]				[0.93,1.00]
DHS cluster mean of the above access to healthcare variables								
DHS cluster mean that visited health facility last 12 months				0.33***				1.68***
				[0.24,0.45]				[1.46,1.93]
DHS cluster mean that find getting permission to get medical help a big problem				0.94				0.83
				[0.67,1.32]				[0.65,1.06]
DHS cluster mean that find getting money for medical treatment a big problem				0.89				1.08
				[0.63,1.27]				[0.93,1.24]
DHS cluster mean that find distance to health facility a big problem				1.45**				0.85***
				[1.12,1.87]				[0.78,0.93]
DHS cluster mean that find not wanting to go alone a big hurdle				1.44*				0.88
				[1.02,2.03]				[0.75,1.04]
Observations	166,953	162,823	162,823	162,823	166,953	166,953	166,953	166,953
DHS year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Region FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Age cohort FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes

Notes: 95% confidence intervals in brackets; Columns 4 and 8 correspond to the model specifications reported in the main text; * p<0.05; ** p<0.01; *** p<0.001.

Table A.12 Robustness to different levels of fixed effects

	None of the basic vaccinations				All basic vaccinations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mistrust in public institutions (standardized)	1.14**	1.12**	1.09*	1.10**	0.88***	0.88***	0.94***	0.94***
	[1.04,1.26]	[1.03,1.22]	[1.01,1.18]	[1.03,1.18]	[0.83,0.94]	[0.83,0.93]	[0.92,0.97]	[0.92,0.97]
Observations	166,953	166,865	162,823	162,823	166,953	166,953	166,953	166,953
DHS year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Region FE	No	No	Yes	Yes	No	No	Yes	Yes
Age cohort FE	No	No	No	Yes	No	No	No	Yes

Notes: 95% confidence intervals in brackets; Columns 4 and 8 correspond to the model specifications reported in the main text; * p<0.05; ** p<0.01; *** p<0.001.

Appendix 6. Robustness to controlling for maternal religion

Studies have shown that maternal religion in Africa may have an important impact on child vaccination status (see for instance Heymann and Aylward 2004 and Stoop, Verpoorten, and Deconinck 2019). However, maternal religion was not consistently available for the DHS surveys in our sample (notably missing for Lesotho, Niger, South-Africa and Tanzania). We therefore excluded it from the main model specifications. Here we re-estimate our main specification while adding maternal religion as a control variable. The results are presented in Table A.13 and show that our findings are robust to controlling for maternal religion.

Table A.13 Robustness to controlling for maternal religion.

	None of the basic vaccinations (1)	All basic vaccinations (2)
mistrust in public institutions (standardized)	1.10**	0.94***
	[1.03,1.18]	[0.91,0.97]
Religion of mother (reference category=catholic):		
islam	1.11	0.88**
	[0.95,1.29]	[0.81,0.97]
protestant	0.97	1.00
	[0.85,1.11]	[0.96,1.05]
other Christian religion	1.18**	0.91**
	[1.04,1.32]	[0.86,0.97]
traditional religion	1.59***	0.72***
	[1.26,2.00]	[0.65,0.81]
other religion	1.63***	0.73***
	[1.26,2.10]	[0.62,0.86]
no religion	1.22*	0.81***
	[1.01,1.48]	[0.74,0.89]
Observations	151,217	154,663
Region FE	Yes	Yes
DHS year FE	Yes	Yes
Age cohort FE	Yes	Yes

Note: 95% confidence intervals in brackets; Same model specification as reported in the main text, while additionally controlling for maternal religion; * p<0.05; ** p<0.01; *** p<0.001.

Appendix 7. Child vaccination status and non-institutional mistrust indicators

Motivated by the anecdotal evidence cited in the introduction of the main text, we explored the relationship between child vaccination status and mistrust in public institutions. Below we explore how child vaccination status relates to non-institutional mistrust indicators.

Besides trust in institutions, the Afrobarometer surveys also ask questions about trust in people – although these are not systematically included in all surveys. In Columns 1&4 and 2&5 of Table A.16 we re-estimate the main specification but replace mistrust in institutions with mistrust in relatives and mistrust in people in general, respectively. We find no significant relationship between mistrust in people and child vaccination status.

A lack of trust in vaccine or immunization programmes was reported to be the second most frequent concern among systematically reviewed qualitative studies (Muñoz, Llamas, and Bosch-capblanch 2015). Unfortunately, neither the DHS nor the Afrobarometer surveys directly collect measures of trust in medicine. We therefore follow the example of Lowes and Montero (forthcoming) and construct a proxy for trust in medicine that relies on whether mothers consent to a **free** and **non-invasive** blood test for either anaemia or HIV. Lowes and Montero (forthcoming) extensively argue that refusal to consent to these blood tests is a credible proxy for mistrust in modern medicine. Moreover, the proxy has the advantage of being a revealed preference measure of mistrust, rather than a self-reported one.

Anaemia and HIV blood tests are not offered to all surveyed mothers. We have information on consent to a blood test for 57% of the children in our sample (Table A.14). Within that sample 4% refused consent to the blood test (Table A.15). Of course, besides mistrust in medicine, there could be other reasons to refuse consent to a blood test. Two alternative explanations, for instance, are a fear of physical discomfort or of knowing the test outcome. Particularly in case of the former, one could expect a strong correlation with child vaccination status that does not necessarily relate to mistrust: if one refuses a blood test because of physical discomfort, one might also refuse a vaccine for the same reason.

Hence, we do not rely on individual refusal to consent, but construct a variable that measures the mean refusal to consent at the DHS cluster level. We take two important steps. First, we assume that all observations for which we do not have information on consent would have accepted the blood test – hence we are looking at a lower bound of blood test refusal. Second, to limit the impact of the above-mentioned alternative explanations, we construct the leave-out mean of test refusal: i.e. for each observation within a DHS cluster we compute mean test refusal, excluding the test refusal value of the observation in question.

Table A.14 Information on consent to an Anemia or HIV blood test.

	Freq.	Percent
Yes	94,637	56.68
No	72,316	43.32
Total	166,953	100

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Table A.15 Summary statistics on refusal of blood test.

	Obs	Mean	Std. Dev.	Min	Max
Refuse blood test	94,637	0.04	0.19	0	1
Cluster-level refusal of blood test	156,686	0.02	0.07	0	1

Constructed as described above, our proxy for local mistrust in medicine is available for 94% of the observations in our sample, and averages 2% (Table A.15). Figure A.3 reveals substantial heterogeneity across DHS survey clusters however. While the cluster-level refusal of blood tests is equal to 0% for the large majority of observations (83%), it averages 14% for the remaining observations, and ranges between 2% and 100%.

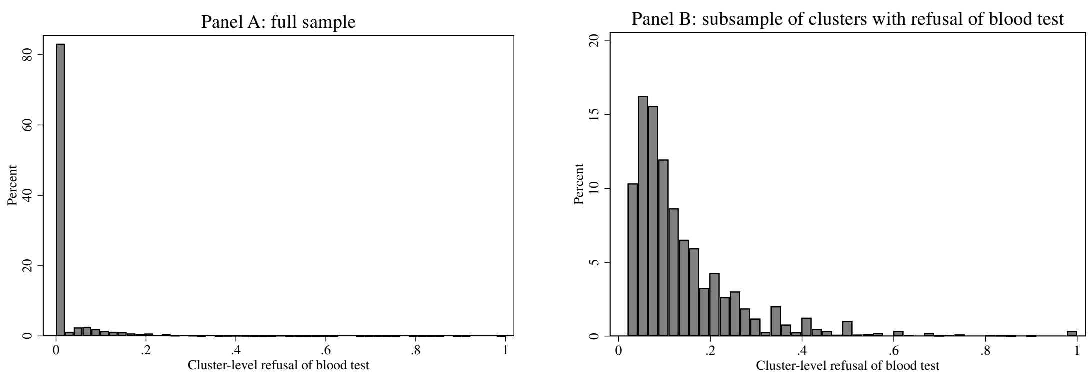


Figure A.3 Cluster-level refusal of blood test

We consider higher levels of cluster-level refusal of blood tests as an indicator for higher levels of mistrust in medicine. In columns 3&6 of Table A.16 we re-estimate the main specification, replacing mistrust in institutions with our proxy for local mistrust in medicine. We find that it is strongly correlated with child vaccination status. The odds ratios quantify the change in child vaccination status when the share of the DHS cluster that refuses consent to a blood test changes from 0 % to 100 %. Thus, a 10-percentage point increase in local mistrust in medicine is associated with a 19.9 percent increase in the likelihood that the child had not received any of the basic vaccines and with a 5.2 percent decrease in the likelihood that the child had received all basic vaccines.

In Table A.17, we re-estimate the main specification, but additionally include our proxy for local mistrust in medicine. The estimated odds ratios for both mistrust in public institutions and mistrust in medicine remain practically unchanged compared to the specifications where we only control for either one of them. This suggests that they capture distinct dimensions of mistrust.

Table A.16 Child vaccination status and non-institutional mistrust indicators.

	None of the basic vaccinations			All of the basic vaccinations		
	(1)	(2)	(3)	(4)	(5)	(6)
Mistrust in relatives	4.16			1.29		
	[0.64,27.13]			[0.52,3.19]		
Mistrust in people in general		1.55			1.46	
		[0.45,5.35]			[0.84,2.53]	
Cluster-level refusal of blood test			2.99***			0.48***
			[1.85,4.84]			[0.37,0.62]
Observations	111,093	59,148	152,612	113,123	60,225	156,679
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
DHS year FE	Yes	Yes	Yes	Yes	Yes	Yes
Age cohort FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 95% confidence intervals in brackets; Same model specification as reported in the main text but replacing institutional mistrust with three non-institutional mistrust indicators; * p<0.05; ** p<0.01; *** p<0.001.

Table A.17 Robustness to controlling for a proxy of mistrust in medicine.

	None of the basic vaccinations	All basic vaccinations
	(1)	(2)
Mistrust in public institutions (standardized)	1.10**	0.94***
	[1.03,1.18]	[0.92,0.97]
Cluster-level refusal of blood test	3.00***	0.48***
	[1.85,4.86]	[0.37,0.62]
Observations	152,612	156,679
Region FE	Yes	Yes
DHS year FE	Yes	Yes
Age cohort FE	Yes	Yes

Notes: 95% confidence intervals in brackets; Same model specification as reported in the main text but additionally controlling for cluster-level refusal of blood test; * p<0.05; ** p<0.01; *** p<0.001.

Appendix 8. Robustness to restricting the sample to children whose mother had lived in the same location at least since the birth

We matched children from the DHS surveys to mistrust variables from the Afrobarometer surveys based on the sub-national region in which the children's mothers were interviewed. This location might be different from the location where the child spent the first years of his/her life. Below we examine the robustness of our findings to excluding potential migrants. The DHS includes a question "How long have you been living in your current place of residence". This question was however not consistently asked in all DHS surveys, and the information was only available for 55.2% of our sample.

Among the children for whom we had this information, 75% had been living in their current place of residence for at least 5 years, i.e. at least since the child was born. In Table A.18, we re-estimate the main specification, restricting the sample to this group of children thus excluding potential migrants. While doing so reduces our sample by about 60%, the main findings are robust.

Table A.18 Robustness to excluding potential migrants.

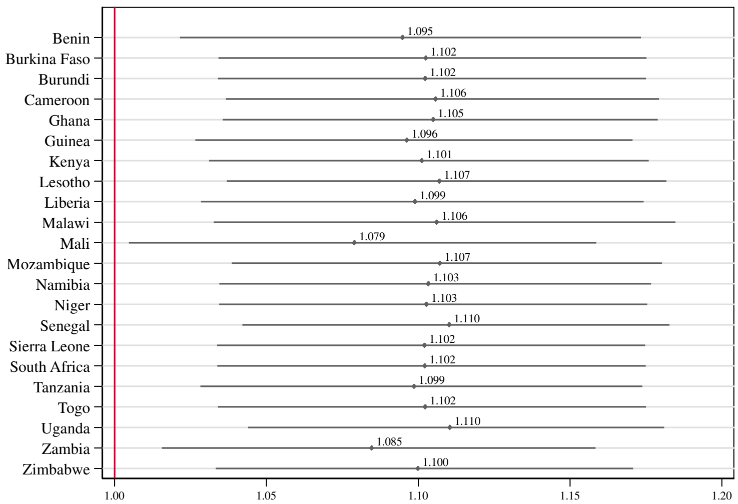
	None of the basic vaccinations (1)	All basic vaccinations (2)
mistrust in public institutions (standardized)	1.13**	0.96*
	[1.03,1.24]	[0.92,1.00]
Observations	65,566	68,976
Region FE	Yes	Yes
DHS year FE	Yes	Yes
Age cohort FE	Yes	Yes

Note: 95% confidence intervals in brackets; Same model specification as reported in the main text, while restricting the sample to households that had lived in the same DHS survey cluster at least since the child's birth; * p<0.05; ** p<0.01; *** p<0.001.

Appendix 9. Robustness to leaving out individual countries and regions

It is possible that our findings are driven by a particular country or region within Sub-Saharan Africa, due to its size or because it has particularly high (or low) levels of mistrust in public institutions or child vaccination status. Below we explore the sensitivity of our findings. First we re-estimate the main specification while dropping each country's observations one at a time. Figure A.4 shows that our findings are stable to the country composition of our sample and are not driven by a particular country.

Panel A: None of the basic vaccinations



Panel B: All basic vaccinations

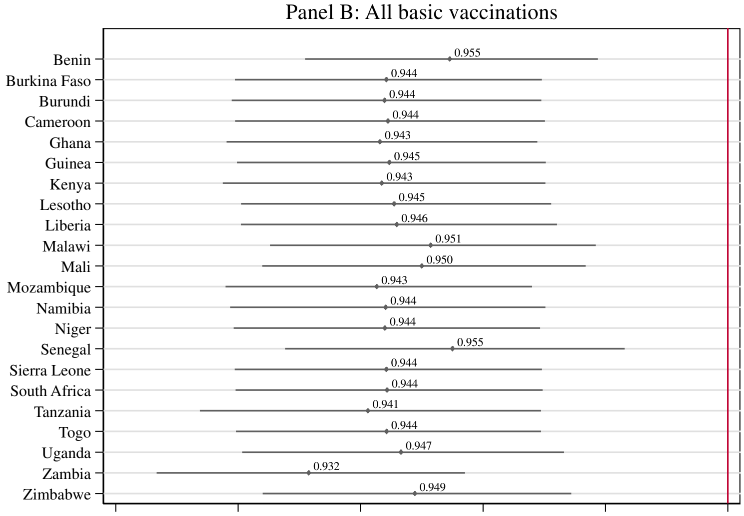


Figure A.4 Robustness to dropping each country's observations one at a time.

Note: Data are odds ratios (and their 95% confidence interval) from logistic regressions that regressed child's vaccine status on the standardized index of public mistrust. Same model specification as reported in the main text, while dropping the observations for each country one at a time.

Second, we re-estimate the main specification while dropping the observations from each region within Sub-Saharan Africa one at a time. These include: Central Africa (Cameroon); Eastern Africa (Burundi, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe); Southern Africa (Lesotho, Namibia, South Africa); and West Africa (Benin, Burkina Faso, Ghana, Guinea, Liberia, Mali, Niger, Senegal, Sierra Leone, Togo). Figure A.5 shows that our findings are stable to the regional composition of our sample and are not driven by a particular region.

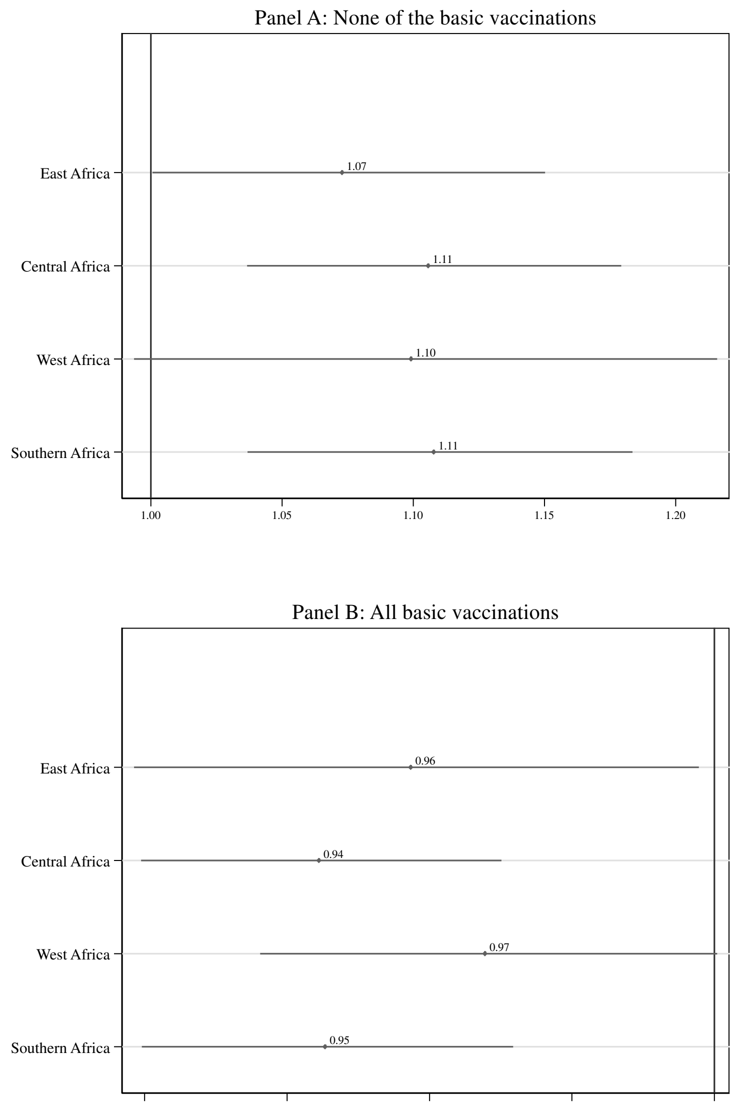


Figure A.5 Robustness to dropping each SSA region's observations one at a time.

Note: Data are odds ratios (and their 95% confidence interval) from logistic regressions that regressed child's vaccine status on the standardized index of public mistrust. Same model specification as reported in the main text, while dropping the observations for each SSA region one at a time.

Appendix 10. Robustness to treating children with missing vaccination information as not being vaccinated

Our analytical sample is restricted to children for which we have full information on the vaccination status. For 1.18% of children for whom the vaccination status should have been collected, vaccination information is missing. They were excluded from the sample. Table A.19 shows the percentage of children with missing vaccination information by survey.

Following WHO guidelines (WHO 2019), we tested the robustness of our findings to including these children in the sample and treating them as not having received any vaccine. The results presented in Table A.20 show that the estimated association between institutional mistrust and child vaccination status remained stable.

Table A.19 Percentage of children with missing vaccination information.

Country	Survey year	% missing vaccination information
Benin	2011-12	3.26%
Benin	2017-18	0.61%
Burkina Faso	2010	0.23%
Burundi	2016-17	0.00%
Cameroon	2018	0.78%
Ghana	2008	1.45%
Ghana	2014	0.89%
Guinea	2018	2.40%
Kenya	2014	0.82%
Lesotho	2004	1.30%
Lesotho	2009	1.15%
Lesotho	2014	0.82%
Liberia	2013	3.81%
Malawi	2004	0.96%
Malawi	2010	0.46%
Malawi	2015-16	0.24%
Mali	2006	4.21%
Mali	2012-13	1.47%
Mali	2018	1.59%
Mozambique	2011	0.54%
Namibia	2006-07	3.80%
Namibia	2013	3.62%
Niger	2012	3.79%
Senegal	2005	1.72%
Senegal	2010-11	0.68%
Senegal	2017	0.68%
Sierra Leone	2013	2.55%
South Africa	2016	4.51%
Tanzania	2004-05	0.14%

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Country	Survey year	% missing vaccination information
Tanzania	2010	0.77%
Tanzania	2015-16	0.15%
Togo	2013-14	0.62%
Uganda	2006	0.81%
Uganda	2011	0.71%
Uganda	2016	0.67%
Zambia	2007	0.35%
Zambia	2013-14	0.65%
Zambia	2018	0.24%
Zimbabwe	2005-06	0.48%
Zimbabwe	2010-11	0.42%
Zimbabwe	2015	0.05%
Overall		1.18%

Table A.20 Regression results for the association between institutional mistrust and child vaccination status, treating children with missing vaccination information as unvaccinated

	None of the basic vaccinations			All basic vaccinations		
	N	OR* [95% CI]	p-value	N	OR* [95% CI]	p-value
Standardized institutional mistrust index	166,012	1.09 [1.02,1.16]	0.006	168,946	0.94 [0.92,0.97]	0.00002

Note: Data are odds ratios from logistic regression that regressed child vaccination status on a standardized index of public mistrust (continuous measure). Each odds ratio quantifies the associated change in the likelihood that the child had not received any of the basic vaccinations or the likelihood that the child had received all basic vaccinations when public mistrust is increased by one standard deviation. Sample restricted to children 12-59 months. Sub-national regions without variation in the outcome variable were omitted from the sample resulting in a different number of observations (N) across the models.* adjusted for differences in child's age (binary variables for different age cohorts), sex, birth-order and birth-interval; maternal age and age at which her first child was born; maternal and paternal level of education; household wealth, demographics and location (rural/urban); time-invariant sub-national region characteristics (sub-national region fixed effects) and variation across DHS survey years (survey-year fixed effects). We further controlled for access to and utilization of health care services at the household and DHS cluster level.

Stoop N, *et al. BMJ Global Health* 2021; 6:e004595. doi: 10.1136/bmjgh-2020-004595

Appendix 11. Robustness to using DHS sampling weights

Both the DHS and the Afrobarometer surveys apply two-stage cluster designs; first randomly selecting enumeration areas generally drawn from recent censuses, and then randomly drawing a sample of households from a list of households within each enumeration area. We used the Afrobarometer sampling weights to aggregate the mistrust variable at the first sub-national administrative level but did not use the sampling weights provided by the DHS survey. The reason for not using DHS sampling weights is that the probability to be selected in the sample (the sampling design) is exogenous to the likelihood to be vaccinated (and the error term), conditional on all our covariates. When sampling is exogenous, applying the survey weights yields similar coefficients but wider confidence intervals (Solon, Haider, and Wooldridge 2015). In other words, the weighted logistic regression is less efficient than the unweighted one.

We demonstrate this with our data using two different sampling weights. First, we used the women's sampling weight provided in the DHS child recode files in our main regression model. Table A.21 shows the regression results. Compared to the results provided in Table 2 in the main text, we obtain almost identical coefficients, just slightly wider confidence intervals. Second, we de-normalized the women's sampling weight to take into account differences in population sizes across countries and over time using data from the World Development Indicators. To do so, we divided the DHS sampling weight by the survey sampling fraction; the ratio of total number of women aged 15-49 interviewed in the DHS survey over the total number of women aged 15-49 in the country at the time of the survey. For more information about the de-normalization process, see Section 1.13.7 in (ICF International 2012). Table A.22 shows the regression results based on these de-normalized weights. As before, we see that the coefficients are nearly identical to the unweighted ones reported in Table 2 but the confidence intervals are again somewhat wider.

Table A.21 Robustness to using DHS sampling weights

	None of the basic vaccinations			All basic vaccinations		
	N	OR* [95% CI]	p-value	N	OR* [95% CI]	p-value
Standardized institutional mistrust index	162,823	1.08 [1.02,1.15]	0.015	166,953	0.95 [0.92,0.97]	0.0001

Table A.22 Robustness to using de-normalized DHS sampling weights

	None of the basic vaccinations			All basic vaccinations		
	N	OR* [95% CI]	p-value	N	OR* [95% CI]	p-value
Standardized institutional mistrust index	162,823	1.10 [1.00,1.21]	0.055	166,953	0.96 [0.93,1.00]	0.042

Appendix 12. Robustness to aggregating the analysis at the first sub-national administrative level

Our exposure variable is institutional mistrust taken from the Afrobarometer survey and measured at the first sub-national administrative level. Our outcome variable (vaccination coverage) comes from the DHS survey and is measured at the child level. We merged the exposure variable into the DHS data using information about the first sub-national administrative level in which the child's household is located. Temporally, we linked the Afrobarometer data to DHS using the level of mistrust at the time of child's birth. Consequently, the unit of observation in our data is defined at the child – year-of-birth level.

Our analysis is thus conducted at the individual level, while the exposure variable is measured at the first sub-national administrative level. These types of aggregation problems are common in social sciences (Blundell and Stoker 2005). There is for instance a large branch of literature that studies the association between aggregate shocks such as conflict or weather on health outcomes measured at individual level (e.g., Cooper et al. 2019; Maccini and Yang 2009; Wagner et al. 2018) as well as a literature that studies associations between aggregate social capital and individual health measures (e.g., Mellor and Milyo 2005; Martin Ljunge 2014; Younsi and Chakroun 2016; M. Ljunge 2018).

The reason for having the exposure variable and the outcome variable at different levels is that the DHS data come with a host of variables capturing child, parental and household characteristics that have been found to be strongly associated with vaccine uptake (e.g. Abadura et al. 2015; Acharya et al. 2019; Adedokun et al. 2017; Wiysonge et al. 2012). If we aggregated all individual data to the first sub-national administrative level, we would have to make a series of cumbersome decisions regarding averaging categorical variables such as birth order, age cohort and wealth quintile. Therefore, we believe we can better control for these important individual and household level (confounding) factors by keeping the unit of observation of our analytical data at the child – year-of-birth level. That also permits us to verify that the estimated coefficients on the control variables are in line with the existing literature (see appendix 4). Hence, this is our preferred estimation strategy.

Nevertheless, our results do hold when we aggregate the individual data from each DHS survey at the first sub-national administrative level (by simply taking the average of each variable). Note that we are then left with only one observation per sub-national region and DHS survey, reducing the number of observations from ~160,000 to 407. The dependent variable now indicates the proportion of children vaccinated at the first sub-national administrative level within a given DHS survey. The main variable of interest represents the level of mistrust at that same sub-national administrative level, averaged over the different years in which the children included in that DHS survey were born. Below, in Table A.23, we replicate the analysis presented in Table 2 of the main manuscript with this aggregated dataset. Note that because the dependent variable is now a proportion, we now use a linear regression approach instead of a logistic one. The results indicate that a one standard deviation increase in the institutional mistrust index is associated with a 1.5 percentage point increase in the proportion of children that received none of the basic vaccinations and a 3.2 percentage point decrease in the proportion of children that received all basic vaccinations. Compared to the average levels of vaccination coverage in this database (see Table

A.24), these changes imply a 25% increase in the proportion of children that received none of the basic vaccinations and a 5% decrease in the proportion of children that received all basic vaccinations. Table A.25 presents the results when we repeat this analysis using de-normalised sampling weights in the aggregation process. The findings remain qualitatively unchanged.

Table A23. Replicating Table 2 with aggregated vaccination coverages at the sub-national level

	None of the basic vaccinations			All basic vaccinations		
	N	b [95% CI]	p-value	N	b [95% CI]	p-value
Standardized institutional mistrust index	407	0.015 [0.005,0.024]	0.003	407	-0.032 [-0.050,-0.014]	0.0007

Table A24. Summary statistics of vaccination coverage and mistrust aggregated at the sub-national level

	Obs.	Mean	Std. Dev.	Min	Max
proportion none of the basic vaccinations	407	0.06	0.08	0.00	0.82
proportion all basic vaccinations	407	0.66	0.17	0.00	0.94
standardized institutional mistrust index	407	0.00	1.00	-1.53	4.72

Table A25. Replicating Table 2 with aggregated vaccination coverages (with de-normalized sampling weights) at the sub-national level

	None of the basic vaccinations			All basic vaccinations		
	N	b [95% CI]	p-value	N	b [95% CI]	p-value
Standardized institutional mistrust index	407	0.010 [0.001,0.019]	0.031	407	-0.030 [-0.048,-0.002]	0.002

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