Title

Trust In Governments And Health Workers Low Globally, Influencing Attitudes Toward Health Information, Vaccines

Journal

Health Affairs, 40(8)

ISSN

0278-2715

Authors

Moucheraud, Corrina
Guo, Huiying
Macinko, James

Publication Date

2021-08-01

DOI

10.1377/hlthaff.2020.02006

Peer reviewed

HHS Public Access

Author manuscript

Health Aff (Millwood). Author manuscript; available in PMC 2022 May 02.

Published in final edited form as:

Health Aff (Millwood). 2021 August ; 40(8): 1215–1224. doi:10.1377/hlthaff.2020.02006.

Trust In Governments And Health Workers Low Globally, Influencing Attitudes Toward Health Information, Vaccines

Corrina Moucheraud[1], **Huiying Guo**[1], **James Macinko**[1,2]

[1]Department of Health Policy and Management, Jonathan and Karin Fielding School of Public Health, University of California, Los Angeles

[2]Department of Community Health Sciences, Jonathan and Karin Fielding School of Public Health, University of California, Los Angeles

Abstract

Trust – particularly during emergencies – is essential for effective health care delivery and health policy implementation. We use data from the 2018 Wellcome Global Monitor survey (comprising nationally-representative samples from 144 countries; n=149,014 respondents) to examine levels and correlates of trust in governments and health workers, and attitudes toward vaccines. Only one-quarter of respondents globally trust their government a lot (more common among people with less schooling, living in rural areas, financially comfortable, and at older ages); and less than half of respondents globally trust doctors and nurses a lot. People's trust in these institutions is correlated with trust in health or medical advice from them, and with more positive attitudes toward vaccines. Vaccine enthusiasm varies substantially across regions with safety concerns as the most common concern. Policymakers should understand that the public may have varying levels of trust in different institutions and actors. Although much attention is paid to crafting public health messages, it may be equally important -- especially during a pandemic -- to identify appropriate, trusted messengers to deliver those messages more effectively to different target populations.

Introduction

Trust – in health systems, in governance and leadership – shapes health care delivery (1, 2), and health system quality and resilience (3, 4). If patients do not trust their health care providers or system, this can compromise care-seeking, health behaviors and adherence to medical recommendations, and can undermine broader social welfare (5–8). (Mis)trust can also compromise efforts for a coordinated and effective response to emergencies (9, 10) as demonstrated during Ebola epidemics (11, 12), the 2009 H1N1 pandemic (13), Zika (14), cholera outbreaks (15), and HIV in the United States (16, 17).

Trust is therefore of high importance for global public health, particularly during the COVID-19 pandemic (18). Information and misinformation about COVID-19 spread rapidly online (19, 20) and may be associated with mistrust (21), adoption of prevention behaviors (22), and uptake of the COVID-19 vaccine (23) -- so we must also identify trusted information sources and spokespersons. Although policies to encourage social distancing and mask-wearing have helped curb the spread of COVID-19 (24–26), adherence to

recommendations is essential and may be impacted by trust in the government. Trust is also important for vaccine uptake (27, 28), so low trust could impede the global COVID-19 vaccination effort.

Many disciplines use the concept of trust to explain a myriad of outcomes and, while there is no single definition (29), the literature broadly agrees that trust is relational, and therefore it is important to consider both characteristics of the trustor (the individual; such as gender and educational attainment, both of which have been found to be associated with trust in health care workers) and the object of their trust, i.e., institutions (30) as trust may vary by type of institution (e.g., government versus health workers). Our analytic approach is informed by a prominent model that frames trustworthiness as a function of an institution's perceived ability, benevolence, and integrity (31).

We use nationally-representative survey data from 144 countries to assess people's degree of trust in institutions (governments and health workers) and health advice from them, and how each type of trust is associated with attitudes toward vaccines. We describe how trust varies geographically, how trust in different institutions is correlated, and how reported trust is associated with country- and individual-level characteristics.

Methods

Data sources:

Information on trust and all individual-level characteristics was collected by the Wellcome Global Monitor (WGM) survey. The WGM is the most recent global assessment of people's opinions of health and medical topics -- including trust and attitudes toward vaccines -- that includes countries across all geographic regions and income levels (32). In 2018, the survey was administered as a module within the Gallup World Poll which collects data from nationally-representative samples. In total, 149,014 respondents from 144 countries completed the WGM 2018 survey. Face-to-face surveys were performed in nearly all countries (in 34 countries, phone-based surveys were used; Gallup uses phone-based surveying where at least 80% of the population has a phone or where this is the customary mode of surveying). Characteristics of the survey and respondents can be found in Appendix 1 (33).

Variables:

We identified explanatory variables corresponding to dimensions of the trust framework presented above, contingent on the availability of national-level proxy indicators for all 144 countries. For governments, ability was operationalized according to a government effectiveness indicator, benevolence was represented by rule of law – both measures as reported by the World Bank's Worldwide Governance Indicators (WGI) project (34) – and integrity was operationalized using the Corruption Perceptions Index (35). We used principal component analysis (PCA) to create a composite governance score that incorporated these three constructs; and assigned countries above, or below, the median score as higher-, or lower-, governance quality. Similarly for health systems characteristics, we used PCA to combine measures of health worker ability (coverage of measles vaccine) (36, 37); health

system responsiveness to represent benevolence (38, 39), and the Healthcare Access and Quality Index to capture integrity (40). Using the resulting score, we then assigned countries above, or below, the median score as higher-, or lower-, health systems quality.

Data analysis:

The main outcome variables were trusting institutions, trusting health advice from these institutions, and positive attitudes toward vaccines. We explored trust in national governments (as a function of individual-level characteristics and governments' ability, benevolence, and integrity); and trust in doctors and nurses (as a function of individual-level characteristics and health systems' ability, benevolence and integrity, as well as trust in the government). Trust in health and medical advice from the government, from doctors and nurses, and positive vaccine attitudes, were correlated with individual-level characteristics, as well as trust in, and the ability, benevolence and integrity of, these institutions.

The survey asked about trust using a 4-point scale, and we dichotomized these as "a lot," versus "some," "not much," or "not at all" based on the distribution of responses. Opinions about the safety, efficacy and importance of vaccines were asked using a 5-point scale, which we dichotomized as "strongly agree," versus "somewhat agree," "neither agree nor disagree," "somewhat disagree" or "strongly disagree." (In sensitivity analyses, we tried alternate specifications for all outcomes.)

We investigated correlations between these different types of trust and key individual- and country-level characteristics. Information on all variables can be found in Appendix 2 (33). The individual-level explanatory variables were: respondent gender, age, age-squared (to allow for non-linear age effects), educational attainment, urban or rural residence, household wealth (per capita income quintiles), and subjective income. The country-level variables were used directly as measured; except governance and health system quality: every country was classified as below- or above-median for each, based on a PCA-based score as described above.

All associations were estimated using logistic regression models; we report adjusted odds ratios using the global data, and stratified by geographic region per World Bank classifications (41), except Mexico which was included in the North America group. (See Appendices 3 and 6 for details of all models estimated (33).) All analyses incorporated sampling weights as calculated by the WGM that account for national population characteristics and non-response, and regression analyses use country-clustered standard errors.

Study limitations:

The WGM was not implemented in every country worldwide; and the publicly-available data included limited variables on respondent characteristics so we were unable to explore factors like exposure to media, health behaviors, social norms (including the influence of language, ethnicity or social networks), health status, marginalization by the government, or prior experience with and perceived quality of the health care system – all of which may impact trust (42–45). The literature also suggests that vaccine attitudes may be shaped by individual attributes not measured here, such as ideological beliefs of personal liberty and

individualism (46, 47). Data were collected in 2018 so may not fully reflect the current situation (given global phenomena like COVID-19, and governance and other ongoing changes). Lastly, trust is a multidimensional construct that is challenging to measure and there is little consensus about how to do so (29). We are unable to assess the degree to which the measures used here fully capture the constructs of integrity, benevolence and responsiveness; also, other determinants of trust may be equally important but are not explored here.

Results

Trust in institutions: governments and health workers

On average, approximately one-quarter of respondents globally said they trust their government a lot (Exhibit 1). This sentiment was more common among respondents in South Asia (37.0%) and sub-Saharan Africa (32.6%), and was lowest in Latin America and the Caribbean (LAC) (6.3%) and North America (9.2%) (Exhibit 2).

Women were less likely to trust the national government than men but, in fully adjusted models, this difference was only significant in the LAC and East Asia regions (Exhibit 1, Appendix 6 (33)). In every region, trust in the national government was negatively associated with educational attainment – with particularly strong effects in LAC, the Middle East and North Africa (MENA), and sub-Saharan Africa – and with living in urban areas. Those who reported greater financial comfort (regardless of income quintile) were more likely to trust their national government, and this was significant in all regions except South Asia. Age exhibited a U-shaped relationship with trust in government, particularly in South Asia and sub-Saharan Africa: those at the middle ages exhibited the lowest, and those aged ≥65 had the highest, levels of trust in government (Appendix 5 (33)). In the global model, trust in the government was no different among respondents living in higher- and lower-governance quality contexts. There was no difference in results when a more inclusive definition of trust was employed (Appendix 8 (33)).

Overall, 42.7% of respondents said that they trust doctors and nurses a lot, and this was a more common sentiment than trusting the government a lot, both globally and in every region (Exhibit 2). Globally and in all regions, trust in government was strongly and positively associated with trust in doctors and nurses in models that included covariates as specified (Exhibit 1 and Appendix 6 (33)). Financially comfortable people had 26% higher odds of trusting doctors and nurses than those reporting economic challenges in adjusted models. Education and trust in health workers had a heterogenous association across regions: people with more education were significantly less likely to trust doctors and nurses in MENA and sub-Saharan Africa, whereas more education was significantly associated with greater health worker trust in North America and South Asia. Using a broader operationalization of trust, these relationships held and an additional positive association with female gender emerged (Appendix 8 (33)).

Trusted sources of medical and health advice

Less than 40% of respondents globally trusted health advice from the government or health workers (Exhibit 3); sub-Saharan Africa had the highest rates and those living in North America were the least trusting (Appendix 4 (33)). Among people who expressed trust in their government, the adjusted odds of trusting health and medical advice from the government were 3.43 times higher than among people who did not trust their government. Among people who trusted doctors and nurses, the odds of trusting health and medical advice from these health professionals were 5.51 times higher than among those who did not trust doctors and nurses (Exhibit 3). This was true in all regions (Appendix 6 (33)), and with all operationalizations of these trust variables (Appendix 8 (33)).

Women had 11% and 14% higher odds than men, when including covariates as specified, to report trusting health advice from either the government or health workers, respectively (Exhibit 3); in region-stratified models, these were significant only in South Asia and sub-Saharan Africa (Appendix 6 (33)). In adjusted models, people reporting living financially comfortably were more likely to trust both sources of advice (Exhibit 3), and this was true in all regions except South Asia and sub-Saharan Africa (Appendix 6 (33)). In the global model, country-level measures of governance and health systems quality were not associated with trusting either source of health advice (Appendix 7 (33)).

In each region, trust in government health advice was about half as common among those who do not trust health advice from health workers compared with those who do (Exhibit 4). Those who trust neither government nor health workers exhibited the lowest rates of trusting health advice, while those who trust both institutions had rates more than twice that of those who trust neither institution (Exhibit 4).

Attitudes toward vaccines

Positive attitudes toward vaccines – feeling that they are safe, effective and important – varied widely, with over 70% of South Asian respondents, but less than 40% of European or East Asian respondents, strongly agreeing with these sentiments (Appendix 4 (33)). In some regions (MENA, Europe, and North America) respondents were particularly unlikely to strongly agree that vaccines were safe (Appendix 9 (33)).

Positive vaccine attitudes were about 39% more common among those who trust the government and 59% more common among those who trust health advice from the government (Exhibit 3). Those who trust doctors and nurses as well as those who trust health advice from doctors and nurses were also more likely to report positive vaccine attitudes in fully adjusted models (Exhibit 3). In regionally-stratified models, trust in health workers, trust in advice from the government, and trust in advice from health workers was strongly positive and significantly associated in all regions (with the exception of sub-Saharan Africa where there was not an association with trusting advice from health workers in the fully adjusted model) (Appendix 6 (33)).

Other individual-level characteristics were not associated with positive vaccine attitudes (Exhibit 3, Appendix 7 (33)). In sub-Saharan Africa and LAC, women were significantly more likely to express positive vaccine attitudes than men (Appendix 6 (33)); education did

not exhibit a clear positive gradient in any region (Appendix 6 (33)). When positive vaccine attitudes were operationalized less strictly, the global model found a positive association for women, but no other associations changed in significance (Appendix 8 (33)).

Discussion

Trust is an essential ingredient in effective health care delivery (1), particularly during emergencies (9, 10). By better understanding how and why trust attitudes are related, the global community can gain important insights into how to communicate urgent health information more effectively.

Only approximately one-quarter of respondents trust their government a lot, and less than half trust doctors and nurses a lot. With a few exceptions as noted below, individual characteristics were largely uncorrelated with different forms of trust. This echoes a broader literature which has found heterogeneous evidence about how individual traits correlate with trust, care satisfaction, and health system responsiveness (48, 49). Instead, trusting attitudes were strongly associated with respondents' trust in other institutions and information; and there was little correlation with characteristics of the institutions' ability, benevolence and integrity – hypothesized to be important for trusting relationships.

Three individual characteristics merit further discussion. First, all forms of trust were more common among those who felt economically better-off, regardless of actual income quintile; this correlation may be picking up something about people's underlying disposition (29). Second, trust in government was the only outcome to exhibit significant associations with individual characteristics: it was positively associated with rural residence, negatively associated with educational attainment, and was highest among those at older ages. This last observation is particularly relevant as we implement age-based immunization campaigns (e.g., influenza, pneumonia and COVID-19). Third, we identified a gender difference in trusting "outputs": women expressed greater trust in medical advice from the government and from health workers, compared to men. This may be attributable to women's greater use of the health system (e.g., for reproductive, maternal and child health), a hypothesis needing further exploration.

Although vaccines were generally seen as safe, effective and important, in most regions fewer than half of respondents strongly agreed with all three of these attributes. The correlates of these vaccine attitudes are particularly noteworthy: feeling positively about vaccines was strongly associated with trust in institutions, and in health advice from both the government and health workers. Similar results were recently reported in a longitudinal analysis that incorporated the WGM data (53); and is also consistent with other studies that highlight the important role of social norms and trust in advice from health care providers (54–56).

Policy implications

Three key policy-relevant findings emerge from this analysis.

(1) As policymakers seek ways to effectively communicate important health messages – for example, to encourage compliance with behaviors like mask-wearing or social distancing in the context of COVID-19 – it is essential to consider that public trust in governments is fairly low in most countries. Therefore, government officials may not be the optimal "face" of public health messages, particularly where trust in government or in health advice from the government is low. Data also suggest that COVID-19 misinformation online has focused on statements from and about public authorities (57), highlighting how low trust in these officials may be seeding this "infodemic." Specific drivers of institutional trust, such as people's perceptions of the government's benevolence, may be particularly salient. One approach could be to incorporate non-government actors or agencies more strongly perceived to be benevolent, such as religious leaders – especially in areas where faith-based organizations play an important role in social movements or health service delivery (58–60).

(2) Trust in doctors and nurses is surely helpful for medical matters handled through a clinician-patient relationship. However, in the context of emergencies (or other health behaviors that occur outside the doctor's office), doctor and nurse spokespersons exist outside this clinician-patient relationship and therefore may not benefit from this trust. For example, although studies from the early months of the COVID-19 pandemic identified Dr. Anthony Fauci as a particularly effective messenger for COVID-19 information (61), even outside the United States (62), his prominent role in the U.S. government-led response may have recast him as a more distal type of health worker, or even a representative of the government – which affected his status as an effective spokesperson among certain demographic groups (63). Family physicians and other clinicians may instead be more effective at communicating vaccine messages via their one-on-one relationships with patients (64–66), but to date, there have been few coordinated efforts to engage clinicians in this way. Another relationship that may help disseminate health messages is the pathway suggested here whereby women transmit information from "experts" to their social and familial networks. Previous analyses have posited similar associations between trust and communication as well as social capital (50–52), and our results lend support to engaging women more explicitly in the diffusion of health messages.

(3) The World Health Organization named vaccine hesitancy one of the "top 10 threats to global health" (67) and there is growing vaccine hesitancy and mounting misinformation in many areas of (68, 69). Hesitancy is only one reason underlying this phenomenon, but it is an important one to understand and address. Trust in the government was associated with hypothetical willingness to accept an anti-H1N1 medication offered under an Emergency Use Authorization in a 2009 survey of American adults (70); and broad "trust" has been identified as an important correlate of positive attitudes about COVID-19 vaccine in the United Kingdom (71) and Ireland (72). Understanding vaccine attitudes and the sources of hesitation – including trust and mistrust – will be essential both for boosting routine vaccination rates and scaling up COVID-19 vaccine. The relative priority of vaccine safety, for example, suggests that information and messages on this topic might need to be emphasized, rather than focusing on vaccine importance or effectiveness.

Conclusion

The interconnectedness of trust in institutions, and associations with vaccine attitudes, should be considered carefully in the context of policymaking and messaging particularly during a pandemic. This study demonstrates the interconnectedness of trust in institutions, trust in health information, and positive vaccine attitudes, and suggests several mechanisms for bolstering effective messages and messaging during the COVID-19 pandemic and beyond.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

1. Gilson L. Trust and the development of health care as a social institution. Soc Sci Med. 2003;56(7):1453–68. [PubMed: 12614697]
2. Ozawa S, Sripad P. How do you measure trust in the health system? A systematic review of the literature. Soc Sci Med. 2013;91:10–4. [PubMed: 23849233]
3. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era: Time for a revolution. Lancet Glob Health. 2018;6(11): e1196–e1252. [PubMed: 30196093]
4. Kruk ME, Myers M, Varpilah ST, Dahn BT. What is a resilient health system? Lessons from Ebola. Lancet. 2015;385(9980):1910–2. [PubMed: 25987159]
5. Hyde J Health system reform and social capital. Development. 1999;42(4):49–53.
6. LaVeist TA, Isaac LA, Williams KP. Mistrust of health care organizations is associated with underutilization of health services. Health Serv Res. 2009;44(6):2093–105. [PubMed: 19732170]
7. Hammond WP, Matthews D, Mohottige D, Agyemang A, Corbie-Smith G. Masculinity, medical mistrust, and preventive health services delays among community-dwelling African-American men. J Gen Intern Med. 2010;25(12):1300–8. [PubMed: 20714819]
8. Ackatia-Armah NM, Addy NA, Ghosh S, Dubé L. Fostering reflective trust between mothers and community health nurses to improve the effectiveness of health and nutrition efforts: An ethnographic study in Ghana, West Africa. Soc Sci Med. 2016;158:96–104. [PubMed: 27131046]
9. Woskie LR, Fallah MP. Overcoming distrust to deliver universal health coverage: lessons from Ebola. BMJ. 2019;366:l5482. [PubMed: 31548212]
10. Kittelsen SK, Keating VC. Rational trust in resilient health systems. Health Policy Plan. 2019;34(7):553–7. [PubMed: 31377793]
11. Blair RA, Morse BS, Tsai LL. Public health and public trust: Survey evidence from the Ebola Virus Disease epidemic in Liberia. Soc Sci Med. 2017;172:89–97. [PubMed: 27914936]
12. Vinck P, Pham PN, Bindu KK, Bedford J, Nilles EJ. Institutional trust and misinformation in the response to the 2018-19 Ebola outbreak in North Kivu, DR Congo: A population-based survey. Lancet Infect Dis. 2019;19(5):529–36. [PubMed: 30928435]
13. Gilles I, Bangerter A, Clémence A, Green EG, Krings F, Staerklé C, et al. Trust in medical organizations predicts pandemic (H1N1) 2009 vaccination behavior and perceived efficacy of protection measures in the Swiss public. Eur J epidemiol. 2011;26(3):203–10. [PubMed: 21476079]
14. Simas C, Penn-Kekana L, Kuper H, Lyra TM, Moreira MEL, de Albuquerque MdSV, et al. Hope and trust in times of Zika: the views of caregivers and healthcare workers at the forefront of the epidemic in Brazil. Health Policy Plan. 2020;35(8):953–961. [PubMed: 32681164]
15. Peprah D, Palmer JJ, Rubin GJ, Abubakar A, Costa A, Martin S, et al. Perceptions of oral cholera vaccine and reasons for full, partial and non-acceptance during a humanitarian crisis in South Sudan. Vaccine. 2016;34(33):3823–7. [PubMed: 27265459]

16. Siegel K, Raveis V. Perceptions of access to HIV-related information, care, and services among infected minority men. Qual Health Res. 1997;7(1):9–31.
17. Vervoort SC, Borleffs JC, Hoepelman AI, Grypdonck MH. Adherence in antiretroviral therapy: a review of qualitative studies. AIDS. 2007;21(3):271–81. [PubMed: 17255734]
18. Lim VW, Lim RL, Tan YR, Soh AS, Tan MX, Othman NB, et al. Government trust, perceptions of COVID-19 and behaviour change: cohort surveys, Singapore. Bull World Health Organ. 2021;99(2):92. [PubMed: 33551503]
19. Depoux A, Martin S, Karafillakis E, Preet R, Wilder-Smith A, Larson H. The pandemic of social media panic travels faster than the COVID-19 outbreak. Oxford University Press; 2020.
20. Pennycook G, McPhetres J, Zhang Y, Lu JG, Rand DG. Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. Psychol Sci. 2020;31(7):770–80. [PubMed: 32603243]
21. Jaiswal J, LoSchiavo C, Perlman D. Disinformation, Misinformation and Inequality-Driven Mistrust in the Time of COVID-19: Lessons Unlearned from AIDS Denialism. AIDS Behav. 2020;24(10): 2776–2780. [PubMed: 32440972]
22. Allington D, Duffy B, Wessely S, Dhavan N, Rubin J. Health-protective behaviour, social media usage and conspiracy belief during the COVID-19 public health emergency. Psychol Med. 2020:1–7.
23. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. Nat Hum Behav. 2021:1–12. [PubMed: 33473201]
24. Courtemanche C, Garuccio J, Le A, Pinkston J, Yelowitz A. Strong Social Distancing Measures In The United States Reduced The COVID-19 Growth Rate: Study evaluates the impact of social distancing measures on the growth rate of confirmed COVID-19 cases across the United States. Health Aff (Millwood). 2020;39(7):1237–1246. [PubMed: 32407171]
25. Le NK, Le AV, Brooks JP, Khetpal S, Liauw D, Izurieta R, et al. Impact of government-imposed social distancing measures on COVID-19 morbidity and mortality around the world. Bull World Health Organ. 2020.
26. Brauner JM, Mindermann S, Sharma M, Johnston D, Salvatier J, Gavenčiak T, et al. Inferring the effectiveness of government interventions against COVID-19. Science. 2021;371(6531).
27. Brewer NT, Chapman GB, Rothman AJ, Leask J, Kempe A. Increasing vaccination: putting psychological science into action. Psychol Sci Public Interest. 2017;18(3):149–207. [PubMed: 29611455]
28. Larson HJ, Cooper LZ, Eskola J, Katz SL, Ratzan S. Addressing the vaccine confidence gap. Lancet. 2011;378(9790):526–35. [PubMed: 21664679]
29. PytlikZillig LM, Kimbrough CD. Consensus on Conceptualizations and Definitions of Trust: Are We There Yet? In: Shockley E, Neal TMS, PytlikZillig LM, Bornstein BH, editors. Interdisciplinary Perspectives on Trust: Towards Theoretical and Methodological Integration. Cham: Springer International Publishing; 2016. p. 17–47.
30. Norris P The conceptual framework of political support. Handbook on political trust: Edward Elgar Publishing; 2017.
31. Mayer RC, Davis JH, Schoorman FD. An integrative model of organizational trust. Acad Manage Rev. 1995;20(3):709–34.
32. Wellcome Global Monitor. How does the world feel about science and health. Gallup; 2018.
33. To access the Appendix, click on the Appendix link in the box to the right of the article online.
34. Kaufmann D, Kraay A, Mastruzzi M. The Worldwide Governance Indicators: Methodology and Analytical Issues1. Hague J Rule Law. 2011;3(2):220–46.
35. Transparency International. Corruption Perceptions Index 2019. 2019.
36. World Health Organization. WHO vaccine-preventable diseases: Monitoring system, 2020 global summary. 2020 [cited 2020 15 September]; Available from: https://apps.who.int/immunization_monitoring/globalsummary.
37. World Health Organization. Global Health Observatory. 2020.

38. Darby C, Valentine N, De Silva A, Murray CJ, World Health Organization. World Health Organization (WHO): strategy on measuring responsiveness. 2003.
39. Robone S, Rice N, Smith PC. Health systems' responsiveness and its characteristics: A cross-country comparative analysis. Health Serv Res. 2011;46(6pt2):2079–100. [PubMed: 21762144]
40. Barber RM, Fullman N, Sorensen RJ, Bollyky T, McKee M, Nolte E, et al. Healthcare Access and Quality Index based on mortality from causes amenable to personal health care in 195 countries and territories, 1990-2015: a novel analysis from the Global Burden of Disease Study 2015. Lancet. 2017;390(10091):231–66. [PubMed: 28528753]
41. World Bank. Country and Lending Groups. 2020; Available from: http://data.worldbank.org/about/country-and-lending-groups.
42. Roder-DeWan S, Gage A, Hirschhorn LR, Twum-Danso NA, Liljestrand J, Asante-Shongwe K, et al. Level of confidence in and endorsement of the health system among internet users in 12 low-income and middle-income countries. BMJ Glob Health. 2020;5(8):e002205.
43. Macinko J, Guanais FC, Mullachery P, Jimenez G. Gaps in primary care and health system performance in six Latin American and Caribbean countries. Health Aff (Millwood). 2016;35(8):1513–21. [PubMed: 27503978]
44. Mechanic D, Meyer S. Concepts of trust among patients with serious illness. Soc Sci Med. 2000;51(5):657–68. [PubMed: 10975226]
45. Zhao D, Zhao H, Cleary PD. International variations in trust in health care systems. Intl J Health Plann Manage. 2019;34(1):130–9.
46. Rossen I, Hurlstone MJ, Dunlop PD, Lawrence C. Accepters, fence sitters, or rejecters: Moral profiles of vaccination attitudes. Soc Sci Med. 2019;224:23–7. [PubMed: 30735925]
47. Hornsey MJ, Harris EA, Fielding KS. The psychological roots of anti-vaccination attitudes: A 24-nation investigation. Health Psychol. 2018;37(4):307. [PubMed: 29389158]
48. Valentine N, Verdes-Tennant E, Bonsel G. Health systems' responsiveness and reporting behaviour: Multilevel analysis of the influence of individual-level factors in 64 countries. Soc Sci Med. 2015;138:152–60. [PubMed: 26093073]
49. Batbaatar E, Dorjdagva J, Luvsannyam A, Savino MM, Amenta P. Determinants of patient satisfaction: a systematic review. Perspect Public Health. 2017;137(2):89–101. [PubMed: 27004489]
50. Mohseni M, Lindstrom M. Social capital, trust in the health-care system and self-rated health: the role of access to health care in a population-based study. Soc Sci Med. 2007;64(7):1373–83. [PubMed: 17202025]
51. Thiede M. Information and access to health care: is there a role for trust? Soc Sci Med. 2005;61(7):1452–62. [PubMed: 16005780]
52. Christakis NA. Social networks and collateral health effects. BMJ. 2004;329(7459):184–5. [PubMed: 15271805]
53. Sajedinejad S, Majdzadeh R, Vedadhir A, Tabatabaei MG, Mohammad K. Maternal mortality: a cross-sectional study in global health. Global Health. 2015;11(1):1–13. [PubMed: 25889826]
54. Kennedy A, LaVail K, Nowak G, Basket M, Landry S. Confidence about vaccines in the United States: understanding parents' perceptions. Health Aff (Millwood). 2011;30(6):1151–9. [PubMed: 21653969]
55. Larson HJ, Jarrett C, Eckersberger E, Smith DM, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature, 2007–2012. Vaccine. 2014;32(19):2150–9. [PubMed: 24598724]
56. Mills E, Jadad AR, Ross C, Wilson K. Systematic review of qualitative studies exploring parental beliefs and attitudes toward childhood vaccination identifies common barriers to vaccination. J Clin Epidemiol. 2005;58(11):1081–8. [PubMed: 16223649]
57. Brennen JS, Simon F, Howard PN, Nielsen RK. Types, sources, and claims of Covid-19 misinformation. Reuters Institute. 2020;7.
58. Kagawa RC, Anglemyer A, Montagu D. The scale of faith based organization participation in health service delivery in developing countries: systemic review and meta-analysis. PLoS One. 2012;7(11):e48457. [PubMed: 23152775]

59. Haakenstad A, Johnson E, Graves C, Olivier J, Duff J, Dieleman JL. Estimating the development assistance for health provided to faith-based organizations, 1990–2013. PLoS One. 2015;10(6):e0128389. [PubMed: 26042731]
60. Morgan R, Ensor T, Waters H. Performance of private sector health care: implications for universal health coverage. Lancet. 2016;388(10044):606–12. [PubMed: 27358251]
61. Bokemper SE, Huber GA, Gerber AS, James EK, Omer SB. Timing of COVID-19 vaccine approval and endorsement by public figures. Vaccine. 2021;39(5):825–9. [PubMed: 33390295]
62. Abu-Akel A, Spitz A, West R. The effect of spokesperson attribution on public health message sharing during the COVID-19 pandemic. PLoS One. 2021;16(2):e0245100. [PubMed: 33534800]
63. Latkin CA, Dayton L, Miller JR, Yi G, Jaleel A, Nwosu CC, et al. Behavioral and Attitudinal Correlates of Trusted Sources of COVID-19 Vaccine Information in the US. Behav Sci (Basel). 2021;11(4):56. [PubMed: 33924118]
64. Oh NL, Biddell CB, Rhodes BE, Brewer NT. Provider communication and HPV vaccine uptake: A meta-analysis and systematic review. Prev Med. 2021;148:106554. [PubMed: 33857561]
65. Lu P-j, Srivastav A, Amaya A, Dever JA, Roycroft J, Kurtz MS, et al. Association of provider recommendation and offer and influenza vaccination among adults aged≥ 18 years–United States. Vaccine. 2018;36(6):890–8. [PubMed: 29329685]
66. Bricout H, Torcel-Pagnon L, Lecomte C, Almas MF, Matthews I, Lu X, et al. Determinants of shingles vaccine acceptance in the United Kingdom. PLoS One. 2019;14(8):e0220230. [PubMed: 31369608]
67. World Health Organization. Ten health issues WHO will tackle this year. 2019.
68. Kata A A postmodern Pandora's box: anti-vaccination misinformation on the Internet. Vaccine. 2010;28(7):1709–16. [PubMed: 20045099]
69. de Figueiredo A, Simas C, Karafillakis E, Paterson P, Larson HJ. Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: a large-scale retrospective temporal modelling study. Lancet. 2020;396(10255):898–908. [PubMed: 32919524]
70. Quinn SC, Kumar S, Freimuth VS, Kidwell K, Musa D. Public willingness to take a vaccine or drug under Emergency Use Authorization during the 2009 H1N1 pandemic. Biosecur Bioterror. 2009;7(3):275–90. [PubMed: 19775200]
71. Freeman D, Loe BS, Chadwick A, Vaccari C, Waite F, Rosebrock L, et al. COVID-19 vaccine hesitancy in the UK: the Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II. Psychol Med. 2020:1–15.
72. Murphy J, Vallières F, Bentall RP, Shevlin M, McBride O, Hartman TK, et al. Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom. Nat Commun. 2021;12(1):1–15. [PubMed: 33397941]

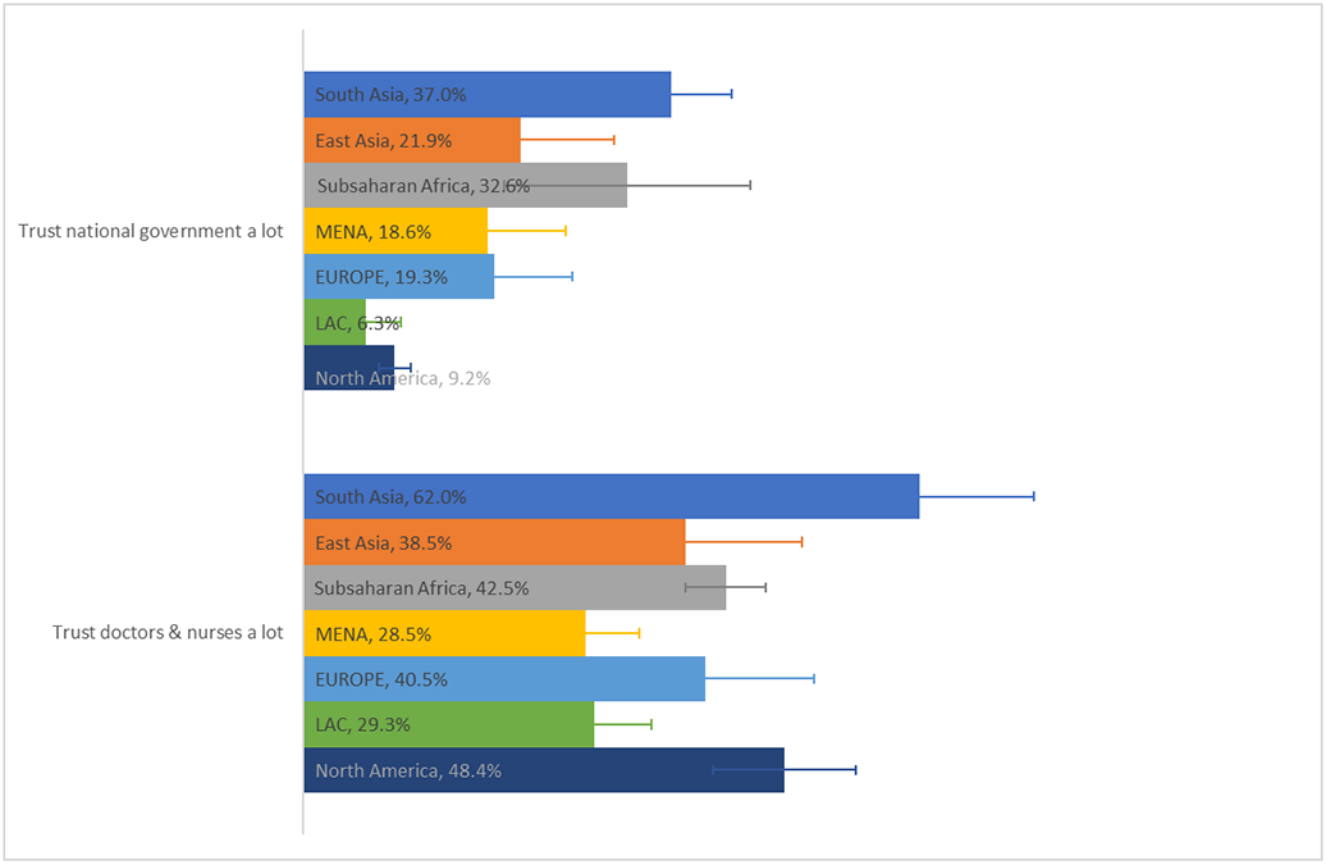

Exhibit 2:

Trust in national government and health care workers, by region

Chart displays predicted regional averages from fully adjusted models. Includes individual-level covariates (gender, age, age-squared, education category, rural/urban residence, household income quintile, living comfortably on current income) and country-level covariates (income classification, above- or below-median governance score based on factor analysis incorporating Government Effectiveness Index (World Bank), Rule of Law Index (World Justice Project, and Corruption Perceptions Index (Transparency International), and above- or below-median health system score based on factor analysis incorporating Healthcare Access and Quality Index (Institute for Health Metrics and Evaluation), health system responsiveness and measles vaccine coverage (World Health Organization)) with individual-level survey weights. Bars represent 95% confidence interval on each regional estimated value.

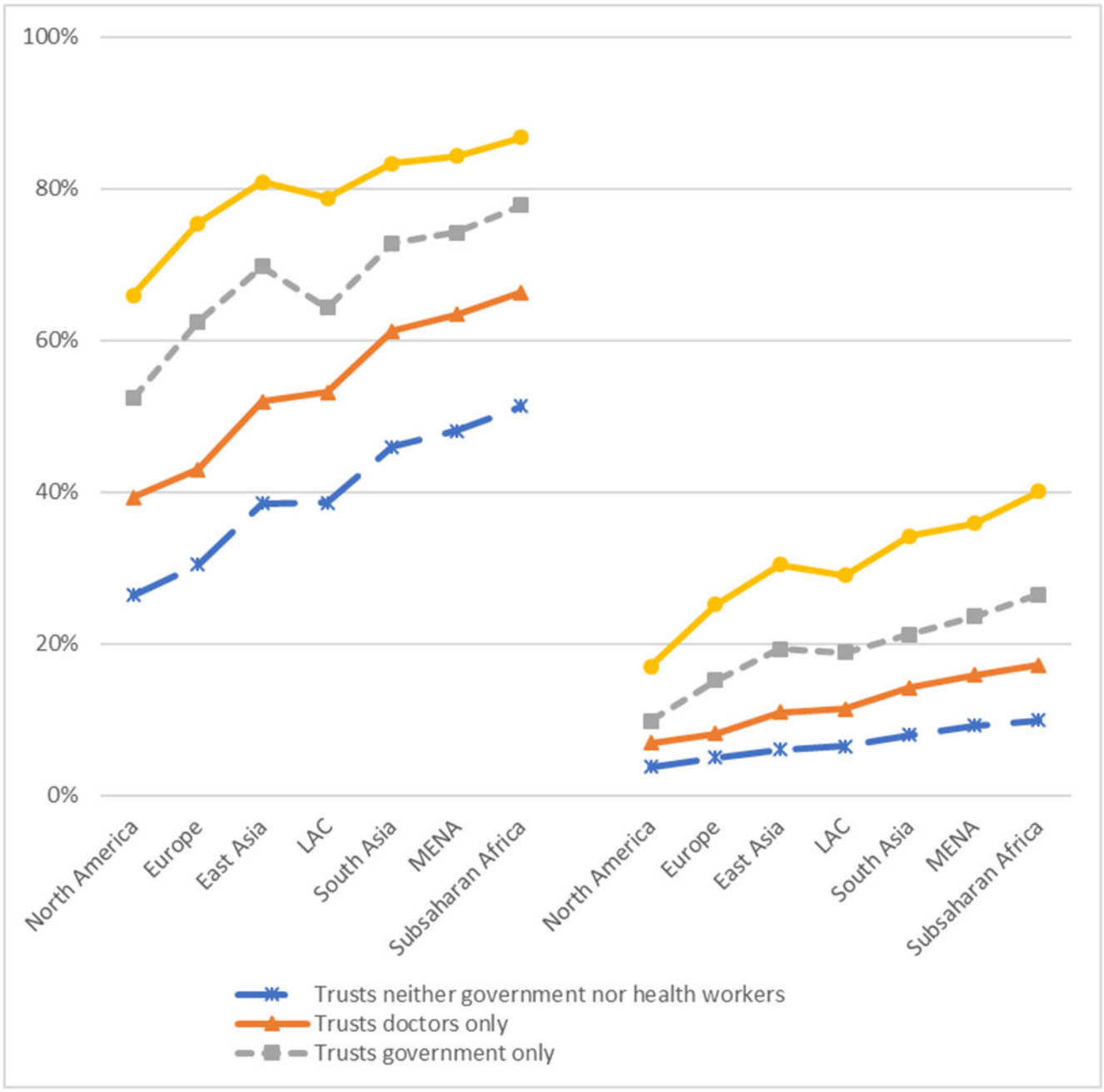

Exhibit 4:

Relationships between institutional trust and trusted sources of health advice

Results are predicted margins from logistic regression models with individual-level survey weights that include: age, age-squared, education category, rural/urban residence, household income quintile, regional fixed effects, country-level covariates (income classification, above- or below-median governance score, and above- or below-median health system score).

** p<0.05, ***p<0.01, ****p<0.001

Exhibit 1:

Trust in government and health workers (doctors and nurses)

	Trust government a lot (vs, some, not much, or not at all) (n=114,001)		Trust doctors and nurses a lot (vs, some, not much, or not at all) (n=110,002)	
	Unadjusted percent who trust government	Adjusted odds ratios of trust in government†	Unadjusted percent who trust doctors & nurses	Adjusted odds ratios of trust in doctors & nurses†
Overall	**24.5%**	**n/a**	**42.7%**	**n/a**
By gender:				
Among men	24.9%	(ref)	42.9%	(ref)
Among women	24.1%	0.94	42.5%	1.02
By age:				
Average age of those who trust a lot	38.6	0.98†	40.7	1.00†
Average age who do not trust a lot	40.3		40.4	
By educational attainment:				
Among those with primary schooling	32.4%	(ref)	43.2%	(ref)
Among those with secondary schooling	20.4%	0.75****	42.7%	0.94
Among those with tertiary schooling	16.5%	0.82	41.0%	1.02
By area of residence:				
Among those living in urban settings	17.1%	(ref)	37.7%	(ref)
Among those living in rural settings	28.6%	1.20**	45.4%	1.07
By economic status:				
Getting by, or finding it difficult to get by on income	24.8%	(ref)	40.7%	(ref)
Living comfortably on income	23.7%	1.39**	51.9%	1.26**
By trust in government:				
Those who do not trust govt	n/a	n/a	39.9%	(ref)
Those who trust govt	n/a	n/a	74.2%	4.49****
Country-level characteristics				
Governance, above-median score (vs. below-median)	n/a	1.27	n/a	n/a
Health systems, above-median score (vs. below-median)	n/a	n/a	n/a	1.17

Results from logistic regression models (except age, which used a linear regression model) with individual-level survey weights that also include: household income quintile, age-squared, regional fixed effects, and country income classification (low-, lower-middle, upper-middle, high-income country). Above- or below-median governance score based on factor analysis incorporating Government Effectiveness Index (World Bank), Rule of Law Index (World Justice Project, and Corruption Perceptions Index (Transparency International). Above- or below-median health systems score based on factor analysis incorporating Healthcare Access and Quality Index (Institute for Health Metrics and Evaluation), health system responsiveness and measles vaccine coverage as estimated by the World Health Organization.

n/a: not applicable

† Note: age was measured as a continuous variable so OLS coefficient is reported here

** p<0.05

*** p<0.01

**** p<0.001

Exhibit 3:

Trusted sources of health advice, and attitudes toward vaccines

	Trust health advice from the government a lot (vs, some, not much, or not at all) (n=104,723)	Trust health advice from doctors and nurses a lot (vs, some, not much, or not at all) (n=107,109)	Feel vaccines are safe, important and effective (n=103,319)
Overall, unadjusted percent	**31.2%**	**39.1%**	**46.0%**
Adjusted odds ratios:			
Among women (ref: men)	1.11***	1.14***	1.07
Among those with secondary schooling (ref: primary schooling)	0.94	0.97	1.03
Among those with tertiary schooling (ref: primary schooling)	1.12	1.07	1.06
Among those living in rural areas (ref: urban)	1.07	1.03	1.05
Among those living comfortably on income (ref: getting by, or finding it difficult to get by on income)	1.21**	1.15**	0.99
Among those who trust the government (ref: those who do not trust the government)	3.43****	2.12****	1.39****
Among those who trust doctors & nurses (ref: those who do not trust doctors & nurses)	3.70****	5.51***	1.40****
Among those who trust health and medical advice from the government (ref: those who do not trust)	n/a	n/a	1.59****
Among those who trust health and medical advice from doctors & nurses (ref: those who do not trust)	n/a	n/a	1.81****

Results from logistic regression models with individual-level survey weights that include additional individual-level covariates (household income quintile, age-squared), regional fixed effects, and country-level covariates (income classification (low-, lower-middle, upper-middle, high-income country), above- or below-median governance quality score (based on factor analysis incorporating Government Effectiveness Index (World Bank), Rule of Law Index (World Justice Project, and Corruption Perceptions Index (Transparency International)), above- or below- health system score (based on factor analysis incorporating Healthcare Access and Quality Index (Institute for Health Metrics and Evaluation), health system responsiveness and measles vaccine coverage (World Health Organization))).

n/a: not applicable

** p<0.05

*** p<0.01

**** p<0.001