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Article

The disproportionate toll of the COVID-19 pandemic on social trust in low- and middle-income countries

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Code that support the findings of this study is available at: https://github.com/TheYongjinChoi/jps-social-trust

Availability of data and material
The primary dataset used in this study can be accessed from the Wellcome Global Monitor:
- Wellcome Global Monitor – COVID-19 (2020): https://wellcome.org/reports/

Abstract

Horizontal trust, which emerges from interdependence and shared values and norms among people of comparable social status, has been considered a crucial driver of individual health-protective behaviors and community resilience during health emergencies. However, recent data suggest the global decline in community resilience and its disproportionate impact on low- and middle-income countries (LMICs). To assess this empirically, we examined the difference in the degree of social trust, which was measured as trust in neighbors, in 94 countries between 2018 and 2020. The study dataset combined a global survey from the Wellcome Global Monitor and other country-level measures from Google Mobility Reports, the Johns Hopkins University's COVID-19 Tracker, the United Nations, and the World Bank. Using a multilevel regression with post-stratification weights, we estimated that the global average decline in trust in neighbors until the early stage of the pandemic was 6 percentage points. This impact was disproportionately harsher for LMICs, causing the most salient drop of 17 percentage points among low-income countries, however, it was comparable among high- and middle-upper income countries. This finding implies a hightened degree of global disparities in social capital between LMICs and wealthier countries since the pandemic and calls for international collaboration and support to help LMICs address these additional social and economic burdens.

Keywords: social trust, vaccine confidence, COVID-19, multilevel analysis

Introduction

Perceptions towards others shape the collective consciousness of communities and society, influencing various social and health behaviors. Positive perceptions such as trust in neighbors, appreciating diversity, and assuming good intentions, help foster the virtuous cycle of affirmative interactions and interdependence among members, thereby incentivizing people to maintain moral and responsible choices to align with the community's norms and values (Festinger, 1954; Festinger et al., 1950; Putnam, 2000). In contrast, having a negative perception can diminish interpersonal and

wellcome-global-monitor-covid-19/2020 - Wellcome Global Monitor (2018): https://wellcome.org/reports/wellcome-global-monitor/2018

communal connections, empathy and compassion, and, consequently, may lead to a neglect of social responsibility (Blascovich et al., 2001; Sibicky & Dovidio, 1986).

Social trust, which refers to the expectations or confidence that one has towards other people or society as a whole, is regarded as the bedrock of community resilience and health behaviors and has recently gained attention as a factor shaping society's collective response to health emergencies. It fosters a collective consciousness that leads to a sense of belonging and solidarity among community members (Evans & Evans, 1977; Ji et al., 2020; Schoenfeld & Meštrović, 1989), which is crucial for disaster preparedness, community resilience, and fast disaster recovery (Cagney et al., 2016; Kim & Kawachi, 2017; Lalot et al., 2021; Tackenberg & Lukas, 2019). In societies with a high sense of social solidarity, people are more inclined to cooperate for common goals and engage in collective action, thereby reducing social isolation (Durkheim, 1897; Hart, 1967; Latinen & Pessi, 2014; Putnam, 2000; Ratcliffe & Newman, 2011). This promotes the effective dissemination of information and ensures that community care extends to vulnerable populations in areas where governmental support may be limited or absent (White et al., 2014; Williams et al., 2020).

During the COVID-19 pandemic, social trust emerged as a crucial component for mobilizing mass public participation in public health measures employed to fight the national emergency in many countries. Studies found that people who trust their neighbors were more likely to accept and receive COVID-19 vaccines (Cárdenas et al., 2023; Qin et al., 2022). Furthermore, it can promote people's multicultural understanding, empathy, and shared responsibility for the well-being of the global community, contributing to support for coordinated international efforts to address global challenges (Lalot et al., 2021).

However, the outbreak of COVID-19 deepened existing social divisions and created new fractures within the society, potentially undermining the foundation of population-based interventions against the pandemic that rely on public participation. Recent evidence suggests a notable decline in the proportion of people who interact with or trust their neighbors in several countries during the pandemic (e.g., Borkowska & Laurence, 2021). Furthermore, other studies indicate that communities in low- and middle-income countries (LMICs), possibly with weaker social safety nets, fragile economic structures, and limited capacity to collect data and evidence to design effective disease control policies, have had a harder hit by the pandemic (Alon et al., 2020; Khetan et al., 2022; Miguel & Mobarak, 2022). Consequently, these countries are more likely to experience severe disruptions in social capitals due to the health risks. However, this hypothesis has rarely been empirically tested on a global scale.

Recognizing this gap in the literature, this study examines one of the key aspects of horizontal social trust, trust in neighbors, by conducting multilevel linear regression using global survey data from 94 countries, obtained from the Wellcome Global Monitor (WGM) survey. We tracked the global rate of trust in neighbors between 2018 and 2020 to estimate the disproportionate impact of the pandemic on horizontal trust. In the result section, we report two major findings: a 6 percentage points decrease in the global average of trust in neighbors since the onset of the COVID-19 pandemic and a a more severe decline in LMICs.

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Literature Review

Social trust and vaccination

Social trust that emerges members' interdependence and shared values and norms is a foundation of collective responses to societal challenges and community resilience (Fukuyama, 1996; Negură et al., 2021; Putnam, 2000). When members of society engage in close interactions with each other, they are integrated into a collective consciousness, that engenders a sense of belonging and shared trust, solidarity, and common values (Evans & Evans, 1977; Schoenfeld & Meštrović, 1989). This collective consciousness leads to develop a cohesive culture and social norms that temper individual desires and aspirations for societal values or goals, thereby fostering a sense of unity and cooperation (Festinger, 1954; Hart, 1967; Hawkins, 1979; Ji et al., 2020; Smith & Sorrell, 2014). As collective consciousness intensifies individualistic tendencies can wane, making way for heightened emphasis on actions and thoughts aimed at community well-being (Latinen & Pessi, 2014; Smith & Sorrell, 2014; Wang et al., 2021a). These cultural ties incite "moral support" and momentum for collaboration, metamorphosing into a motivational force that facilitates the compliance with the recommendation from the authority and the voluntary care for disadvantaged others under emergencies (Amdaoud et al., 2021; Bonfanti et al., 2023). Therefore, the benefits of social trust lies in the formation of interdependent relationships and expectations through which members share common values and contribute to shared objectives (Hart, 1967; Hawkins, 1979; Putnam, 2000). Moreover, in communities where social solidarity and cohesion are robust, people actively engage in supportive activities for their vulnerable neighbors, such as the elderly, low-income individuals, and the disabled (White et al., 2014; Williams et al., 2020).

While the current literature recognizes various dimensions of social trust (Freitag & Bauer, 2013; Fukuyama, 1996; Stefaniak et al., 2022; Uslaner, 2008; Welch et al., 2005), it is worth noting the differing roles of vertical and horizontal trust in the context of health emergencies (Negură et al., 2021; Sztompka, 2006). Vertical trust pertains to the relationship between individuals and authorities possessing power. This includes the type of trust people place in formal institutions, such as the government, police, judiciary, and other public bodies or large corporations with regard to their past performance, behaviors and characteristics, such as representation and shared identity (Campbell, 2023; Cook & Gronke, 2005; Houston & Harding, 2013). Vertical trust helps maintain societal stability by fostering the public's confidence in the decisions or policies of authorities and by ensuring compliance with the rules and recommendations set forth by these authorities (Cooper et al., 2008; Hammar & Jagers, 2006; Kim, 2010). Trust in government and health authorities—a form of vertical trust—has received particular attention in vaccination research, where it is considered a key factor of vaccine uptake. As people seek reliable guidance on prevention during disease outbreaks, governments and health authorities, the primary gateways to up-to-date information can play a crucial role in helping people correctly assess the risk of diseases and believe in the safety and effectiveness of vaccines (Prickett & Chapple, 2021; Siegrist & Cvetkovich, 2000; Siegrist et al., 2002). Vertical trust also pertains to the health system: people are more likely to have confidence in vaccines when they have confidence in the vaccine development process and health care providers who deliver the vaccines (Dopelt et al., 2023; Mesch & Schwirian, 2015). Consequently, during the

COVID-19 pandemic, the importance of vertical trust in government and public health institutions has been emerged as the most salient driver of health-protective behaviors and compliance with public health recommendations, including vaccination as well as mask-wearing and other health protective behaviours, across various contexts (Choi & Fox, 2022; Miyachi et al., 2020; Prickett & Chapple, 2021; Yu et al., 2023).

Horizontal trust refers to mutual trust among people of comparable social status, including trust in neighbors, colleagues, family, and friends. Studies suggest various benefits of promoting horizontal trust among people in modern communities. Like vertical social trust, horizontal trust can also shape vaccine confidence and vaccination behaviors. Health-protective behaviors, including vaccination as well as mask-wearing and social distancing, are socially embedded behaviors, especially when considering that people often formulate their decisions by observing the actions or opinions of those around them (Short & Mollborn, 2015). The social comparison theory explains that people derive their subjective judgements about whether their opinions and actions are appropriate through interpersonal interactions (Festinger, 1954; Festinger et al., 1950). People often shape their decisions regarding health related behaviors by observing the behaviors and choices of those around them (Bikhchandani et al., 1998; Higgs, 2015). In other words, people may turn to their immediate social networks or close communities as a reference point for normative behavior during health emergencies. Similarly, studies generally find that vaccine uptake increases when the vaccination rate of surrounding people is higher (Romley et al., 2016; Tassier et al., 2015). These assessments are often benchmarked against the views and actions of others whom they hold in high regard, for example, social media influencers, and thereby, a strong preference for or trust in a particular group can exert pressure toward uniformity, prompting people to conform to the group's norms (Bonnevie et al., 2020).

Such peer effects also explain other preventive behaviors and community resilience, making the importance of maintaining horizontal trust for societal responses to health emergencies (Godlonton & Thornton, 2012; Miguel & Kremer, 2004). Several studies demonstrated that the public's decisions regarding mask-wearing during the COVID-19 pandemic and vaccinations in various contexts were significantly influenced by family and friends as well as guidance from local health professionals or opinion leaders (Lipsey & Losee, 2023; Rogers et al., 2021; Sato & Takasaki, 2019). A few studies also found that people with a higher degree of horizontal trust tended to be more acceptable of health recommendations (Haslam et al., 2005; Rönnerstrand & Andersson Sundell, 2015). Especially during crises, such as pandemics and natural disasters, horizontal trust enhances community resilience against external shocks. It helps encourage voluntary collaboration and mutual aid among its members and, in particular, for vulnerable populations (Putnam, 2000; Stefaniak et al., 2022; White et al., 2014; Williams et al., 2020). Horizontal trust also promotes compliance with social norms when confronting challenges and by providing a sociocultural buffer that facilitates adaptive recovery processes (Horwitz & Lascar, 2021; Jovita et al., 2019; Kokubun & Yamakawa, 2021; Mishra & Rath, 2020; Negură et al., 2021).

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Disproportionate impact of the COVID-19 pandemic on horizontal trust in low- and middle-income countries

While national emergencies often have a devastating shock to communities, they can either strengthen or weaken horizontal trust among people (Aldrich & Meyer, 2015; Hawkins & Maurer, 2010; King Li et al., 2022). Studies exploring the positive impact of these crises on horizontal trust find that people can develop greater interdependence and experience shifts in social structures during and after such events. For example, the reconstruction process after emergencies could increase solidarity among survivors and positive interactions, such as support from neighbors, family, other communal forms of aid (Alesina & La Ferrara, 2002; Cassar et al., 2017).

Conversely, data indicate that the world has experienced widespread mistrust in institutions and heightened social conflicts and divisions since the onset of the COVID-19 pandemic (Flew, 2021). The virus spread through direct and indirect contact, leading people to avoid interacting with others. Moreover, social distancing measures, intended to reduce face-to-face interactions for the sake of public safety, unintentionally fostered feelings of emotional disconnection and isolation among people (e.g., Bland et al., 2022; Saltzman et al., 2021). In certain areas, these mobility restrictions reshaped power dynamics and incited conflicts among people and groups. For example, the economic challenges and disruptions of existing systems as a consequence of mobility restrictions during the pandemic questioned the legitimacy of governments and authorities, leading to public resistance, protests (Kriesi & Oana, 2023; Ozduzen et al., 2023), and armed conflicts in some regions (Levavi et al., 2022; Mehrl & Thurner, 2021). Additionally, COVID-19 became a source of social stigma and discrimination. In areas with pre-existing intergroup tensions, hate crimes and xenophobia against certain groups increased, such as the rise in anti-Asian hate crimes in the United States (Rzymski et al., 2021; Selvarajah et al., 2022).

A more pressing concern is the disproportionate impact of the pandemic on communities in LMICs (Khetan et al., 2022; Miguel & Mobarak, 2022). Compared to those in high-income countries, many communities in LMICs are more economically vulnerable and exposed to weaker health systems and social safety nets (Kruk et al., 2018). Studies find that governments in LMICs were less likely to make effective policy responses against COVID-19 (Gonzalez Block & Mills, 2003; Shroff et al., 2017). Therefore, the pandemic's impact and the burden of government responses was heavier for communities in LMICs (Alon et al., 2020; Miguel & Mobarak, 2022). Furthermore, some LMICs were already facing underlying social conflicts and divisions, whether they were based on religion, ethnicity, or politics, especially where countries were already in conflict (Levavi et al., 2022; Mehrl & Thurner, 2021). Pandemic-induced societal challenges could amplify these pre-existing tensions, further diminishing positive attitudes toward others and eroding interdependence between people. In essence, LMICs could grapple with the multiple challenges of health issues that arise from the pandemic and weakening social trust while also confronting a prolonged recovery phase.

Despite the potential for harsher consequences of the pandemic in LMICs and a widening disparity horizontal trust between high-income countries and LMICs in the post-pandemic era, research on this topic has been very rare. A few studies reported mixed findings in the context of the pandemic. For example, using survey data collected during a COVID-19 lockdown in Germany

in late 2020, Burrmann et al. (2022) reported a decline in people's trust in others compared to levels in 2017 and 2018. Similarly, Borkowska & Laurence (2021) found a decrease in Neighborhood cohesion, measured with five items including trust in neighbors in the United Kingdom. The decline was particularly pronounced among economic and ethnic minorities. Bierman & Schieman (2020) also reported an increase in psychological distress among Canadian workers, attributed to heightened feelings of isolation and reduced trust in neighbors. On the contrary, Kye & Hwang (2020) observed increases in trust in society and interpersonal relationships in the Republic of Korea while reporting a decrease in trust in the judiciary, the press, and religious organizations. Wu et al. (2022) point out that the impact can vary by people's socio-economic status, with those of higher socio-economic status experiencing positive effects, while those of lower socio-economic status having negative impacts.

These earlier studies provide insights into how the COVID-19 pandemic reshaped horizontal trust in specific countries. However, none of these studies offers a global overview, thereby failing to capture the widening gap between high-income countries and LMICs. Without understanding this aspect, we may lack a comprehensive understanding of the impact of the pandemic on horizontal trust and societal and community resilience more broadly, leading to incomplete interventions and inadequate post-pandemic support for vulnerable populations and marginalized countries.

Therefore, this study examines two hypotheses. First, we estimate the global decline in horizontal trust and examine the disproportionate impact of the COVID-19 pandemic on horizontal trust globally, using global survey data. We hypothesize that the pandemic's disproportionate impact on these countries may have accelerated this erosion of horizontal trust, leading to more severe effects in LMICs compared to their higher-income counterparts. Additionally, we examine the association between horizontal trust and COVID-19 vaccine acceptance to highlight that horizontal trust was a meaningful driver of individual vaccination decisions during the pandemic. We use trust in neighbors as a proxy measure of horizontal trust in community. Trust in people with comparable social status, such as colleagues, friends, and neighbors, is a key indicator of positive interactions with others in society and has been often used to measure horizontal trust in earlier studies across various fields (Burrmann et al., 2022; Candelo et al., 2023; Lelieveldt, 2004; Muurinen et al., 2014; Zizumbo-Colunga, 2019). At the societal level, trust in neighbors can specifically capture cooperative behavior and compliance with social norms (Lelieveldt, 2004; Zizumbo-Colunga, 2019). For example, according to a study conducted in Mexico, communities with higher levels of trust in neighbors tended to have greater engagement in anti-crime initiatives (Zizumbo-Colunga, 2019).

Data and Method

This study assessed the impact of the COVID-19 pandemic on horizontal trust and the association between horizontal trust and COVID-19 vaccine acceptance by analyzing global survey data with two specifications of multilevel linear regression. Our analysis aimed to utilize the hierarchical structure of the study data that account for both individual and country level variations.

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Data

The study data comes from four sources: the WGM survey and country-level data from the Google Mobility Trends, the United Nations, and the World Bank. The primary data source was the 2018 and 2020 rounds of the WGM survey. The WGM survey investigated public views on trust, science, and the COVID-19 pandemic from people aged 15 and above across 147 countries from April to December 2018 and from October 2020 to February 2021 amid the COVID-19 pandemic (268,102 responses). Country-level data were combined with the WGM survey: Google mobility reports, logged population from the United Nations, and gross domestic product (GDP) per capita from the World Bank. These country-level data were obtained through the Our World in Data (https://ourworldindata.org).

As the 2018 survey did not include the COVID-19 vaccine acceptance variable, we created two datasets and conducted the imputation procedure separately: one for the trends analysis that included both rounds without vaccine acceptance (94 countries) and another for the vaccine acceptance analysis using the 2020 round excluding countries without the vaccine acceptance variable (86 countries). To create the dataset for the trends analysis, we dropped 53 countries (75,383 responses): 37 countries with a single round of data collection, 15 countries for which Google mobility reports were not provided, and one country without the income variable (see Appendix 1 for further details). For the vaccine acceptance analysis, we further excluded 8 countries without the vaccine acceptance variable. Most exclusions were due to the fact that these countries only had a single survey round, and many of them were from lower-income countries (see Appendix 2 for further details). Additionally, the WGM survey did not cover countries in regions where survey access is limited, such as the Pacific Islands.

We conducted multiple imputation to account for missing values by following the recommendation that the benefits of multiple imputation outweigh the risk of data distortion from the imputation when the proportion of missing values is over 5% (Jakobsen et al., 2017; Lee & Shi, 2021). A detailed breakdown of missing values by variable and country can be found in Appendix 2. The imputation for the trends data was conducted for 23,801 responses that contained missing values in the variables of interest: trust in neighbors, trust in government, age, gender, education, household income, logged population, logged GDP per capita, and country income categories. These accounted for 12% of the sample from 94 countries and were not missing completely at random (Little's MCAR test: X^2 (df=136)=3,759.42, p<0.001) (Jakobsen et al., 2017; Lee & Shi, 2021). We statistically imputed these missing values by including 11 variables: trust in neighbors, trust in government, age, gender, education, household income, logged population, logged GDP per capita, country income categories, and country and year dummies. The imputation for the vaccine acceptance data accounted for 10,293 responses in the 2020 survey. These accounted for 12% of the sample from 86 countries. We imputed these missing values statistically by including vaccine acceptance, pandemic-related employment changes, and the country-level mobility variable—along with the other variables used in imputing the trends data, except for the year. The number of iterations was set as 30. These procedures were conducted by using the mice package Version 3.16.0 in R.

While the sampling of the original data stratified gender, age, education, and other demographic

characteristics of each country, it is widely known that data collection during the COVID-19 pandemic suffered the sampling bias due to a higher degree of non-responses (Haddad et al., 2022; Rothbaum & Bee, 2021; Schaurer & Weiß, 2020). Therefore, we applied post-stratification weights provided by the WGM survey.

Variables

The analysis examined two binary outcomes: trust in neighbors, which represents the horizontal dimension of social trust (Negură et al., 2021; Sztompka, 2006), and COVID-19 vaccine acceptance. Trust in neighbors was coded as 1 if respondents answered "a lot" or "some" and 0 if otherwise (i.e., "not much" or "not at all") to the questions asking if they "trust people in neighborhood." Vaccine acceptance was coded as 1 if respondents answered yes to the following question: "*agree to be vaccinated if Coronavirus vaccine was available at no cost*."

The key independent variables in the trends analysis were the year dummy variable that distinguishing between the 2020 and 2018 survey waves and its interaction with the World Bank's 2020 country income classification, which was included in the 2020 WGM survey. This classifies countries into four income groups based on gross national income (GNI) per capita: low income (lower than $1,036), lower-middle income ($1,036–$4,045), upper-middle income ($4,046–$12,535), and high income (higher than $12.535). On the other hand, the vaccine acceptance analysis used trust in neighbors as the independent variable and COVID-19 vaccine acceptance as the outcome.

Individual-level control variables included trust in government, the impact of the COVID-19 pandemic on work status, gender (1 if women), age (24 or less, 25–34, 35–44, 45–54, 55–64, 65 or older), educational attainment (elementary or less, secondary, tertiary or higher), and income, which was divided into quintiles. We controlled for trust in government by considering the vertical dimension of social trust (Negură et al., 2021; Sztompka, 2006) and earlier studies that consider trust in government as one of the most salient drivers of vaccine acceptance (Choi & Fox, 2022; Prickett & Chapple, 2021). This was measured by using a 4-Likert scale question (a lot, some, not much, and none at all) and dichotomized into 1 if respondents chose a lot or some and 0 otherwise. The work impact variable was created by first recoding three work-related variables—temporary work cessation, job loss, and reduced work hours—so that a response indicating a negative work outcome was assigned 1, while responses of "no" and "not applicable" were coded as 0. A composite work impact variable was coded as 1 if any of the three variables were equal to 1, indicating any adverse work outcome, and 0 otherwise.

Country-level control variables included the mobility index, the cumulative number of COVID-19 related deaths at the end of the survey period, logged population (2020), and logged GDP per capita (2020). We constructed the mobility index as the average change in visitor numbers across four types of places, relative to the baseline period (January 3rd–February 6th, 2020): grocery and pharmacy stores, transit stations, workplaces, retail and recreation. The measures were reported daily based on the rolling 7-day average. We averaged the four measures during the 2020 survey period for each country, while coding the index as 0 for the 2018 round. Although the Google Mobility Reports also provided park visits, however, we excluded this due to its high seasonal

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variation—visits to parks typically peak in the summer and decline in the winter.

Analysis

We conducted trend and statistical analyses to examine changes in trust in neighbors between 2018 and 2020 and the association between trust in neighbors and COVID-19 vaccine acceptance in 2020. Our trend analysis compared shifts in neighbor trust across regions—Americas, Europe, Middle East and North Africa (MENA), Sub-Saharan Africa (SSA), and Western Pacific (WP)—as well as by country and sociodemographic categories.

We then estimated the decline in trust in neighbors and the association between trust in neighbors and vaccine acceptance by using multilevel linear regression to account for the hierarchical structure of the study dataset in which individual respondents nested within countries. The first model to assess the decline of trust was:

$$Y(\ Trust\ )_{ijt} = \beta_0 + \beta_1 R_t + \beta_2 I_j + \beta_3 \left(R_t \times I_j\right) + \beta_4 X_{ijt} + \beta_5 C_{jt} + u_j + \varepsilon_{ijt} \quad (1)$$

where i indexes individuals, j indexes countries, and t indexes survey round. Y_{ijt} denotes the binary dependent variable indicating trust in neighbors. R_t denotes a dummy variable for the 2020 survey round, and I_j denotes country's income category (low-income countries as the reference category). β_1, β_2, and β_3 are the estimators of interest. The combination of β_1 and β_3, weighted by population size, estimates the average change in the probability of trust in neighbors across country income categories. X_{ijt} denotes individual-level covariates, including age, gender, education, and income. C_{jt} denotes country-level factors, including the mobility index, the number of COVID-19 related deaths, and the logged of population and GDP per capita. The random effects u_j accounts for unexplained country-level variation, while ε_{ijt} denotes the individual-level random error term that accounts for residual variation within countries not explained by the model.

We then estimated the average effect of trust in neighbors on the probability of accepting COVID-19 vaccines by using the 2020 survey round based on the following specification:

$$Y(Acceptance)_{ij} = \gamma_0 + \gamma_1 T_i + \gamma_2 X_{ij} + \gamma_3 C_j + u_j + \varepsilon_{ij} \quad (2)$$

Here, γ_1 captures the average effect of trust in neighbors. X_{ijt} denotes individual-level covariates, including trust in government, the impact of the pandemic on work status, age, gender, education, and income.

We used Cramér's V, which is more robust against the sample size than a chi-squared test in comparing categorical variables, to compare the sample characteristics between the two years. Its algebraic representation is: $V = \sqrt{\frac{X^2/n}{\min(k-1, r-1)}}$.

The analytical process in this study was conducted by using R 4.3.0 and Stata version 18 (StataCorp LP, College Station, TX).

Results

Table 1 presents the sample characteristics. The trend analysis included 94 countries, while the vaccine acceptance analysis included 86 countries. Based on the imputed sample, trust in neighbors was slightly lower in 2020, compared to 2018 (79% to 72%), in the 94 countries. The percentage of people who trust government was comparable between the two years (63% in both years). Seventy-two percent of respondents answered that they would receive COVID-19 vaccines if they were offered for free in 2020. In the 2020 sample, 57% answered that they had reduced their workhour or

Table 1. Trust, COVID-19 vaccine acceptance, the pandemic impact on work, and demographic information of the study sample in 2018 and 2020 (weighted)

Variables	Without vaccine acceptance			With vaccine acceptance
	2018 (n, %)	2020 (n, %)	Unweighted V	2020 (n, %)
No. of countries	94	94	-	86
No. of responses	96,272	96,447	-	88,414
Trust in neighbors	79.32	72.05	0.03	76.89
Trust in government	62.71	63.50	0.03	56.25
Vaccine acceptance	-	-	-	71.76
Work impacted by COVID-19	-	-	-	57.07
Female	50.3	48.81	0.04	48.78
Age				
<25	22.47	24.52	0.03	25.19
25–34	21.26	23.59	0.06	23.89
35–44	18.41	19.56	0.02	19.59
45–54	15.15	15.09	0.02	14.93
55–64	11.59	8.55	0.04	8.39
65+	11.14	8.69	0.06	8.01
Education				
Elementary or less (8 years or less)	37.21	33.29	0.18	35.00
Secondary (8–15 years)	50.46	51.85	0.02	50.96
Tertiary (16+ years)	12.33	14.87	0.14	14.04
Income				
Poorest 20%	20.16	19.91	0.02	19.91
Second 20%	20.07	19.98	0.02	19.98
Middle 20%	19.97	20.04	0.01	20.05
Fourth 20%	19.92	20.02	0.01	20.02
Richest 20%	19.88	20.05	0.03	20.05
Country-level factor				
Change in mobility	0	–13.84	-	–14.17
Cumulative number of COVID-related deaths	0	76,046.69		81,622.52
Average logged population	18.98	18.99	-	19.05
Average logged GDP per capita	6.97	6.96	-	6.95

GDP, gross domestic product.

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left jobs.

The 2020 survey under-sampled the low-educated population compared to the 2018 sample (27% vs. 12%), however, the post-stratification weights effectively corrected this imbalance (Appendix 3). Otherwise, demographic characteristics were largely comparable between the two rounds, and these characteristics remained consistent even without statistical imputation (Appendix 4).

Fig. 1 provides a comprehensive view of the shifts in the percentage of respondents who reported trusting their neighbors by country between 2018 (cross markers) and 2020 (circle markers). In the figure, darker markers indicate data from lower-income countries, while brighter markers

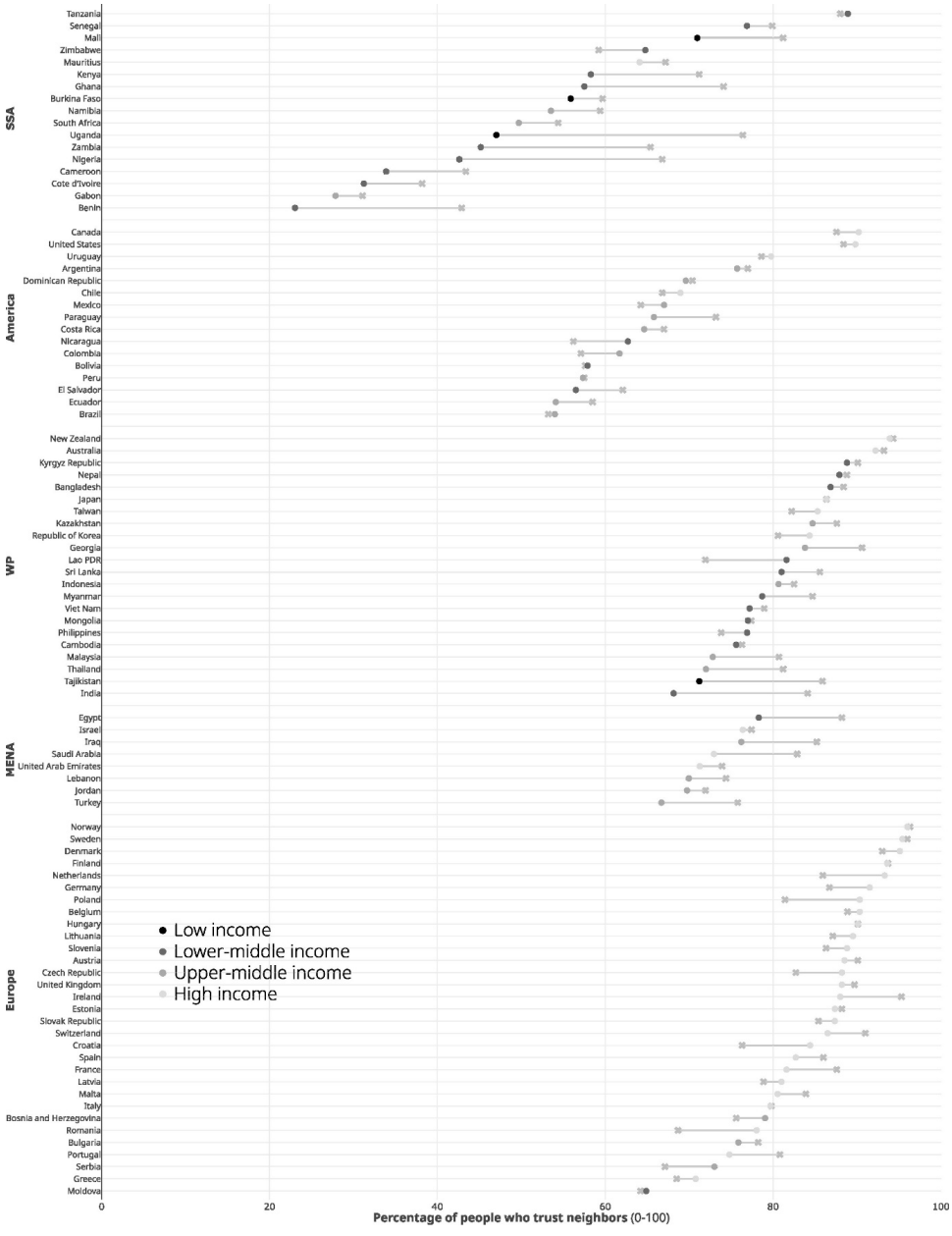

Fig. 1. Weighted country-level shifts in trust in neighbors, 2018–2020. Markers indicate percentage. Circle markers indicate 2020, while cross markers indicate 2018. Colors indicate country income categories based on the World Bank's classification.

indicate higher-income countries. Trust levels varied across regions and countries. Many countries in Europe, MENA, and WP regions reported trust levels above 60%, in contrast to generally lower percentages in America and SSA. SSA, America, and Europe showed a wider range of trust levels—with some countries showing very high levels and others considerably lower. Such variations likely arise from diverse sociopolitical and cultural dynamics. For example, many countries in the WP and MENA regions might be influenced by religious or cultural traditions that promote the sense of community.

The figure also highlights the differential impacts of the COVID-19 pandemic on the level of trust in neighbors across regions and countries. Most countries experienced noticeable shift in trust levels between 2018 and 2020; some countries demonstrate an increase in trust levels, while others show a decrease. Europe had the highest concentration of countries with elevated trust levels. On the contrary, most countries in SSA and the MENA experienced substantive drops in the percentage of trust in neighbors. These declines resonate with reports of increased violence and armed conflicts in these regions during the pandemic (Basedau & Deitch, 2021; Daw, 2021).

Fig. 2 presents regional levels of trust in neighbors for 2018 and 2020, broken down by age, education, and income. The figure highlights that the SSA, WP, and MENA regions experienced sharper declines in trust compared to America and Europe. While trust declined across all age, education, and income groups in these regions, there were sharper declines among low-educated and older groups in SSA and WP. In contrast, there were only moderate changes in trust levels across America and Europe.

Fig. 3 presents the estimated change in the probability of trusting neighbors between 2018 and

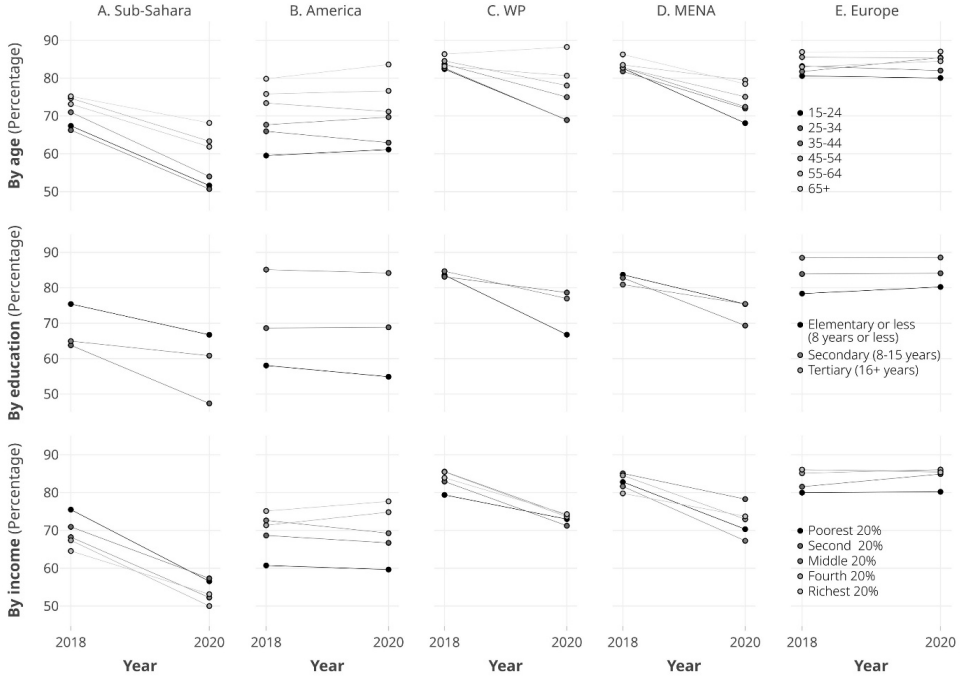

Fig. 2. Weighted trends in trust in neighbors by region and by demographic groups, 2018–2020. Markers indicate percentage.

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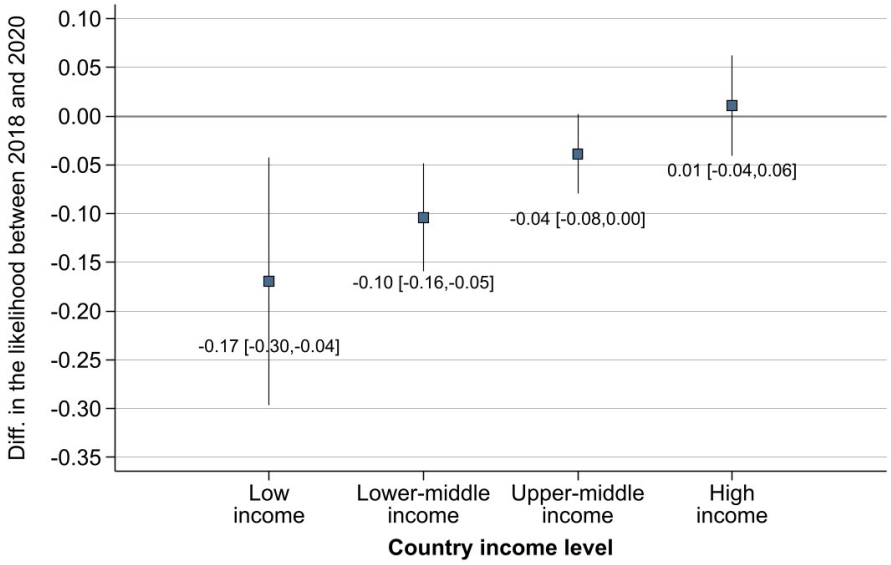

Fig. 3. Weighted changes in the probability of trust in neighbors by country income category, 2018–2020. Markers indicate the difference in the probability of trust in neighbors between 2018 and 2020 based on multilevel regression. Vertical spikes indicate 95% CIs. Control variables included but not shown: trust in government, the COVID-19 pandemic's impact on work, being female, age, education, household income, mobility change compared to the baseline period, cumulative COVID-19 confirmed deaths, logged population, and logged GDP per capita. CIs, confidence intervals; GDP, gross domestic product.

2020 (see Appendix 3 for the full regression output). On average, the probability of trust declined by 6 percentage points in 2020 relative to 2018 [95% confidence intervals (CIs)=–0.10 to –0.01; p=0.008]. The decrease was sharper in lower income countries. This impact was significantly disproportionate to LMICs. Low-income countries experienced the steepest drop—a 17 percentage point decline [95% CIs=–0.30 to –0.04; p=0.009]. Lower-middle income countries showed more moderate decreases of 12 percentage points [95% CIs=–0.16 to –0.05; p<0.001]. In contrast, the changes in high- and upper-middle-income countries were not significant (Appendices 5–7).

Table 2 presents the association between trust in neighbors and COVID-19 vaccine acceptance in 2020. The result indicates that trust in neighbors was a significant determinant of COVID-19 vaccine acceptance at the early stage of the COVID-19 pandemic even when controlling for trust in government and other covariates. The probability of accepting COVID-19 vaccines was 5 percentage points higher among those who answered that they trusted their neighbors [95% CIs=0.04 to 0.06; p<0.001].

Other key predictors include trust in government, the impact of the pandemic on work, gender, and age. The probability of vaccine acceptance was 6 percentage points higher among those who trusted government [95% CIs=0.02 to 0.10; p=0.003]. The probability was 5 percentage points higher among those whose work was affected by the COVID-19 pandemic [95% CIs=0.002 to 0.11; p=0.004]. Female respondents were 3 percentage points less likely to accept the COVID-19 vaccine compared to other respondents [95% CIs=–0.03 to –0.02; p<0.001]. Compared to the youngest group, respondents aged 55-64 and those 65 or older were more likely to accept COVID-19 vaccines by 4 percentage points higher [95% CIs=0.01 to 0.06; p=0.006] and 7 percentage points higher [95% CIs=0.03 to 0.12 p<0.001]. Household income and the country-level factors were not significantly

Table 2. Association between trust in neighbors and COVID-19 vaccine acceptance (weighted)

Variables		COVID-19 vaccine acceptance [95% CIs]
Trust in neighbors	0.047***	[0.04, 0.06]
Trust in government	0.060**	[0.02, 0.10]
Work impacted by COVID-19	0.053*	[0.00, 0.10]
Education (ref: elementary or less)		
Secondary	–0.010	[–0.03, 0.01]
Tertiary or higher	0.025	[–0.00, 0.05]
Female	–0.026***	[–0.03, –0.02]
Age (ref: <25)		
25–34	–0.024	[–0.06, 0.01]
35–44	–0.033*	[–0.06, –0.00]
45–54	–0.012	[–0.05, 0.02]
55–64	0.036**	[0.01, 0.06]
65+	0.074***	[0.03, 0.12]
Income (ref: poorest 20%)		
Second 20%	0.030	[–0.01, 0.07]
Middle 20%	0.002	[–0.01, 0.02]
Fourth 20%	–0.002	[–0.02, 0.01]
Richest 20%	0.001	[–0.03, 0.03]
Country-level factors		
Mobility	0.000	[–0.00, 0.00]
Cumulative number of COVID-related deaths	0.000	[–0.00, 0.00]
Logged population	0.030	[–0.01, 0.07]
Logged GDP	–0.000	[–0.03, 0.03]
Constant	0.026	[–0.55, 0.60]
Observations	88,414	

95% confidence intervals in brackets.
* p<0.05, ** p<0.01, *** p<0.001.
CIs, confidence intervals; GDP, gross domestic product.

associated with the probability of vaccine acceptance.

Discussion

In the analysis, we examined the global impact of the COVID-19 pandemic on horizontal trust, measured as trust in neighbors. Between 2018 and 2020, most countries experienced noticeable shifts in trust levels, with the early impacts of the pandemic differing across regions and countries. Europe, for instance, maintained high levels of trust, while many countries in SSA and MENA experienced substantial declines. Furthermore, these declines were sharper in LMICs. Finally, the association between trust in neighbors and COVID-19 vaccine acceptance was found to be significant, emphasizing the importance of community solidarity and cohesion in facilitating positive health preventive behaviors during the crisis of COVID-19.

The significant impact of the pandemic on trust in neighbors, particularly in LMICs, has several implications. Disruptions in horizontal trust may indicate the erosion of social capital and community support systems that are essential for collective action and community resilience for

https://doi.org/10.52372/jps.e686

post-pandemic recovery and future health emergencies. This may further weaken informal support networks, which are vital in LMICs, where formal support mechanisms might be insufficient. Furthermore, the contrast between the severe impact on LMICs and the relatively stable levels in high-income countries may have exacerbated global inequalities in the capacity to respond to local disease outbreaks and future health emergencies. Therefore, these disproportionate impacts underscore the urgent need for international collaboration and support to help LMICs address their unique social challenges in the post-pandemic era and rebuild horizontal trust and community solidarity for next pandemics.

These declines also open new avenues for further research on contextual drivers of the erosion of trust since the COVID-19 pandemic. Future studies could explore the role of political leadership, economic factors, cultural norms, and historical experiences in shaping horizontal trust across different communities and countries during health emergencies.

The finding that people who trusted their neighbors were significantly more likely to accept the COVID-19 vaccine suggests that declines in horizontal trust may have serious health consequences. This association supports the role of social capital, solidarity, and cohesion in promoting health and health behaviors (Cárdenas et al., 2023; Lalot et al., 2021; Qin et al., 2022; Ratcliffe & Newman, 2011) and expands the idea into the context of health emergencies at a global scale. Robust social networks and community solidarity can facilitate the willingness to vaccinate, especially in the early stage of a crisis. Therefore, the erosion of horizontal trust since the COVID-19 pandemic may leave countries more vulnerable to the threats from future health emergencies. Similarly, the strong effect of trust in government on vaccine acceptance echoes the importance of institutional trust during health emergencies. This result is consistent with earlier findings that suggest trust in government is critical for the success of immunization programs (Choi & Fox, 2022; Miyachi et al., 2020; Prickett & Chapple, 2021; Yu et al., 2023).

Age-related differences in vaccine acceptance largely align with observations from earlier studies and could be understood through the lens of risk perception. Older populations, who face a higher risk of severe COVID-19 outcomes may be more willing to protect themselves from COVID-19 by getting a vaccine. In contrast, younger age groups, who perceive themselves at lower risk, are less willing to get vaccinated. Overall, these findings contribute to a more comprehensive understanding of the factors influencing vaccine acceptance, drawing on theories related to social trust, institutional trust, and risk perception.

However, we should be cautious when generalizing the observation that COVID-19 vaccine acceptance was lower among female respondents. Earlier studies in various contexts suggest women tend to be more risk averse than men (e.g., Ferrín, 2022) but are more likely to express concerns about both COVID-19 (Alsharawy et al., 2021; Lewis & Duch, 2021) and potential vaccine side effects (Toshkov, 2023). Moreover, studies indicate that men have a lower perception of disease risk, which may contribute to a lower acceptance rate of COVID-19 vaccines (Wang et al., 2021b). Consequently, the literature reports mixed findings on whether women are more or less likely than men to accept COVID-19 vaccines (Pires, 2022).

This study has several limitations that need consideration. First, the study findings rely on cross-sectional survey data and therefore may not enable a rigorous examination of causality. Further

research could improve our understanding of the impact of the COVID-19 pandemic on horizontal trust by using longitudinal data or quasi-experimental design. Second, while our analysis provides global estimates and examines their variations across countries, it does not fully consider the unique circumstances of each country during the pandemic. This oversight might neglect specific local factors that affect horizontal trust and vaccine acceptance under various conditions. Third, the representativeness of the study data could be compromised by the substantial number of missing values and countries and subject to sampling bias linked to restricted participation to the survey during the COVID-19 pandemic (Brubaker et al., 2021; Lin et al., 2021). We acknowledge that excluding these countries may introduce some bias compared to including all countries. Although we mitigated the problem of missing values by employing statistical imputation techniques and the sampling bias by applying post-stratification weights, the study results might still be skewed toward certain demographic groups or countries that were excluded from the analysis. Nonetheless, the findings from this analysis remain significant, as the study still includes data from a number of countries. These results also provide a key indication of the disproportionate burdens from the COVID-19 pandemic, pointing to areas that require additional research.

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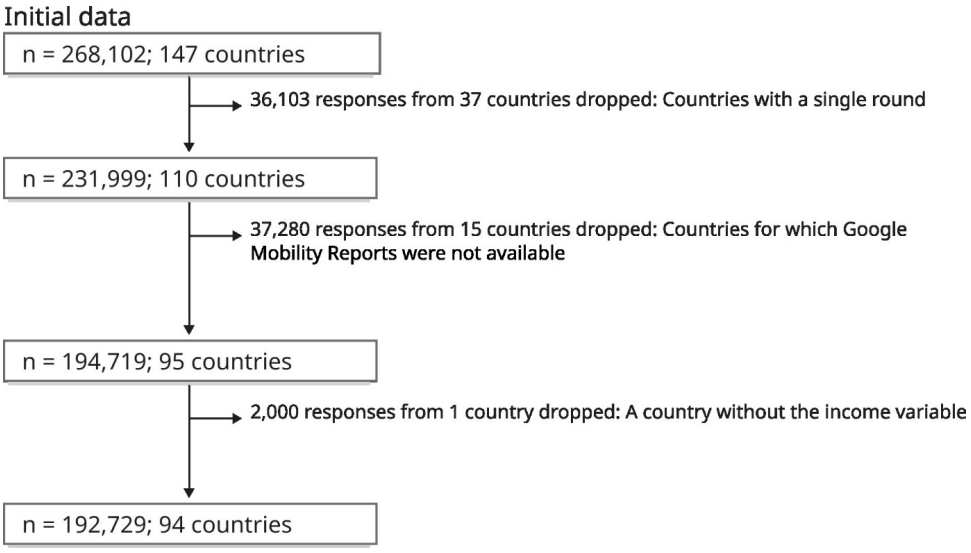
Appendices

Appendix 1. Data cleaning process



Appendix 2. Number of missing values by country

Countries included

ID	Country	2018 / 2020					2020		
		No. of records	Trust in neighbors	Trust in government	Age	Education	No. of records	Vaccine acceptance	COVID-19 impact on work
1	Argentina	2,001	33	32	4	2	1,001	46	1
2	Australia	2,004	73	44	55	24	1,001	26	1,001
3	Austria	2,000	11	15	3	6	1,000	10	2
4	Bangladesh	2,011	24	106	30	8	1,011	45	1
5	Belgium	2,005	25	24	0	2	1,001	63	4
6	Benin	2,007	79	181	26	13	1,007	81	6
7	Bolivia	2,002	29	83	2	17	1,002	53	5
8	Bosnia and Herzegovina	2,002	29	39	1	6	1,002	87	0
9	Brazil	2,000	94	65	4	16	1,000	22	1
10	Bulgaria	2,008	62	63	2	7	1,007	55	3
11	Burkina Faso	2,002	89	163	21	19	1,002	33	10
12	Cambodia	2,000	100	1,096	2	6	1,000	75	1
13	Cameroon	2,006	76	198	18	22	1,006	14	2
14	Canada	2,022	64	35	26	7	1,010	19	1
15	Chile	2,021	34	38	3	11	1,021	49	1
16	Colombia	2,000	28	32	3	13	1,000	8	0
17	Costa Rica	2,001	22	47	9	8	1,001	44	4
18	Cote d'Ivoire	2,005	127	306	13	20	1,005	44	3
19	Croatia	2,000	39	47	9	9	1,000	115	4
20	Czech Republic	2,000	81	85	17	4	1,000	93	1
21	Denmark	2,000	32	13	0	14	1,000	13	1

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ID	Country	2018 / 2020					2020		
		No. of records	Trust in neighbors	Trust in government	Age	Education	No. of records	Vaccine acceptance	COVID-19 impact on work
22	Dominican Republic	2,000	22	49	4	46	1,000	22	5
23	Ecuador	2,000	38	52	3	22	1,000	44	3
24	Egypt	2,004	33	1,092	5	0	1,004	16	0
25	El Salvador	2,000	27	46	2	0	1,000	32	1
26	Estonia	2,013	146	157	0	1	1,013	82	0
27	Finland	2,000	35	14	0	4	1,000	33	1
28	France	2,000	42	28	4	2	1,000	34	3
29	Gabon	2,005	74	226	34	67	1,005	50	4
30	Georgia	2,000	25	62	2	3	1,000	45	1
31	Germany	2,000	24	22	4	6	1,000	22	1
32	Ghana	2,000	52	86	26	17	1,000	37	4
33	Greece	2,006	38	33	6	4	1,006	46	2
34	Hungary	2,000	34	99	10	5	1,000	87	1
35	India	6,045	112	213	0	37	3,045	39	57
36	Indonesia	2,023	118	214	1	2	1,023	22	4
37	Iraq	2,009	25	45	2	2	1,009	24	1
38	Ireland	2,000	17	29	14	10	1,000	31	2
39	Israel	2,073	75	37	11	3	1,063	129	4
40	Italy	2,000	31	5	1	5	1,000	24	2
41	Japan	2,016	139	210	1	16	1,012	24	1,012
42	Jordan	2,007	46	113	2	5	1,005	63	2
43	Kazakhstan	2,000	62	138	24	15	1,000	146	10
44	Kenya	2,002	25	48	17	4	1,002	13	2
45	Kyrgyz Republic	2,000	64	142	7	13	1,000	133	6
46	Lao PDR	2,001	170	1,153	1	4	1,000	70	11
47	Latvia	2,026	110	149	0	5	1,005	94	4
48	Lebanon	2,035	33	122	3	1	1,035	61	0
49	Lithuania	2,001	169	220	81	87	1,001	249	19
50	Malaysia	2,004	140	255	7	11	1,004	46	6
51	Mali	2,002	56	160	32	18	1,002	23	5
52	Malta	2,009	60	103	1	5	1,002	40	0
53	Mauritius	2,000	32	55	1	3	1,000	19	0
54	Mexico	2,034	27	31	13	7	1,000	47	2
55	Moldova	2,005	49	100	3	2	1,005	1,005	6
56	Mongolia	2,000	99	123	1	1	1,000	63	0
57	Myanmar	2,000	27	116	0	1	1,000	0	0
58	Namibia	2,012	55	105	26	23	1,007	29	1
59	Nepal	2,000	75	262	0	2	1,000	5	2
60	Netherlands	2,001	23	6	3	14	1,000	20	1
61	New Zealand	2,002	60	58	62	8	1,000	1,000	1,000
62	Nicaragua	2,000	21	107	2	23	1,000	23	3
63	Nigeria	2,002	21	49	24	9	1,002	44	5
64	Norway	2,000	46	44	1	36	1,000	18	3
65	Paraguay	2,000	24	54	8	13	1,000	88	10
66	Peru	2,001	32	43	3	21	1,001	8	0

ID	Country	2018 / 2020					2020		
		No. of records	Trust in neighbors	Trust in government	Age	Education	No. of records	Vaccine acceptance	COVID-19 impact on work
67	Philippines	2,000	5	5	1	0	1,000	18	0
68	Poland	2,002	28	36	25	7	1,002	56	4
69	Portugal	2,005	62	42	7	2	1,004	63	4
70	Republic of Korea	2,023	94	48	4	5	1,009	15	1
71	Romania	2,008	33	72	13	8	1,006	135	14
72	Saudi Arabia	2,029	71	2,029	6	2	1,013	6	1
73	Senegal	2,025	54	144	12	26	1,025	43	3
74	Serbia	2,000	23	107	8	4	1,000	163	2
75	Slovak Republic	2,004	16	18	3	3	1,004	60	4
76	Slovenia	2,001	17	25	18	6	1,001	31	0
77	South Africa	2,004	26	78	18	17	1,004	28	1
78	Spain	2,000	9	27	1	4	1,000	17	2
79	Sri Lanka	2,120	23	164	0	5	1,011	37	2
80	Sweden	2,000	63	25	1	14	1,000	13	1
81	Switzerland	2,000	16	16	4	10	1,000	74	1
82	Taiwan	2,000	88	89	5	3	1,000	53	2
83	Tajikistan	2,000	40	2,000	0	0	1,000	78	3
84	Tanzania	2,000	28	78	6	3	1,000	11	1
85	Thailand	2,000	91	123	0	9	1,000	54	2
86	Turkey	2,000	113	233	6	1	1,000	49	1
87	Uganda	2,027	38	115	10	11	1,027	26	3
88	United Arab Emirates	2,007	197	2,007	7	42	1,002	69	27
89	United Kingdom	2,000	17	27	10	20	1,000	47	3
90	United States	2,007	71	41	9	10	1,001	13	1
91	Uruguay	2,003	61	40	3	4	1,003	51	1
92	Viet Nam	2,012	134	2,012	7	15	1,000	58	6
93	Zambia	2,005	41	98	12	6	1,005	22	1
94	Zimbabwe	2,002	11	121	7	5	1,002	14	1

PDR, proliferative diabetic retinopathy.

Countries excluded

ID	Country	No. of records		Reasons for exclusion			
		2018	2020	Single survey round	Income variable not available	Google mobility reports not available	COVID-19 deaths data not available
1	Afghanistan	1,000		X			
2	Albania	1,000	1,000			X	
3	Algeria	1,000	1,020			X	
4	Armenia	1,000		X			
5	Azerbaijan	1,000		X			
6	Bahrain		1,005	X			
7	Belarus	1,061		X			
8	Botswana	1,002		X			
9	Burundi	1,000		X			

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ID	Country	No. of records		Reasons for exclusion			
		2018	2020	Single survey round	Income variable not available	Google mobility reports not available	COVID-19 deaths data not available
10	Chad	1,000		X		X	
11	China	3,649	3,502				
12	Comoros	1,000		X			
13	Cyprus	1,011	1,012			X	
14	Eswatini	1,000		X			
15	Ethiopia	1,000	1,003			X	
16	Gambia	1,000		X			
17	Guatemala	1,000		X			
18	Guinea	1,000	1,009			X	
19	Haiti	500		X			
20	Honduras	1,000		X			
21	Hong Kong		1,004	X			
22	Iceland	500		X			
23	Iran	1,005	1,007			X	
24	Kosovo	1,000	1,004			X	
25	Kuwait	1,001		X			
26	Liberia	1,000		X			
27	Libya	1,003		X			
28	Luxembourg	1,000		X			
29	Macedonia	1,008		X			
30	Madagascar	1,000		X			
31	Malawi	1,000		X			
32	Mauritania	1,000		X			
33	Montenegro	1,000	1,027			X	X
34	Morocco	1,001	1,012			X	
35	Mozambique	1,000		X			
36	Niger	1,000		X			
37	North Macedonia		1,019				X
38	Northern Cyprus	1,000		X			
39	Pakistan	1,000		X			
40	Palestinian Territories	1,000		X			
41	Panama	1,000		X			
42	Republic of Congo	1,000	1,009			X	
43	Russia	2,000	2,002			X	
44	Rwanda	1,000		X			
45	Sierra Leone	1,000		X			
46	Singapore	1,000		X			

ID	Country	No. of records		Reasons for exclusion			
		2018	2020	Single survey round	Income variable not available	Google mobility reports not available	COVID-19 deaths data not available
47	Togo	1,000		X			
48	Tunisia	1,001	1,006			X	
49	Turkmenistan	1,000		X			
50	Ukraine	1,000	1,000			X	
51	Uzbekistan	1,000	1,000			X	
52	Venezuela	1,000	1,000		X		
53	Yemen	1,000		X			

Appendix 3. Unweighted sample characteristics with imputation

Variable	Without vaccine acceptance (weighted)		With vaccine acceptance (weighted)
	2018 (n, %)	2020 (n, %)	2020 (n, %)
Size of sample	96,272	96,447	88,414
Trust in neighbors	76.89	74.01	73.62
Trust in government	56.25	59.39	58.79
Vaccine acceptance	-	-	64.20
Work impacted by COVID-19	-	-	50.41
Female	53.21	49.57	49.86
Age			
<25	17.39	19.74	20.09
25–34	20.62	25.38	25.17
35–44	17.57	18.88	19.04
45–54	14.87	13.74	13.99
55–64	13.27	10.50	10.60
65+	16.27	11.77	11.11
Education			
Elementary or less (8 years or less)	26.78	12.46	12.93
Secondary (8–15 years)	54.00	55.94	56.54
Tertiary (16+ years)	19.22	31.60	30.53
Income			
Poorest 20%	16.65	14.98	14.87
Second 20%	18.03	16.68	16.47
Middle 20%	19.56	19.12	18.98
Fourth 20%	20.97	21.84	21.92
Richest 20%	24.79	27.38	27.75

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Appendix 4. Weighted sample characteristics without imputation

Variables	2018 (n, %)	2020 (n, %)
Sample size	83,693	85,225
Trust in neighbors	79.37	72.20
Trust in government	61.95	63.18
Female	49.79	48.03
Age		
<25	22.47	24.77
25–34	21.20	23.67
35–44	18.39	18.99
45–54	15.11	14.95
55–64	11.62	8.63
65+	11.21	8.98
Education		
Elementary or less (8 years or less)	36.92	33.22
Secondary (8–15 years)	50.78	51.96
Tertiary (16+ years)	12.30	14.83
Income		
Poorest 20%	19.76	19.62
Second 20%	20.06	19.96
Middle 20%	19.92	20.19
Fourth 20%	20.13	20.10
Richest 20%	20.12	20.13

Appendix 5. A replication of Table 2 without imputation (weighted)

Variables	Beta	95% CI
Trust in neighbors	0.049***	[0.04, 0.06]
Trust in government	0.061*	[0.01, 0.11]
Work impacted by COVID-19	0.045*	[0.01, 0.08]
Education (ref: under secondary)		
Secondary	–0.012	[–0.03, 0.01]
Tertiary or higher	0.018	[–0.01, 0.05]
Female	–0.021***	[–0.03, –0.01]
Age (ref: under 25)		
25–34	–0.016	[–0.06, 0.03]
35–44	–0.022	[–0.06, 0.02]
45–54	–0.002	[–0.05, 0.04]
55–64	0.040**	[0.01, 0.07]
65+	0.077**	[0.03, 0.13]
Income (ref: poorest 20%)		
Second 20%	0.023	[–0.01, 0.05]
Middle 20%	–0.003	[–0.02, 0.02]
Fourth 20%	–0.007	[–0.03, 0.01]
Richest 20%	0.011	[–0.01, 0.04]
Country-level factors		
Mobility	–0.000	[–0.00, 0.00]
No. of COVID-19 confirmed deaths	0.000	[–0.00, 0.00]
Logged population	0.042*	[0.00, 0.08]
Logged GDP	–0.010	[–0.04, 0.02]
Constant	–0.105	[–0.69, 0.48]
Observations	78,121	

95% confidence intervals in brackets.
* p<0.05, ** p<0.01, *** p<0.001.
CIs, confidence intervals; GDP, gross domestic product.

Appendix 6. Predictors of trust in neighbors in 2018 and 2020 (weighted, full regression output of Fig. 3)

Variables	Beta	95% CI
2020 survey round (ref: 2018)	–0.169**	[–0.30, –0.04]
Country income category (ref: low-income)		
Lower-middle income	–0.090	[–0.19, 0.01]
Upper-middle income	–0.150*	[–0.27, –0.03]
High income	–0.091	[–0.26, 0.07]
Interactions		
2020 × Lower-middle	0.065	[–0.07, 0.20]
2020 × Upper-middle	0.131	[–0.00, 0.26]
2020 × High income	0.180**	[0.05, 0.31]
Trust in government	0.175***	[0.14, 0.21]
Education (ref: under secondary)		
Secondary	0.029	[–0.01, 0.07]
Tertiary or higher	0.067***	[0.04, 0.10]
Female	–0.031***	[–0.04, –0.02]
Age (ref: under 25)		
25–34	0.008	[–0.00, 0.02]
35–44	0.040***	[0.02, 0.06]
45–54	0.063***	[0.05, 0.08]
55–64	0.057***	[0.04, 0.08]
65+	0.094***	[0.07, 0.12]
Income (ref: poorest 20%)		
Second 20%	0.020	[–0.01, 0.04]
Middle 20%	0.030**	[0.01, 0.05]
Fourth 20%	0.031**	[0.01, 0.05]
Richest 20%	0.030**	[0.01, 0.05]
Country-level factors		
Mobility	0.000	[–0.00, 0.00]
No. of COVID-19 confirmed deaths	–0.000	[–0.00, 0.00]
Logged population	–0.019	[–0.06, 0.03]
Logged GDP	0.027	[–0.01, 0.07]
Constant	0.882**	[0.24, 1.52]
Observations	192,719	

95% confidence intervals in brackets.
* p<0.05, ** p<0.01, *** p<0.001.
CIs, confidence intervals; GDP, gross domestic product.

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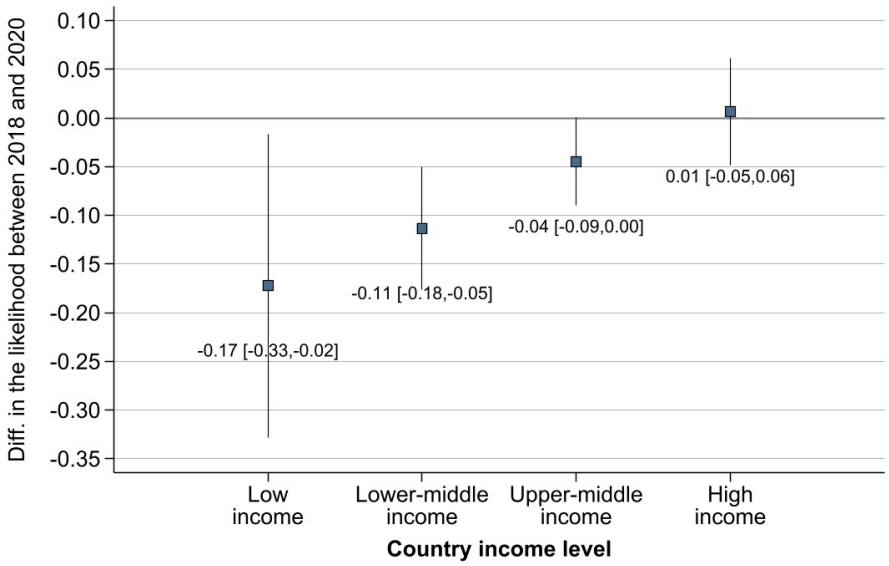
Appendix 7. A replication of Fig. 3 without imputation (weighted)



Markers indicate the difference in the probability of trust in neighbors between 2018 and 2020 based on multilevel regression. Vertical spikes indicate 95% CIs. Control variables included but not shown: trust in government, the COVID-19 pandemic's impact on work, being female, age, education, household income, mobility change compared to the baseline period, cumulative COVID-19 confirmed deaths, logged population, and logged GDP per capita. CIs, confidence intervals; GDP, gross domestic product.