January 31, 2021

COVID-19 among rural peoples in the Peruvian Amazon: Policy brief

Yoshito Takasaki
University of Tokyo

Oliver T. Coomes
McGill University

Christian Abizaid
University of Toronto

Y. Takasaki: Graduate School of Economics, **University of Tokyo**, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan. **Email: takasaki@e.u-tokyo.ac.jp**
O. Coomes: Department of Geography, **McGill University**, Montreal, QC, Canada.
Email: oliver.coomes@mcgill.ca
C. Abizaid: Department of Geography & Planning and School of Environment, **University of Toronto**, Toronto, ON, Canada. **Email: christian.abizaid@utoronto.ca**

Cite as: Takasaki, Y., O.T. Coomes and C. Abizaid. 2021. COVID-19 among rural peoples in the Peruvian Amazon: Policy brief. Peruvian Amazon Rural Livelihoods and Poverty (PARLAP) Project, University of Toyko, Tokyo, Japan.
DOI: 10.5281/zenodo.4683344

Table of Contents

Executive Summary

In the Peruvian Amazon, information about the prevalence of COVID-19 and its consequences in rural communities is scant. As part of the Peruvian Amazon Rural Livelihoods and Poverty (PARLAP) project, we conducted telephone surveys among 469 communities – both indigenous and campesino (folk people, locally known as mestizo or ribereño) communities – in the Departments of Loreto and Ucayali in July and August 2020 to assess local conditions in rural areas. Many communities in the **PARLAP** study area lack functional telephone service.

According to government data which capture more urbanized communities, COVID-19 spread throughout the region in two waves (i.e., April-June; August). Our data indicate that mortality rates in rural communities were higher in Ucayali than Loreto, which is opposite to what government data suggests. Similarly, mortality rates were higher in campesino communities than indigenous communities, which is contrary to the impression given by media reports on COVID-19, which focus on indigenous peoples only.

COVID-19 has reached most rural communities in the two regions. The prevalence decreased from July to August (second wave). Since July, COVID-19 became more prevalent in indigenous communities than campesino communities and more so in Ucayali than Loreto over time.

Gatherings may have caused the spread of the virus initially but were later avoided to reduce contagion. School closure was incomplete, and school re-opening may have led to the spread of the virus during the second wave.

People adopted standard protective measures, which helped reduce the spread of the virus. Hand washing and use of masks were more common than social distancing measures, and this difference increased in the second wave. With limited access to medical services, people relied heavily on traditional medicine. People also relied more on wild resources such as fishing, hunting, and non-timber forest product gathering, both for food and earnings. Cash and food assistance was received, mostly from the government, but health assistance was practically absent. Travel to the city to collect cash assistance provided by the government may have furthered the spread of the virus.

Policy implications suggested from our findings include the need to: (1) gather data to better inform policies to reduce contagion and impacts, paying attention to differences across communities; (2) improve communication infrastructure and services for rural communities (especially telephone); (3) correct unintended adverse consequences of assistance polices; (4) tackle the social cost of protective measures; and, (5) consider linkages between COVID-19 and wild resource conservation.

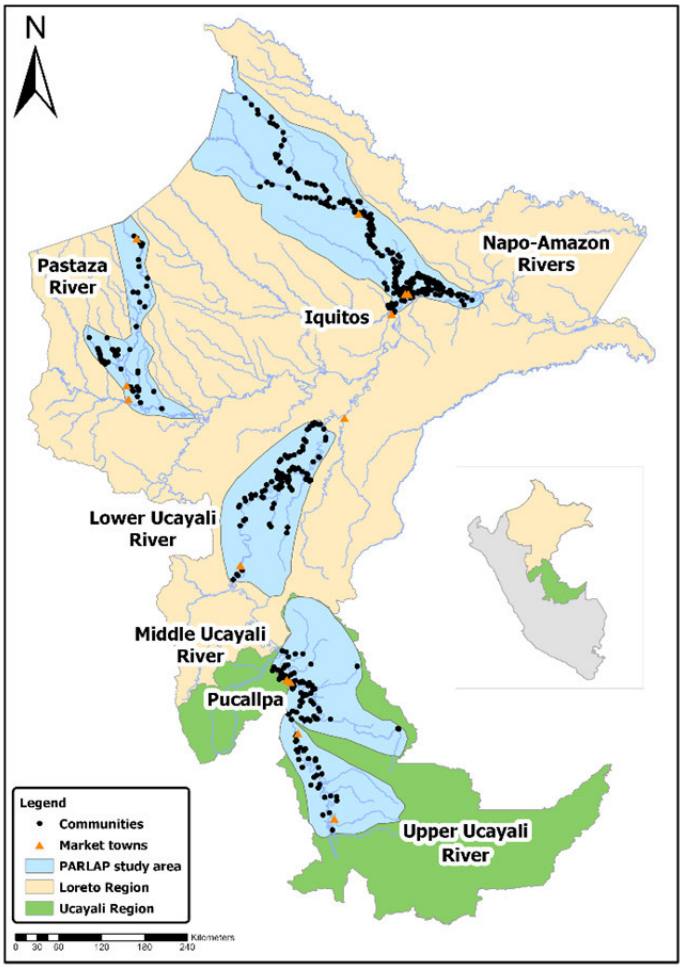
Background and project description

Peru ranks among the countries most severely affected by COVID-19 in the world, despite instituting one of the earliest and longest quarantines in Latin America and an ambitious social program aimed to assist families with the economic consequences of the pandemic. Peru has struggled to flatten the curve while at the same time taken steps to reopen economic activity amidst an acute recession.

The COVID-19 pandemic hit the Peruvian Amazon in mid-March 2020, and sparked international concern about the well-being of the indigenous and non-indigenous peoples of the region. Although the two major urban centers –Iquitos and Pucallpa – received media attention, information about conditions in the many smaller rural communities along the rivers of the Departments of Loreto and Ucayali is scarce. The case incidence and mortality data provided by the Peruvian Government for the two regions is invaluable but reflects conditions in more urbanized communities – those with some health facilities – but most rural communities have none, lack reliable means of communication, and many are just too remote, making it difficult to discern the impacts of COVID-19 in much of the Peruvian Amazon. To remedy this lacuna, and with a concern about the people that we work with, we undertook a large-scale telephone survey to capture the prevalence of COVID-19 and its consequences among rural communities in Loreto and Ucayali that we had previously contacted as part of our ongoing Peruvian Amazon Rural Livelihoods and Poverty (PARLAP) project.

Our original **PARLAP** community survey reached 919 communities (608 in Loreto, 311 in Ucayali) along four major rivers – the Amazon, Napo, Pastaza and Ucayali rivers – over an area of 117,680 km2 or about 2.3 times the area of Costa Rica). Excluding district capitals and communities with a health center, the remaining 893 communities were eligible for the telephone survey. With the suspension of public telephone service since November 2019 and an unreliable radiophonesystem in practice, our baseline survey conducted in July 2020 relied mostly on cell phone contact. As the lockdown was gradually relaxed beginning in May and the economy was reactivated, people became more available and mobile. Our field teams also visited ports and markets in Iquitos and Pucallpa to find people from the target communities. Some phone surveys were also arranged through an intermediary when people from the target communities visited a town where the intermediary lived. In these ways the survey also contacted people in communities with no telephone access. Our baseline telephone survey covered 469 communities (53% of the target communities; 369 in Loreto, 100 in Ucayali; Figure 1).

Figure 1: Surveyed communities



Box 1:

Information about the prevalence of COVID-19 and its consequences in rural communities in the Peruvian Amazon is lacking. We conducted telephone surveys among 469 communities in Loreto and Ucayali in July and August 2020.

We subsequently conducted a follow-up telephone (midline) survey in August and early September that reached 435 of the 469 communities (7% attrition). Both telephone surveys sought information from community leaders following a structured questionnaire on the prevalence of COVID-19, potential causes of its spread, protection measures employed, assistance received, and people's responses over time. We also conducted a series of more in-depth qualitative telephone interviews with contacts in a small number of communities.

Initial findings from this research have been publicized through the PARLAP project website. This policy brief reports major findings from the baseline and midline surveys to provide implications for better policy design and implementation in the Peruvian Amazon.

Community characteristics

The characteristics of communities in the baseline sample are shown in Table 1 (those in the midline sample are similar). The communities are populated by indigenous peoples (56%) and campesinos (folk people, locally known as mestizo or ribereños; one community is populated by colonists) who live as forest peasants, practicing agriculture, fishing, small livestock husbandry, hunting, and forest product extraction for subsistence and cash income. The geographical locations of these two types of communities are distinct: compared to campesino communities, indigenous communities are found in more remote areas in all river basins, especially on the Napo, Pastaza, and Upper Ucayali (Figure 2).

Table 1: Community characteristics

	All	Loreto	Ucayali	Indigenous	Campesino
No. communities	469	369	100	262	206
No. households	78	70	110	64	98
	(153)	(128)	(220)	(87)	(208)
Population	320	252	583	259	400
	(819)	(322)	(1671)	(258)	(1202)
Indigenous	0.56	0.55	0.58	1.00	0.00
Any phone	0.74	0.69	0.93	0.73	0.75
Cell phone	0.55	0.47	0.86	0.44	0.69
Internet	0.14	0.07	0.40	0.11	0.17
Health post	0.20	0.12	0.47	0.19	0.21
Lancha	0.68	0.80	0.23	0.66	0.70
Colectivo	0.29	0.19	0.65	0.24	0.36
Primary school	0.98	0.98	0.98	0.98	0.98
Secondary school	0.30	0.20	0.67	0.28	0.32
Church	0.84	0.85	0.82	0.81	0.89
No. communities (midline)	435	344	91	240	194

Notes: Means across communities in the baseline sample are shown. Standard errors are in parentheses. All variables except no. households and population are an indicator variable. For some variables, no. of observations is slightly smaller than no. communities due to missing values.

Figure 2 (a): Surveyed indigenous communities

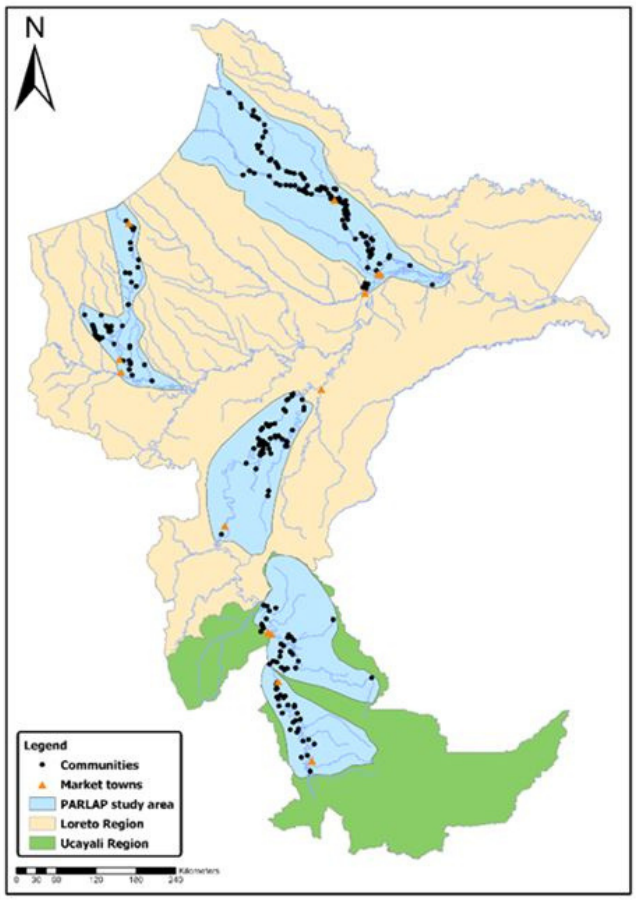
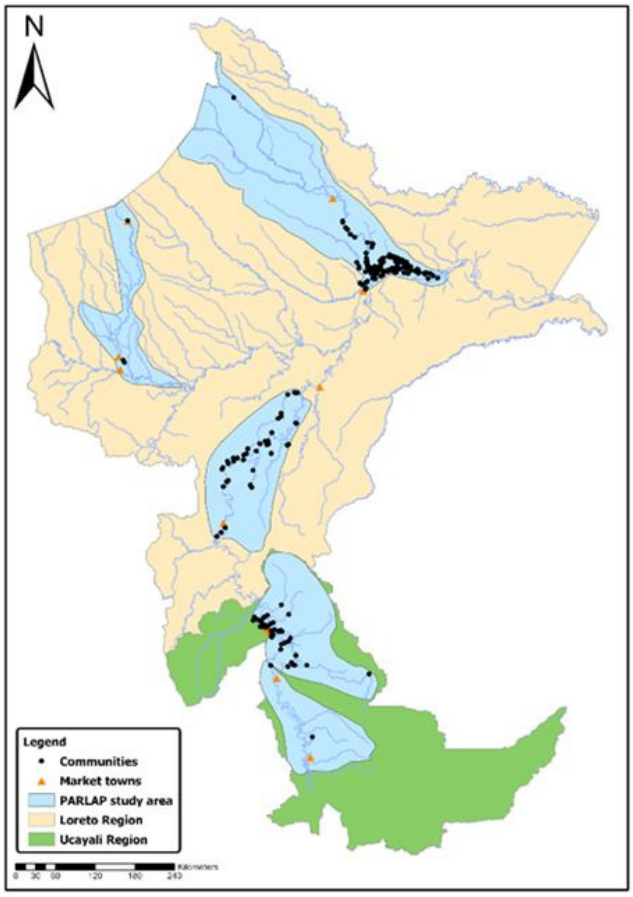


Figure 2 (b): Surveyed campesino communities



Communities are small (78 households and 320 persons, on average) but vary in size significantly (from 2 to 2,000 households; from 12 to 16,000 persons). Among surveyed communities, 26% lack telephone access including communities where public telephone service was suspended. Telephone access was more limited in the target communities not covered by the telephone survey i.e., the telephone survey could not cover those communities precisely because of the lack of telephone service. Among surveyed communities, 55% and 14% have access to cell phone and internet, respectively. Access to health facilities is very limited: 20% have a health post. People rely on river transportation: 68% and 29% have access to a river boat (lancha and colectivo, respectively). Almost all communities have primary school and 30% have a secondary school; 84% have a church.

Box 2:

Many communities lack telephone service. The survey covered both indigenous and campesino (mestizo or ribereño) communities.

Community characteristics are distinct across regions: compared to Loreto, communities in Ucayali are larger, have better access to telephone, internet, health facilities, and secondary school In general, characteristics are similar between indigenous and campesino communities, except that indigenous communities are smaller and have less common access to cell phone service.

Cases and deaths

The Peruvian Ministry of Health (Ministerio de Salud, MINSA) provides data of daily confirmed cases of COVID-19 and daily mortality due to COVID-19.They are the primary source of Peruvian COVID-19 data and are used by Johns Hopkins University Coronavirus Resource Center. MINSA data shows that COVID-19 spread widely in Loreto and Ucayali in two waves (April-June; August) (Figure 3) Mortality was highest early in the first wave and in Loreto (primarily in the city of Iquitos). The patterns of these data across districts within Loreto and Ucayali suggest that they do not capture well rural communities covered in our surveys.

We conducted a baseline survey in July (i.e., between the two waves) and a midline survey in August (i.e., during the second wave). People in all communities knew of COVID-19 and people in many communities had become aware of it early on since March.

With very limited health facilities and testing for COVID-19, the number of confirmed cases of COVID-19 reported in our surveys is incomplete. Compared to the number of cases, the number of reported deaths should be more reliable although respondents' perceptions about whether deaths were caused by COVID-19 can be inaccurate. In each community, the baseline survey in July collected the total number of deaths regardless of cause and those potentially due to COVID-19 (including suspected cases) since mid-March. This captures the first wave of the spread of COVID-19. After communities with highest 2% of mortality rates are dropped because we considered them to be outliers, these two measures yield 0.125% and 0.092% mortality rates, respectively, the latter of which can be considered as an upper bound of the mortality rate due to COVID-19 at that time (Table 2). Thus, at most 74% of deaths were potentially due to COVID-19. The mortality rate due to COVID-19 from mid-March through the last day of the baseline survey (August 2nd, 2020) in Loreto and Ucayali according to the MINSA data is 0.084% (the comparable figure in the whole country is 0.077%). We focus on this specific period to make a comparison between our survey data and the MINSA data. These results suggest that the mortality rate due to COVID-19 in our communities is likely to be in a similar range to the rate in the region.

Figure 3 (a): Daily COVID-19 cases

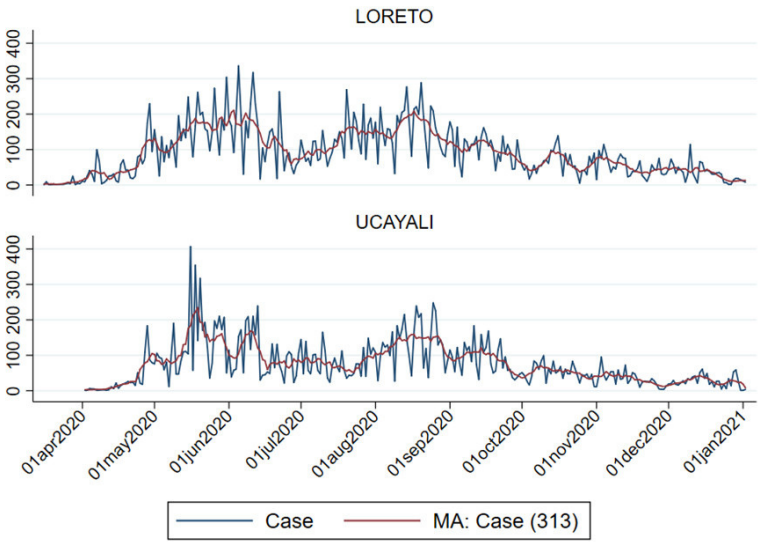


Figure 3 (b): Daily mortality due to COVID-19

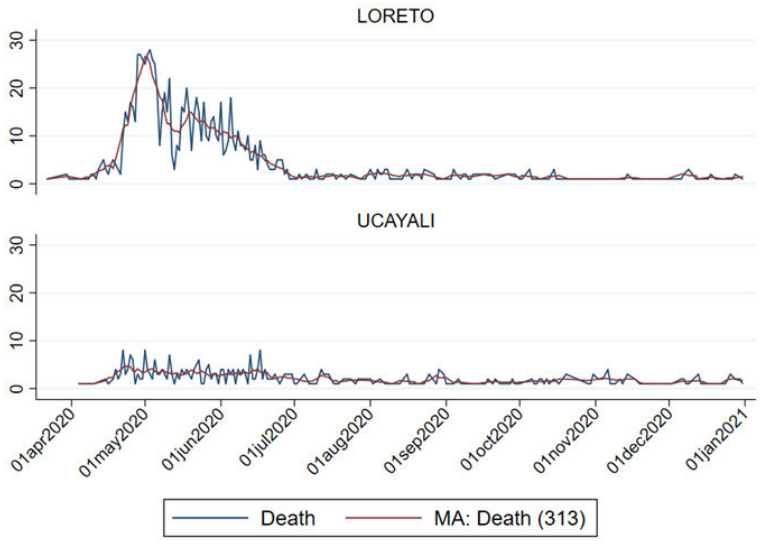


Table 2: Mortality

	All	Loreto	Ucayali	Indigenous	Campesino
A. COVID-19 survey					
No. deaths potentially due to COVID-19	125	35	90	39	86
Mortality rates (%)	0.092	0.039	0.189	0.061	0.118
Population (thousand)	136	89	48	64	73
B. Ministry of Health					
No. deaths due to COVID-19	1161	888	273	-	-
Mortality rates (%)	0.084	0.101	0.055	-	-
Population (thousand)	1380	884	496	-	-

Notes: No. of deaths and mortality rates in percentage between mid-March and July are shown. In panel A, no. of deaths in COVID-19 survey are based on deaths at the time of the baseline survey. Deaths potentially due to COVID-19 include those due to suspected cases. Communities with highest 2% of mortality rates are dropped. Population is total population in the remaining communities at the time of the baseline survey. In panel B, no. of deaths in Ministry of Health data are deaths from mid-March through the last day of the baseline survey (August 2, 2020). Population is total population in the Departments of Loreto and Ucayali from 2017 Population Census.

Box 3:

COVID-19 spread through the region in two waves (April-June; August). The mortality rate in rural communities was higher in Ucayali than Loreto, which is opposite to results from government data. Mortality rate was also higher in campesino communities than indigenous communities, which is contrary to the focus of media reports on COVID-19 among indigenous groups.

Similarly, mortality rates between indigenous peoples and campesinos are strikingly different, according to our survey (this comparison is infeasible with the MINSA data). The mortality rate reported in campesino communities is almost twice that in indigenous communities (0.118% vs. 0.061%). This comparison is not driven by the differences between Loreto and Ucayali because the ethnic composition of communities is similar between the two departments, or by the larger size of campesino communities than indigenous communities (Table 1). As such, we conclude that the mortality rate due to COVID-19 among campesinos between mid-March and July was higher than that among indigenous people. This finding is contrary to the impression given by media reports on COVID-19, which focus on indigenous groups only.

Prevalence and mortality among communities

COVID-19 was widely prevalent across communities in Loreto and Ucayali: at least one case of COVID-19 (including suspected ones) was reported in most communities (91.5% by July in the baseline and 94.5% by August in the midline). At least one confirmed case of COVID-19 was reported in 12.3% of communities by July, which is incomplete because testing in communities has been limited. In contrast, the prevalence of mortality due to COVID-19 was limited to a relatively small proportion of communities: whereas 18% of communities experienced at least one death due to any reasons between mid-March and July, 13% experienced mortality potentially due to COVID-19.

Box 4:

COVID-19 has been prevalent across communities, and decreased from July to August (second wave). COVID-19 became more prevalent in indigenous communities than campesino communities since July and more so in Ucayali than Loreto over time.

The prevalence of COVID-19 across communities decreased from 44% at the time of the baseline survey in July to 32% at the time of the midline survey in August. The reduction was common especially among indigenous communities along the Pastaza and Lower Ucayali rivers (Figure 4). At the same time, among communities in the midline sample, 13% newly reported COVID-19 though they reported no cases in July (Table 3, panel A). Such communities were common especially among indigenous groups along the Upper Napo river (Figure 4). A quarter of communities reported a new case that occurred during the previous seven days at the time of the midline survey in August.

Table 3: Evolution of prevalence of COVID-19

		August			August		
		No	Yes	Total	No	Yes	Total
A. All							
		All (n=413):					
July	No	43.3	13.3	56.7			
	Yes	25.7	17.7	43.3			
	Total	69.0	31.0	100.0			
B. By ethnicity							
		Indigenous (n=225):			Campesino (n=187):		
July	No	25.8	17.8	43.6	64.2	8.0	72.2
	Yes	31.6	24.9	56.4	18.7	9.1	27.8
	Total	57.3	42.7	100.0	82.9	17.1	100.0
C. By region							
		Loreto (n=325):			Ucayali (n=88):		
July	No	46.8	15.1	61.9	30.7	6.8	37.5
	Yes	29.5	8.6	38.2	11.4	51.1	62.5
	Total	76.3	23.7	100.0	42.1	58.0	100.0

Notes: The sample is the midline sample. The percentage of communities with any case including suspected one is shown.

Figure 4 (a): Prevalence of COVID-19 cases - July

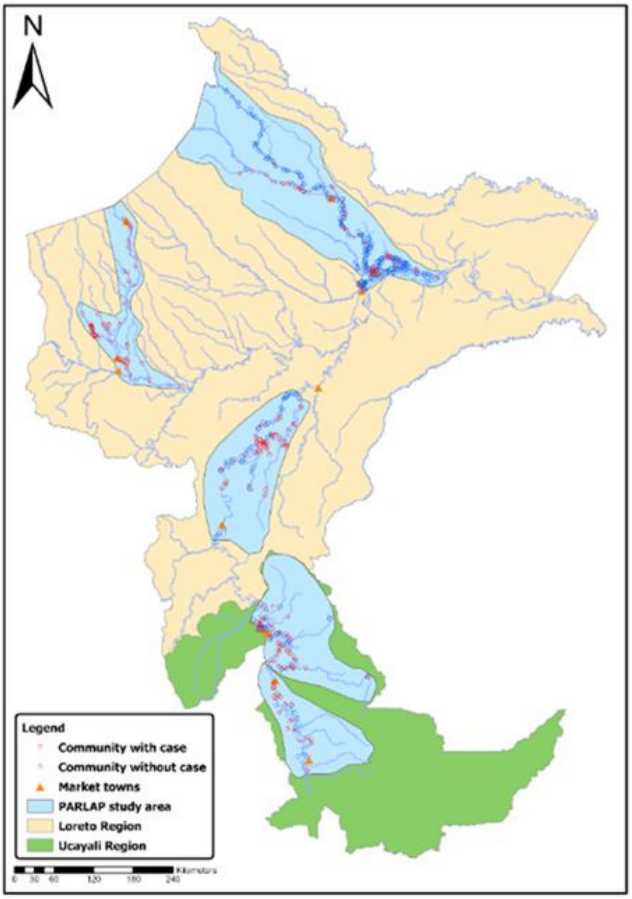


Figure 4 (b): Prevalence of COVID-19 cases - August

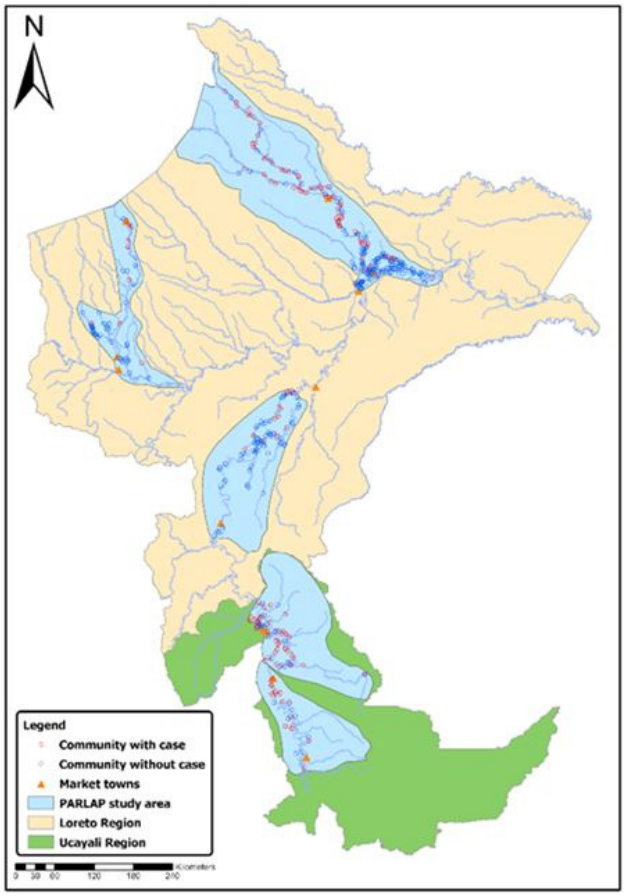


Figure 5 compares the prevalence of cases and mortality between indigenous and campesino communities. On the one hand, differences between these two types of communities were limited in July, after the first wave: no significant difference is found for the prevalence of COVID-19 and mortality potentially due to COVID-19 by July; as an exception, confirmed cases by July were more prevalent in indigenous communities than campesino communities. On the other hand, since July, the prevalence of COVID-19 (any case, suspected or confirmed, in July; any case in August; and new case in August) became more common in indigenous communities. The evolution in patterns of cases between July and August is consistent (Table 3, panel B). Thus, COVID-19 became more prevalent among indigenous communities since July.

Figure 6 compares the prevalence of cases and mortality across communities between Loreto and Ucayali. Except for the prevalence of COVID-19 by July, cases and mortality due to COVID-19 were more prevalent across communities in Ucayali than Loreto over time. The evolution in patterns of cases between July and August again are consistent (Table 3, panel C). This finding about mortality corroborates the comparison of mortality rates between these two departments found above (Table 2).

Photo by: Luis Ángel Collado Panduro

Figure 5: Prevalence of COVID-19 by ethnicity

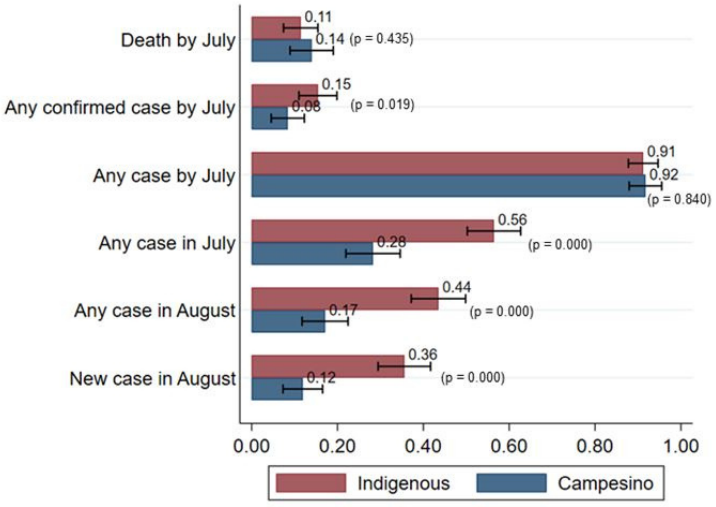
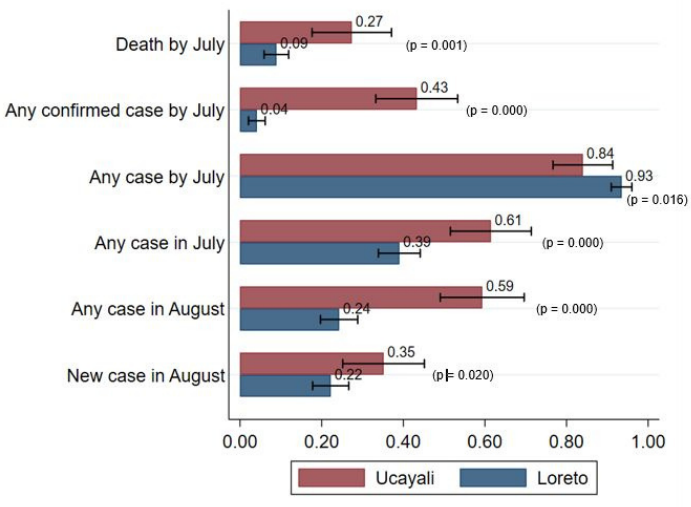


Figure 6: Prevalence of COVID-19 by region



Notes: Any case includes all cases, including confirmed and suspected cases. "by July" refers to "between mid-March and July". For each measure, the mean value and 95% confidence interval in each group is reported and the p-values for the t-test for the equality of the means between the two groups are in parentheses.

Potential causes of spread

We focus on two potential mechanisms for the spread of COVID-19: social gatherings and schools.

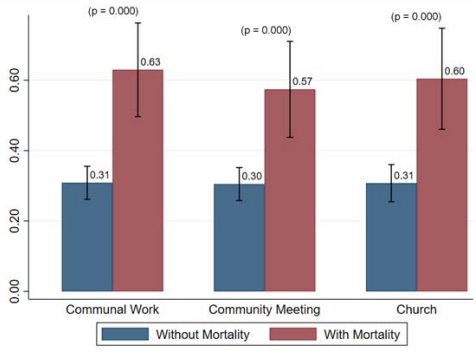
Social gatherings

Although avoiding social gathering is crucial to prevent the spread of COVID-19, gatherings for communal work, community meetings, and church services play central roles in rural life. How did people in our surveyed communities confront this dilemma? Did avoiding gatherings mitigate the spread or failing to do so rather lead to the furthering the spread of the virus?

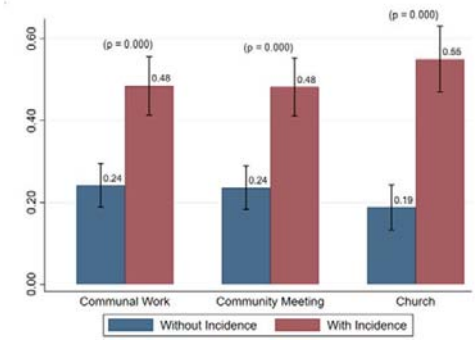
In 34% of the sample communities in July, communal work and community meeting were held during the previous seven days and in 35% of the communities with a church, a religious service was held; patterns in August were similar. Gatherings of all three types in July were more common in communities with at least one death potentially due to COVID-19 (between mid-March and July) and in communities with any COVID-19 case (including suspected ones) in July (Figure 7, panels A and B). These results suggest that such gatherings may have led to the spread of the virus and associated mortality in the first wave (April-June). In contrast, communal work and communal meetings in August were less common in communities with any new case during the previous seven days (panel C). These results suggest that communities reduced gatherings in response to new cases in the second wave (August). Hence, gatherings may have caused the spread of the virus until they were avoided to prevent contagion.

Figure 7

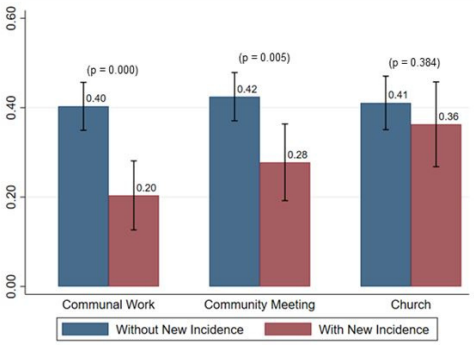
(a): Gatherings in July by mortality between mid-March and July



(b): Gatherings in July by incidence of COVID-19



(c): Gatherings in August by incidence of new cases of COVID-19



Notes: For each measure, the mean value and 95% confidence interval in each group is reported and the p-values for the t-test for the equality of the means between the two groups are in parentheses.

Schools

School closure is a common policy to prevent the spread of COVID-19, and both Loreto and Ucayali regional governments adopted this policy in March 2020. If compliance with this policy was incomplete in rural communities, however, school opening could rather lead to the spread. In many communities, schools are small, and some have only one teacher. Teachers work on an annual contract basis, staying in communities during the academic year, and regularly go to cities to collect their salary.

Box 5:

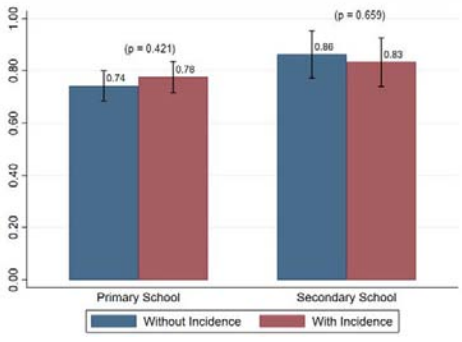
Gatherings may have caused the spread of the virus, although they were avoided to prevent the further spreading. School closure was incomplete. School re-opening may have led to the spread of the virus during the second wave.

In July, 76% of primary schools and 84% of secondary schools were closed, suggesting that despite the government policy of closure, a significant proportion of schools in our study area remained open or had re-opened. Qualitative telephone interviews and anecdotal evidence suggest that potential reasons for this noncompliance include teachers' lack of information about or misunderstanding of the government guidelines, their strategic behavior to secure wages, and their spontaneous effort to support students so they would not get behind. Many schools re-opened during the second wave: 35% of primary schools and 46% of secondary schools were closed in August.

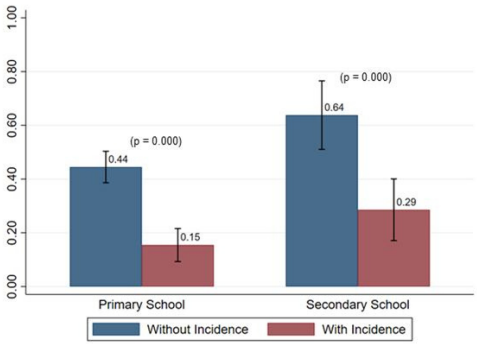
Although no significant difference in school closure (both primary and secondary) in July was found between communities with and without COVID-19 case (including suspected ones), school closure in August was less common in communities with any case and any new case of COVID-19 in August than communities with no such cases (Figure 8). These results suggest that school re-opening may have led to the spread of the virus in the second wave.

Figure 8

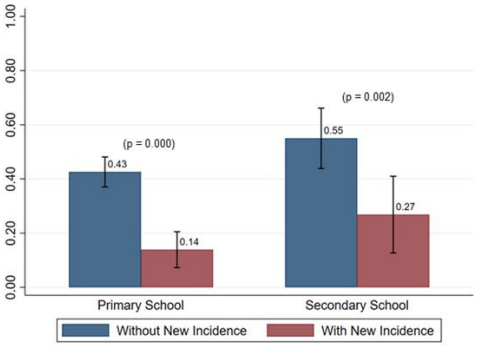
(a): School closure in July by incidence of COVID-19



(b): School closure in August by incidence of COVID-19



(c): School closure in August by incidence of new cases of COVID-19



Notes: For each measure, the mean value and 95% confidence interval in each group is reported and the p-values for the t-test for the equality of the means between the two groups are in parentheses.

Protective measures, responses, and assistance

Protective measures

The baseline survey in July asked which protective measures had been adopted in communities since mid-March. Only hand washing had been adopted (answering "yes") or partially adopted (answering "kind of") in most communities (96%); use of a mask and social distancing measures – avoiding physical greetings, maintaining enough distance, staying at home, avoiding gatherings, avoiding travel, restricting entry to the community – had not been adopted in 10% to 27% of communities (Figure 9, panel A). The rates of adoption (answering "yes") of hand washing, use of a mask, and restriction of entry to the community were higher than those of other social distancing measures (about 60% vs. about 40%).Thus, communities had difficulties in maintaining social distance in practice probably because of social and cultural norms.

The midline survey asked again which protective measures had been adopted by people in communities in August. The comparison of the baseline and midline data on the adoption of protective measures allows us to see how adoption patterns changed in the second wave. Although hand washing and the use of a mask became more common by August, all social distancing measures became less commonly used (panel B). In particular, respondents in more than a quarter of communities did not report staying at home, avoiding travel, or restricting entry to the community. Thus, although people adopted hand washing and the use of a mask more, they did not adopt social distancing measures that were difficult to practice. As such, people became more socially active and mobile in the second wave.

Figure 9 (a): Protective measures - July

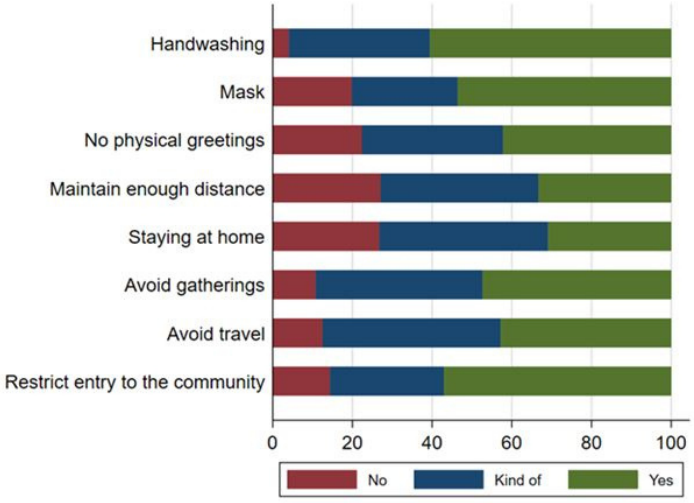
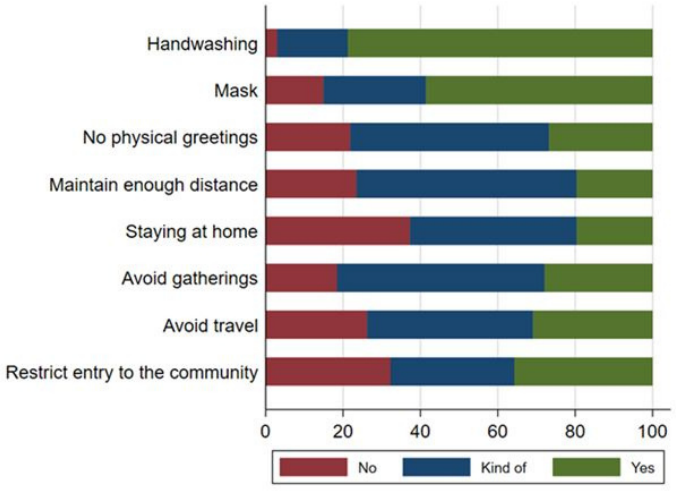


Figure 9 (b): Protective measures - August



Notes: The original sentence in the questionnaire is as follows: (1) "Maintain enough distance of at least 1 meter" for "Maintain enough distance", (2) "Staying at home and avoid going out unless necessary" for "Staying at home", (3) "Avoid gatherings with many people" for "Avoid gatherings", and (4) "Avoid travel to other villages/towns/cities" for "Avoid travel".

The adoption of each of the eight protective measures between mid-March and July, captured in the baseline survey was more common in communities with no COVID-19 cases (including suspected ones) in July (Figure 10, panel A). These results suggest that protective measures helped reduce the spread of the virus, especially in the first wave. The adoption of most social distancing measures, except staying at home in August, was more common in communities with any new case (panel B), indicating that people in communities with new cases adopted social distancing measures to reduce the spread in the second wave.

Photo by: Luis Ángel Collado Panduro

Box 6:

People adopted standard protective measures, which helped reduce the spread of the virus. Hand washing and use of a mask were more commonly adopted than social distancing measures.

Figure 10 (a): Effectiveness of protective measures - July

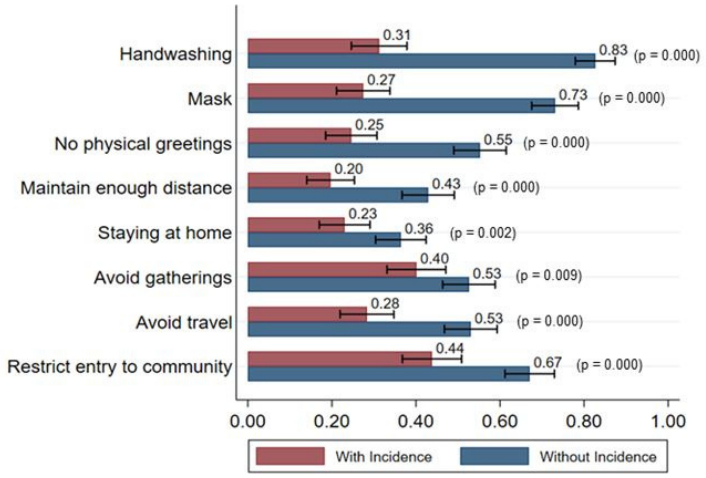
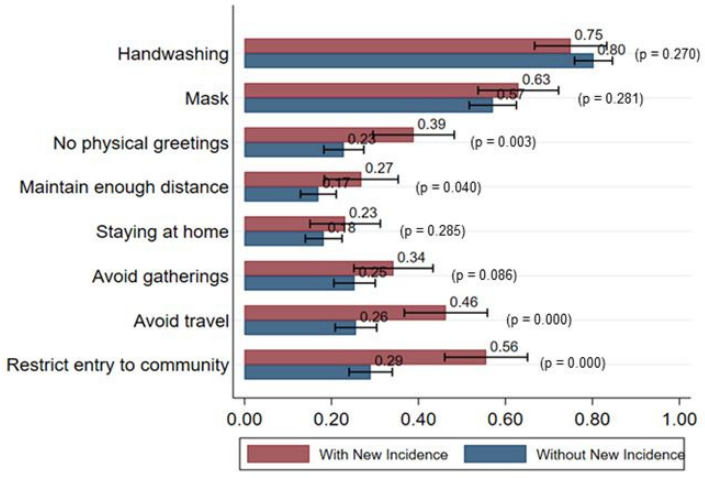


Figure 10 (b): Effectiveness of protective measures - August



Notes: The original sentence in the questionnaire is as follows: (1) “Maintain enough distance of at least 1 meter” for “Maintain enough distance”, (2) “Staying at home and avoid going out unless necessary” for "Staying at home", (3) “Avoid gatherings with many people” for "Avoid gatherings", and (4) "Avoid travel to other villages/towns/cities” for "Avoid travel". For each measure, the mean value and 95% confidence interval in each group is reported and the p-values for the t-test for the equality of the means between the two groups are in parentheses.

Responses

Among communities with COVID-19 cases (including suspected ones), access to medical services was limited in both July and August; instead, people in nearly all communities used traditional medicine – medicinal plants, such as ginger, matico, and lemon, gathered in the forest, harvested, or bought at markets, and traditional healers among indigenous people. These traditional remedies are culturally close to local people. Although the availability of a health post in communities is similar between indigenous and campesino communities (Table 1), access to medical services was more limited in indigenous communities than campesino communities in both July and August (Figure 11, panel A). Consistent with the lower availability of health posts in communities in Loreto than Ucayali, access to medical services was more limited in Loreto than Ucayali in both July and August (panel B).

Box 7:

With limited access to medical services, people relied heavily on traditional medicine. People also relied more on wild resources such as fishing, hunting, and NTFP gathering for food and earnings

Forest peasants who use wild resources, such as fish, game, and forest products, for subsistence and cash income resorted to those resources to cope with the pandemic. According to the midline survey, people relied more on wild resources (85% of communities), especially fishing (82%), hunting (70%), and non-timber forest product (NTFP) gathering (58%). This was more so among indigenous communities, especially for hunting and NTFP gathering (Figure 12).

Figure 11 (a): Access to medical services by ethnicity

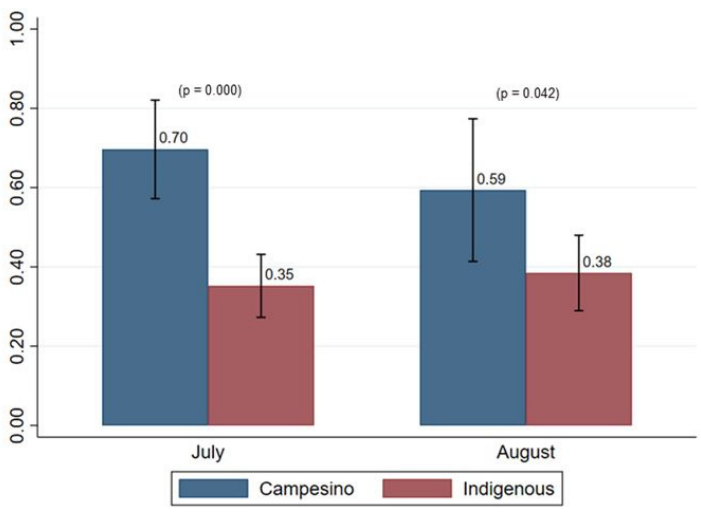
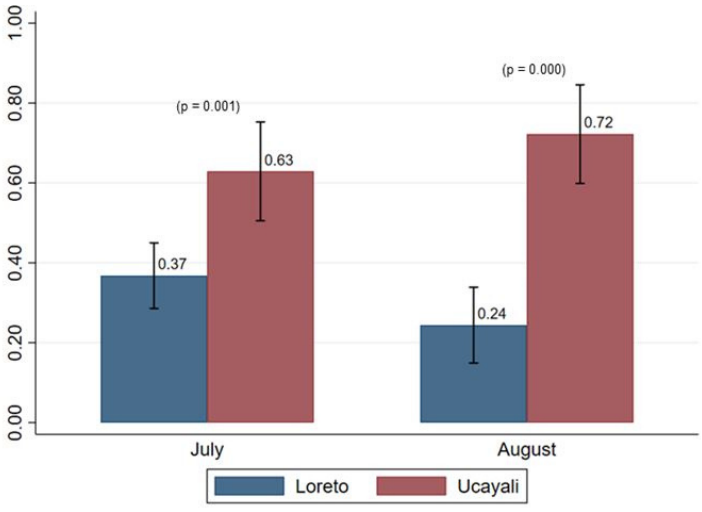
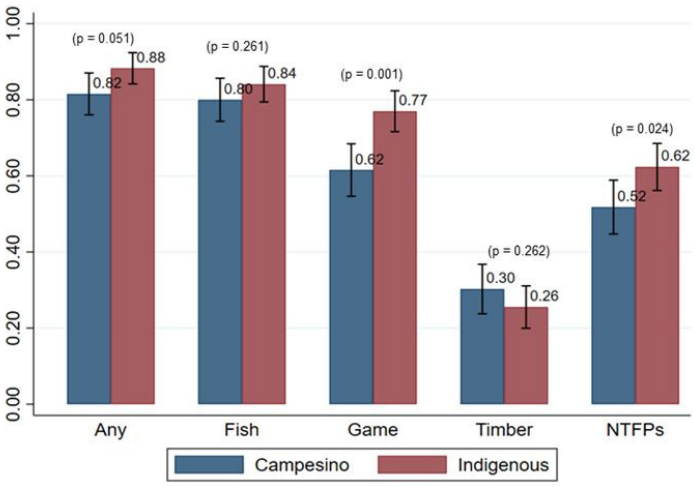


Figure 11 (b): Access to medical services by region



Notes: For each measure, the mean value and 95% confidence interval in each group is reported and the p-values for the t-test for the equality of the means between the two groups are in parentheses.

Figure 12: Wildlife resource use by ethnicity



Notes: For each measure, the mean value and 95% confidence interval in each group is reported and the p-values for the t-test for the equality of the means between the two groups are in parentheses.

Assistance

In July, people in most communities (97%) had received some assistance since mid-March. Whereas food and cash assistance were common (over 80%), most communities received no provision of masks, sanitizer, soap, and medicines (Figure 13, panel A). Most support received was provided by the government; support from other sources (e.g., indigenous federations, NGOs, and international organizations) was very limited (panel B).

Box 8:

People received cash and food assistance mostly from the government, but not health assistance. People's travel to city to seek cash assistance from the government to cope with COVID-19 might have furthered the spread of the virus.

Figure 13 (a): Assistance received - Type

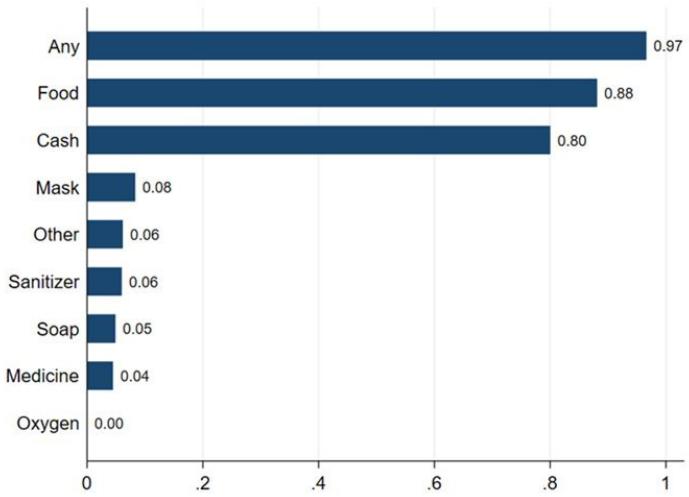
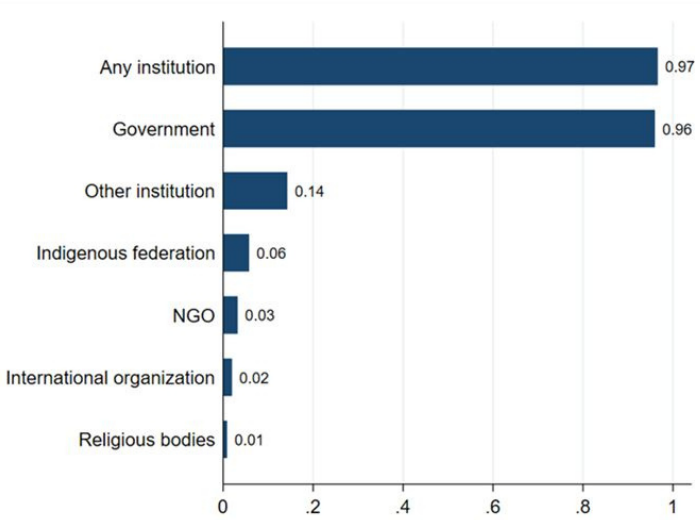


Figure 13 (b): Assistance received - Source



Receipt of government cash assistance was more common in communities with mortality potentially due to COVID-19 between mid-March and July, and in communities with COVID-19 cases including suspected ones in July; there was no such difference in receipt of government non-cash (mainly food) assistance (Figure 14). Although the government delivered non-cash assistance to communities, people had to travel to city to collect cash support; such trips might have furthered the spread of COVID-19 and mortality in rural communities. The midline survey in August asked what assistance people in the community needed at that time. In over 70% of communities, medical supplies (medicine, masks, sanitizer, soap) and food were needed; in comparison, cash was relatively less needed (about 40%).

Photo by: Luis Ángel Collado Panduro

Figure 14 (a): Government cash support by mortality between mid-March and July

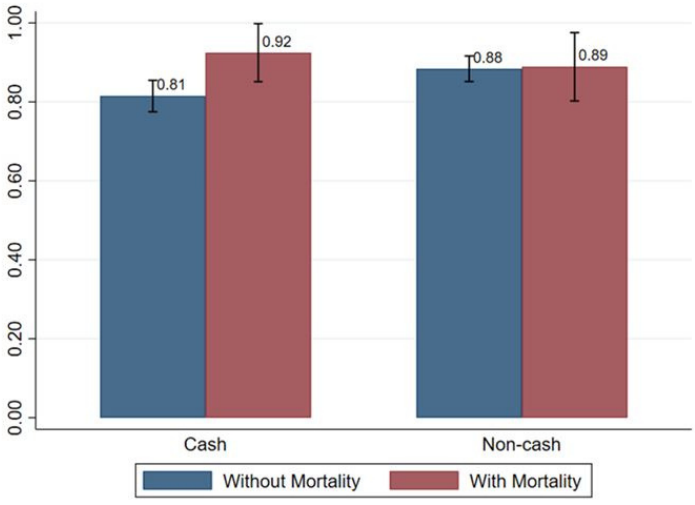
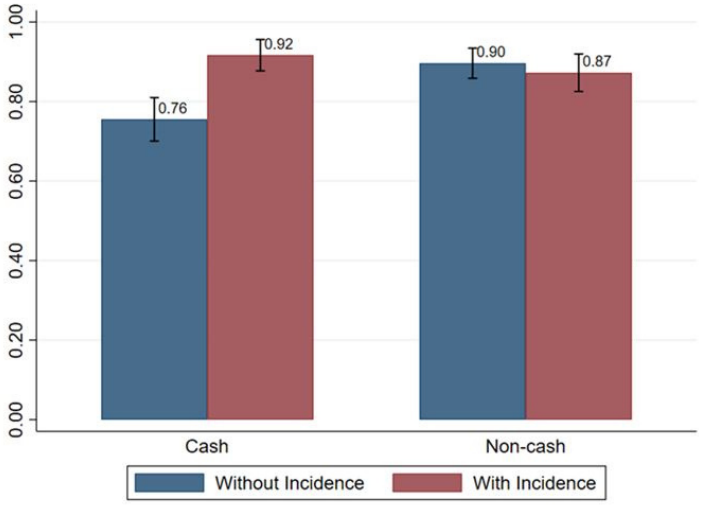


Figure 14 (b): Government cash support by incidence of COVID-19 between mid-March and July



Notes: For each measure, the mean value and 95% confidence interval in each group is reported and the p-values for the t-test for the equality of the means between the two groups are in parentheses.

Policy implications

Findings of the PARLAP telephone surveys on COVID-19 among rural communities suggest the following implications to improve the design and implementation of policies during and after the pandemic in the Peruvian Amazon.

First, it is crucial to better understand the prevalence of COVID-19 and its consequences in rural communities about which available data are very scarce. Many communities are remote, cannot be reached by telephone, and have limited access to health services and testing; at the same time, people in those communities are mobile through river transportation. Although data collection under these constraints is challenging as we witnessed, it is critical for sound policymaking. As exemplified by mortality rates, the available government data, which mainly capture conditions in more urbanized communities, could be significantly incomplete, and relying solely on such data could lead to ineffective or even adverse interventions for rural peoples. At the same time, information about confirmed cases of COVID-19 in our surveys is incomplete because access to testing in rural communities is limited. Improved access to testing is vitally important, which requires strengthening rural health sector and services.

Second, it is critical to improve communication infrastructure and services in rural communities. In Loreto and Ucayali, many communities lack basic communication infrastructure, in particular telephone access, which was worsened by the suspension of public telephone service in late 2019. Poor communication infrastructure could cause a lack, incompleteness, or delay of information or misunderstanding about COVID-19, protective measures, and government policies. Lack of telephone service also severely constrains data collection for research and to inform policy.

Third, structural differences across communities need to be carefully considered. Compared to Loreto, the mortality rate due to COVID-19 was higher and cases and mortality due to COVID-19 were more prevalent across communities in Ucayali. Compared to indigenous people, the mortality rate due to COVID-19 was higher among campesinos, whereas COVID-19 became more prevalent during the second wave in indigenous communities. Research is needed to understand the factors that underlie such differences, but clearly both groups require attention.

Box 9:

Policy implications include the need: (1) to gather data to better inform policies to reduce contagion and impacts with attention to differences across communities; (2) to improve communication infrastructure and services for rural communities (especially telephone); (3) to correct unintended adverse consequences of assistance polices; (4) to tackle the social cost of protective measures; and, (5) to consider linkages between COVID-19 and wild resource conservation.

Fourth, policy makers need to resolve practical problems of current policies that could potentially further the spread of virus in rural communities in unintended ways. Alternative policy design and implementation – both new policies and improvements in current policies – are needed, including the following: alternative protocols to provide social assistance, such as mobile money and itinerant platforms, and strengthening rural education sector through better communication with teachers, measures to better incentivize teachers, and provision of information and communication technology resources.

Many of these improvements require infrastructure that most rural communities lack. Research is needed to identify promising and feasible approaches in the local context (e.g., using small radios as a practical option in the short run).

Fifth, policymakers need to acknowledge both the promise and challenge of adopting socially costly protective measures, such as social distancing and avoiding gatherings, for rural people. If these measures are adopted well, they could reduce the spread of virus; failing to adopt them could instead lead to the further spreading of the virus. Research is needed to see which factors can affect adoption of protective measures and interventions that can promote their adoption considering underlying socio-cultural norms.

Sixth, policy linkages need to receive attention. Faced with limited access to health services to cope with pandemics like COVID-19, forest peasants – both indigenous peoples and campesinos – rely on traditional medicine (for both treatment and prevention) and wild resources (for both food and earnings). Conservation of those resources thus shapes the scope of these coping strategies (as a form of natural insurance) for people's health, nutrition, and welfare. Research is needed to better understand the potential of traditional medicine and local wild resource use and management. Policies strengthening local ecological knowledge and sustainable resource use could be complementary to policies on pandemics.

To address some of these research questions is the next step of our project. By combining COVID survey data with our original PARLAP community survey, remote sensing and GIS data, we will examine how COVID-related measures are related to community, geographical, and environmental factors. Findings from this research promise to provide specific policy-relevant insights for health care, poverty alleviation, and conservation during and after the pandemic.

Acknowledgements

We gratefully acknowledge the efforts of our two teams that conducted the phone survey, under challenging conditions, in Loreto (Carlos Rengifo Upiachihua, Elsa Doris Díaz Ríos, Kathicsa Naydu Mendoza Montalván,Gerardo Torres Vertiz, Willy Denny Rodríguez Pezo and Iris Arévalo Piña) and Ucayali (Luis Ángel Collado Panduro, Claudio Sinuri Lomas, Diego Fernando Dávila Gomez, and Eduardo Carlos Perea Tuesta). This study would not have been possible without their tireless efforts and steadfast dedication to the project, and the support of community authorities throughout the region. In addition, we thank our research assistants, Yuma Noritomo, Soyoung Kim, and Alondra García Villacres, and nine data entry operators, for their fine work. This study was supported by grants from the Japan Society for the Promotion of Science (23243045; 26245032; 18H05312; 18KK0042), the Social Sciences and Humanities Council of Canada (435-2020-0182), and the Arts and Science Tri-Council Bridge Funding Program at the University of Toronto. Any errors of interpretation are solely the authors' responsibility.