FINAL INFORM PROJECT COVID-19 RESPONSE IN PERU

Lima, Perú

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FINAL REPORT UNTIL NOVEMBER, 2022
PROJECT "COVID-19 RESPONSE IN PERU"
Award number: 72052720FA0000X

1. Introduction

On April 21, 2020, Socios En Salud Sucursal Perú (SES), a subsidiary of the international non-profit organization Partners in Health (PIH) based in Boston USA, signed an agreement with the United States Agency for the International, USAID, to collaborate in the project **"COVID-19 Response in Perú."**

The project had two years of activity according to the agreement signed. The main objective of the first year of this project was to increase and improve the active and intensive search for community cases of COVID-19 and their contacts, and the identification of high-risk groups (population of migrants, women, and people with comorbidities: arterial hypertension, diabetes mellitus. cancer, tuberculosis, among others) for infection with the SARS-COV-2 virus and offer alternative approaches to access health services. In addition, this project sought to reduce barriers to access to medical care for different health problems. The main objective of the second year of this project was to reduce morbidity and mortality from COVID-19, mitigate transmission, and strengthen health systems, including to prevent, detect, and respond to pandemic threats.

The main scope at the beginning of the project were the regions under the jurisdiction of the Regional Health Management of Lambayeque (GERESA Lambayeque), the Regional Health Directorate of Loreto (DIRESA Loreto), the Directorate of Integrated Health Networks of Lima North (DIRIS Lima North) and the Directorate of Integrated Health Networks of Lima East (DIRIS Lima East); but these zones were expanded with the months according to addenda in the agreement to include: regions of the Peruvian amazon (DIRESA San Martin and DIRESA Madre de Dios), regions of the south of Perú (DIRESA Ica, GERESA Arequipa and DIRESA Cuzco), DIRESA Cajamarca and DIRESA Tumbes.

To achieve these objectives, activities was programmed in two years:

1.1 Components of the first year (4/21/2020 – 10/30/2021)

Component 1: Implement a health care strategy for patients with severe COVID -19
• Activity 1.1 - Support epidemiological surveillance of COVID-19.
Component 2: provide high - quality health care to people with suspected COVID-19 and patients with other diseases in the context of COVID - 19
• Activity 2.1: Improve the installed capacities of hospitals in Lima and in the provinces for the care of COVID-19. • Activity 2.2: Increase access to quality ongoing care for COVID-19 and non-COVID-19 conditions
Component 3: Education about COVID-19 and search for COVID -19 cases through the community network of health promoters: and provide affected families with socioeconomic support.
• Activity 3.1: Implement a network of community promoters for education, tracking of C0VID -19 cases and socioeconomic support

1.2 Components of the second year (9/29/2021 – 11/30/2022)

Component 1: Epidemiological surveillance in general population (Action Line: Support public health interventions to manage COVID-19)
• Activity 1.1 - Surveillance of SARV-Cov-2 in general population.
Component 2: Mitigate the effects of pandemic in other essential public health programs: (Action Line: Mitigate negative effects on other essential health programs through targeted measures and investments and build resilient, integrated health-systems that can better respond to wider health needs and future biological threats)
• Activity 2.1: Improving the case notification rates of essential public health programs
Component 3: Community based-model oxygen monitoring system to early identification of COVID-19 cases and need for oxygen supplementation and scale-up to other regions (Action Line: Support the delivery of evidence-based clinical interventions and expand access to diagnostics and therapeutics to detect, manage, and treat COVID-19)
• Activity 3.1: Implement a network of community promoters for education, tracking of C0VID -19 cases and socioeconomic support
Component 4: Assessment of risk infection in COVID-19 areas in primary health centers & prepare infection control plans. (Action Line: Support the delivery of evidence-based clinical interventions and expand access to diagnostics and therapeutics to detect, manage, and treat COVID-19)
• Activity 4.1: Preparing control infection plans to inform health authorities
Component 5: Assessment of status of oxygen concentrators and PSA plants and development of maintenance plans and do some corrective maintenance (Action Line: Support the delivery of evidence-based clinical interventions and expand access to diagnostics and therapeutics to detect, manage, and treat COVID-19)
• Activity 5.1: Mapping of oxygen assets, assessing their status and drawing up a maintenance plan
• Activity 5.2: Preparing a training program for the operation and maintenance of oxygen assets
Component 6: Improve the oxygen delivery capacity in the health facilities (Action Line: Support the delivery of evidence-based clinical interventions and expand access to diagnostics and therapeutics to detect, manage, and treat COVID-19)
• Activity 6.1: Addition of oxygen solutions on primary health centers in rural or indigenous communities

2. Alignment to National Policies

The activities of this project are based on current guidelines of the health entities that govern the regulations at the national level. The documents use for reference are as follows:

- RM 039-2020-MINSA: Technical Document National Preparedness and Response Plan against the risk of introduction of the Coronavirus 2019-nCOv. Jan, 30.
- RM 141-2020-MINSA: DS 088-MINSA-2020-CDC Health Directive for the implementation and operation of Rapid Response Teams (ERR). Mar, 31.
- RM N° 145-2020-MINSA: Sanitary Directive for the Epidemiological Surveillance of Coronavirus disease (COVID-19) in Peru. Mar, 31.
- RM 306-2020 – NTS 160-2020 Technical Health Standard for the Adequacy of the Organization of Health Services. May, 21.

- RM N° 905-2020-MINSA: Sanitary Directive for the Epidemiological Surveillance of Coronavirus disease (COVID-19) in Peru. Nov, 01.
- RM 928-2020 – Technical Document Preparedness and response plan for possible second pandemic wave due to COVID-19 in Peru. Nov, 20.
- RM 004-2021 - Technical Health Standard for the Adequacy of First Level Health Services. Jan, 07.
- RM 835-2021 – Technical Document Response Plan to Second Wave and Possible Third Pandemic Wave due to COVID-19 in Peru, 2021. Jul, 09.
- RM 858-2021 - Health Directive for the use of rapid tests for the detection of SARS-CoV-2 virus antigens in Peru, 2021. Jul, 15.
- RM N° 881-2021-MINSA: Sanitary Directive for the Epidemiological Surveillance of Coronavirus disease (COVID-19) in Peru. Jul, 19.
- RM 1218-2021 – Technical Health Standard for the Prevention and Control of COVID-19 in Peru, 2021. Nov, 03.

3. Indicators

3.1 Indicators of the first year (4/21/2020 – 10/30/2021)

Component 1: Implement a health care strategy for patients with COVID-19, theirs contacts and groups at high risk of developing severe COVID-19						
Activity 1.1: Supporting epidemiological surveillance of COVID-19						
Indicators	**First year**			**Second Year**		
	Goal	**Advanced**	**Percentage achieved**	**Goal**	**Advanced**	**Percentage achieved**
Number of Rapid Response Teams (ERR) actively searching for COVID-19 cases	10	10	100%	20	20	100%
Number of USAID-supported laboratories or facilities with diagnostic testing capacity for COVID-19	2	2	100%	Not applicable		
Number of rapid diagnostic tests performed on suspected COVID-19 cases, contacts of a new COVID-19 case, and groups at high risk of developing severe illness.	36000	37889	>100%	18000	78454	>100%
Number of molecular tests performed on suspected cases of	1800	28515	100%	900	3297	> 100%

COVID-19, and on groups at high risk of developing severe disease						
Number of professional managers and/or epidemiologists hired	10	10	100%	Not applicable		
Number of health care providers trained in conducting and/or transporting COVID-19 tests	25	735	>100%	Not applicable		
Number of individuals trained in epidemiological surveillance and rapid response for COVID-19	100	757	>100%	40	70	>100%
Component 2: Provide high-quality health care to people with suspected COVID-19 and patients with other illnesses in the context of COVID-19						
Activity 2.1 Improve the installed capacities of health facilities in Lima and in the province for the care of COVID-19						
Number of health facilities with oxygen points and networks installed, or with concentrators installed	19	42	>100%	Not applicable		
Number of oxygen concentrators and oxygen points for COVID-19 management donated by USAID	450	626	>100%	Not applicable		
Number of oxygen-producing plants implemented or improved	1	4	100%	Not applicable		
Number of assessments conducted on the oxygen ecosystem, for the effective use and placement of respiratory ventilators	15	17	>100%	Not applicable		
Number of assessments conducted on the oxygen ecosystem in Regional Health Directorates, Directorates of Integrated Health Networks and Hospitals	3	3	100%	Not applicable		

Number of health facilities that received Personal Protective Equipment	4	6	>100%	Not applicable		
Number of containers for the temporary storage of corpses installed and operating	2	4	>100%	Not applicable		
Activity 2.2 Increase access to continuous, quality care for COVID-19 and non-COVID-19 conditions						
Number of COVID-19 and non-COVID-19 tele orientation calls	258600	807728	>100%	400	1715	>100%
Home delivery number of medicines for non-COVID-19 conditions	4320	1797	42%	Not applicable		
Number of sputum samples collected	1941	5539	>100%	150	394	>100%
Number of GeneXpert cases positive for tuberculosis	39	155	>100%	3	25	>100%
Number of mobile TB campaigns carried out	8	8	100%	Not applicable		
Number of mobile mental health applications developed	1	1	100%	Not applicable		
Number of mental health teleconsultations conducted	1200	2681	>100%	150	227	>100%
Number of individuals referred to MINSA for mental health care	200	326	>100%	75	142	>100%
Component 3: Provide education on COVID-19, search for COVID-19 cases through the community network of health promoters, and socioeconomic support to affected families						
Activity 3.1: Implement a network of community promoters for education, monitoring of COVID-19 cases and socioeconomic support						
Number of printed COVID-19 educational material	20000	20000	100%	Not applicable		
Number of families receiving socio-economic support	90	7063	>100%	Not applicable		

Number of home visits made by community health agents to provide education, conduct epidemiological surveillance, and identify groups at risk of developing severe COVID-19 disease	18000	19382	>100%	3300	3600	>100%

3.2 Indicators of the second year (9/29/2021 – 11/30/2022)

Component 1: Epidemiological surveillance in general population			
Activity 1.1: Surveillance of SARV-Cov-2 in general population			
Indicators	**Goal**	**Advanced**	**Percentage achieved**
Report of seroprevalence in North Lima in the general population, with at least 2000 people screened with a serological test for COVID-19.	1	1	100%
Report on the implementation of the epidemiological surveillance system in DLN	1	1	100%
Component 2: Mitigate the effects of pandemic in other essential public health programs			
Activity 2.1 Improving the case notification rates of essential public health programs			
Number of screenings for tuberculosis, DM2, arterial hypertension, mental health problems or HIV.	6650	16548	>100%
Number of cases of tuberculosis, DM2, arterial hypertension, mental health problems or HIV identified and referred to the health system.	400	795	>100%
Component 3: Community based-model oxygen monitoring system to early identification of COVID-19 cases and need for oxygen supplementation and scale-up to other regions			
Activity 3.1: Self-monitoring and home clinical monitoring of SARV-Cov-2 infected patients			
Cases of COVID-19 captured in the community and monitored at home.	200	1002	>100%
Number of monitoring home visits made by CHW	4500	8016	>100%
Number of home visits made by epidemiological surveillance teams (EVE)	2000	23920	>100%
Component 4: Assessment of status of measures of infection prevention and control in COVID-19 areas in primary health centers			
Activity 4.1: Preparing control infection plans to inform health authorities			
20 infection control plans developed & informed to health authorities in 5 regions	20	20	100%
Component 5: Assessment of status of oxygen concentrators and PSA plants and development of maintenance plans			
Activity 5.1: Mapping of oxygen assets, assessing their status and drawing up a maintenance plan			
Evaluation and maintenance plans of oxygen assets in at least 5 regions	15	15	100%

Activity 5.2: Preparing a training program for the operation and maintenance of oxygen assets			
Training course on the use and maintenance of oxygen assets included in the National School of Public Health (ENSAP)	1	1	100%
Final Report of the Pilot Program of the Training Course on the use and maintenance of oxygen systems in at least 5 regions	1	1	100%
Component 6: Assessment of status of oxygen concentrators and PSA plants and development of maintenance plans			
Activity 6.1: Addition of oxygen solutions on primary health centers in rural or indigenous communities			
Evaluation and installation of solar powered oxygen systems in 3 regions	3	5	>100%

4. Detail of activities

4.1 Activities of the first year 4/21/2020 – 10/30/2021)

Activity 1.1 Support in the epidemiological surveillance of COVID-19

Staff were hired to constitute 10 rapid response teams (ERR) that began their activities on April 21, 2020 in the jurisdiction of DIRIS Lima Norte. Subsequently, since May 13, 2020, five of them began to do their activities in the jurisdiction of DIRIS Lima Este, culminating its activities in this area in July 2020. After that date, they returned to carry out their activities in the DIRIS Lima Norte. Each of the 10 rapid response teams consisted of a nurse, a nursing technician, and two community health workers. The activities that were developed will be explained below:

Between April and August 2020, contact tracing was carried out through home visits to people with COVID-19 in the districts of North Lima and East Lima. This mobile care offers, prioritized during the months of mandatory social immobilization, differed from the national standard of care due to the inclusion of any household contact, regardless of age, sex, or presence of symptoms at the time of the interview. During this visit, the nurse and the nursing technician conducted interviews to identify the risk of contracting COVID-19, counseling aimed at proper isolation or quarantine, and the execution of rapid antibody or molecular tests (RT-PCR). Meanwhile, community health workers were conducting home visits around homes where COVID-19 cases were found. This work allowed the identification of respiratory infections for the clinical team to approach.

At first, 757 community health workers (CHW) were trained in infection control, adequate use of personal protective equipment and knowledge about COVID-19 prevention issues, to participate in activities to actively search for new COVID-19 cases. On May 25th, 2020, the CHW began active case finding activities in an articulated work with the SES ERRs. 25 CHW conducted 17,994 home visits searching for patients with fevers or people with potential COVID-19 symptoms. 37,889 people were

screened, finding 1,017 people (3.3%) suspected of having COVID-19. This first stage allowed for the improvement in detection of COVID-19 cases and census of contacts between community workers.

The need for epidemiological surveillance of COVID-19 in risk groups has been of vital importance in the joint work with local health authorities. In this way, rapid antibody tests were screened for occupational risk groups located in markets and transportation services, as well as risk age groups such as those identified in nursing homes with molecular tests (RT-PCR). These activities took place in the months of June and July 2020.

As of June 2020, the Ministry of Health began to strengthen face-to-face services in its establishments. In this way, we prioritize the care offered through "COVID Points" or differentiated triage spaces for the detection of COVID-19 cases. We support this activity from July 2020 to January 2021, in 4 strategic establishments in the districts of San Martín de Porres (1), Rimac (1), and Comas (2). Rapid antibody and antigen tests were applied, as well as molecular tests for COVID-19 (RT-PCR) according to Peruvian guidelines. In order to track the burden of COVID-19 infection, we implemented home activities for the measurement of seroprevalence and prevalence of SARS-CoV-2 infection in the district of Carabayllo (between November and December 2020) and San Martín de Porres (between March and April 2021), through the use of rapid antibody and antigen tests. The prevalence rates of COVID-19 around 3.4% (Carabayllo) and 8.5% (San Martín de Porres) were identified; and the seroprevalence was 25% and 44% respectively. All this information was shared with the local health authorities for decision-making.

And finally, to contribute to COVID-19 case search activities, the Socios En Salud Molecular Biology Laboratory received its accreditation to process molecular tests for SARV-CoV-2 on June 4, 2020. The Molecular Biology Laboratory processed 28,515 samples by RT-PCR from different DIRIS in Lima, whose results are reported on the INS website. Likewise, a mobile laboratory for molecular tests was implemented, which was donated to the National Institute of Health (INS) on July 27, 2020. This Mobile Laboratory, called COVID Masqak, processed a total of 45,380 molecular tests,[1] mostly during its journey through the regions of Junín, Huancavelica, and Pasco. The specifications of the laboratory prototype were made available to various institutions (INS and some regions), and technical assistance was provided for the implementation of new mobile laboratories: COVID Masqak Iskay (24,718 tests performed) and COVID Masqak Kimsa (36,942 tests performed).

[1] https://web.ins.gob.pe/es/indicador/pruebas-moleculares-realizadas-para-el-diagnostico-de-covid-19

In the second year of the project, a total of 78454 rapid tests, 71870 antigen and 6578 antibody tests, both were by immunochromatography, have been carried out. In this period, 3297 molecular tests have also been carried out, which includes the tests carried out on the venezuelan migrant population that is in a situation of vulnerability to which it has been supported since February of 2022.

Activity 2.1 Improvement of the installed capacities of health facilities in Lima and other provinces for the care of COVID-19

a) Improvement of oxygen capacity in hospitals

In the first stage, the activities were mainly focused on enhancing the capacity to supply oxygen in hospitals, it was possible to improve the delivery of oxygen in nine hospitals belonging to eight geographical regions of Peru:

- Ica, Hospital Regional de Ica: 30 double oxygen points.
- La Libertad, Hospital Belén de Trujillo: 24 oxygen points.
- Lambayeque, Hospital Regional de Ferreñafe: 24 oxygen points.
- Callao, Hospital de Ventanilla: 12 oxygen points.
- Lima Este, Hospital Nacional Hipólito Unanue: 24 oxygen points.
- Lima Norte, Hospital Cayetano Heredia: 15 oxygen points.
- Lima Norte, Hospital de Apoyo de Carabayllo: 20 ten liters oxygen concentrators.
- San Martin, Hospital de Juanjui: 10 ten liters oxygen concentrators.
- San Martin, Hospital Rural de Nueva Cajamarca: 10 ten liters oxygen points. Additionally, 12 oxygen cylinders were donated to Hospital Rural de Nueva Cajamarca.

Likewise, before April 21, 2020 (start of the project) works were carried out for the placement of oxygen points in 2 Hospitals of DIRIS Lima Norte: Hospital Cayetano Heredia (24 oxygen points) and Hospital Nacional Sergio Bernales (8 double oxygen points); although they were completed and paid after the project start date.

In addition, the oxygen generating plant of the Hospital Regional de Lambayeque was strengthened, in such a way that it can supplement oxygen to its entire hospital network with the necessary pressure that the maximum demand requires.

This activity will continue using some remaining funds of the first year of the project, between October 2021 and June 2022, a total of 100 oxygen points has been implemented:

- Arequipa, Hospital Honorio Delgado: 25 points.
- Arequipa, Hospital Goyoneche: 25 points.
- La Libertad, Hospital Nacional Belén: 12 points.
- Lambayeque, Hospital Referencial de Ferreñafe: 2 points.

- Lima, Hospital Cayetano Heredia: 12 points.
- Lima, Hospital Hipólito Unanue: 24 points.

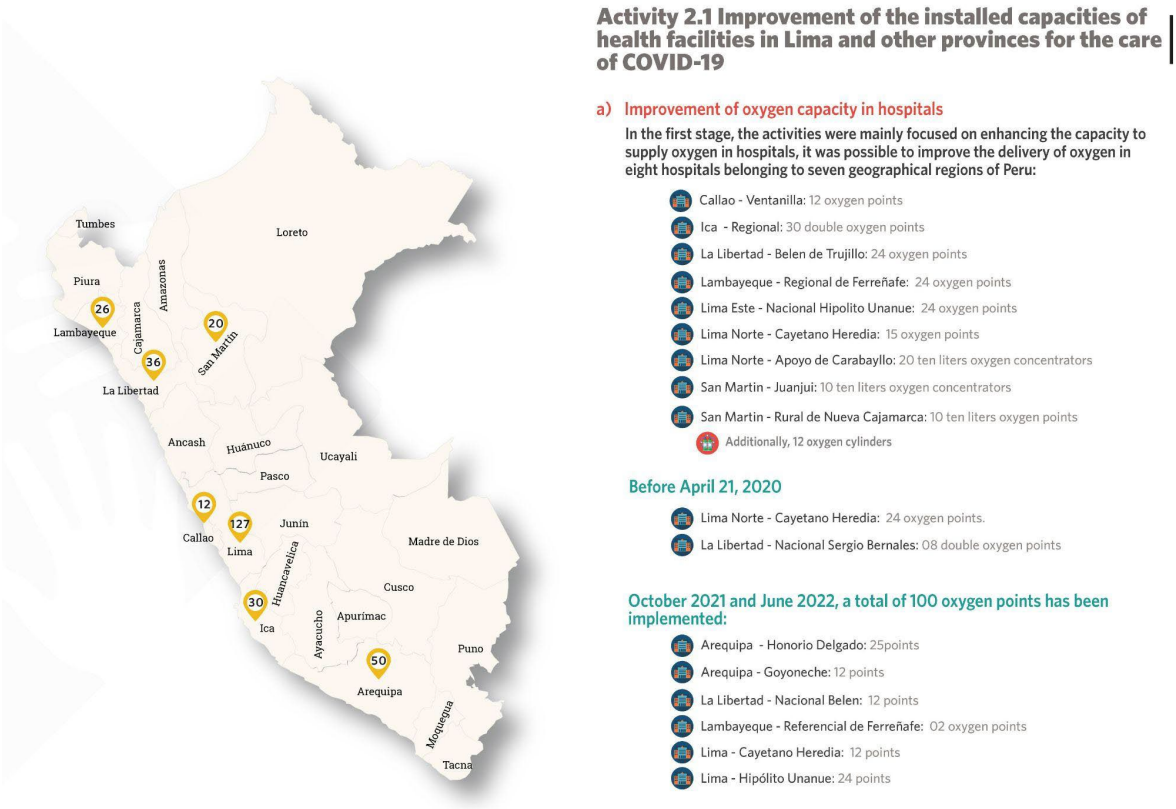

Figure 1. *Improvement of the installed capacities to delivery oxygen in hospitals*

Also, 01 manifold panel system was implemented in the Hospital Referencial de Ferreñafe in Lambayeque Region, 01 oxygen generating plants was implemented in Hospital Belen de Trujillo, in La Libertad Region and 01 oxygen generating plants was implemented in Centro de Salud Iberia.

b) Improvement of oxygen capacity in primary health facilities

The capacity to supply oxygen in level I4 primary health centers was strengthened. Oxygen delivery was improved in 12 centers in 8 regions of the country:

- Ica, Centro de Salud San Juan de Dios de Pisco: 15 points.
- La Libertad, Centro de Salud Sagrado Corazón: 18 points.
- La Libertad, Centro de Salud Alto Trujillo: 14 points.
- La Libertad, Centro de Salud El Milagro: 15 points.
- Lambayeque, Centro de Salud Olmos: 10 points.
- Lambayeque, Centro de Salud José Leonardo Ortiz: 12 points.
- Lambayeque, Centro de Salud de Reque: 9 points.
- Lima Este, Centro de Salud Miguel Grau, Chaclacayo: 12 points.

- Lima Este, Centro de Salud Santa Anita: 08 points.
- Lima Este, Centro de Salud San Fernando, Ate: 12 points.
- Loreto, Centro de Salud Moronacocha: 2 points.
- Loreto, Centro de Salud Nanay: 3 points.
- Loreto, Centro de Salud San Juan: 3 points.
- Loreto, Centro de Salud 6 de Octubre: 2 points.
- Madre de Dios, Centro de Salud Iberia: 15 points.
- San Martin, Centro de Salud Nueva Cajamarca: 9 points.
- San Martin, Centro de Salud San Martin de Alao: 12 points.
- Tumbes, Centro de Salud Zarumilla: 8 points.
- Tumbes, Centro de Salud Pampa Grande: 12 points.

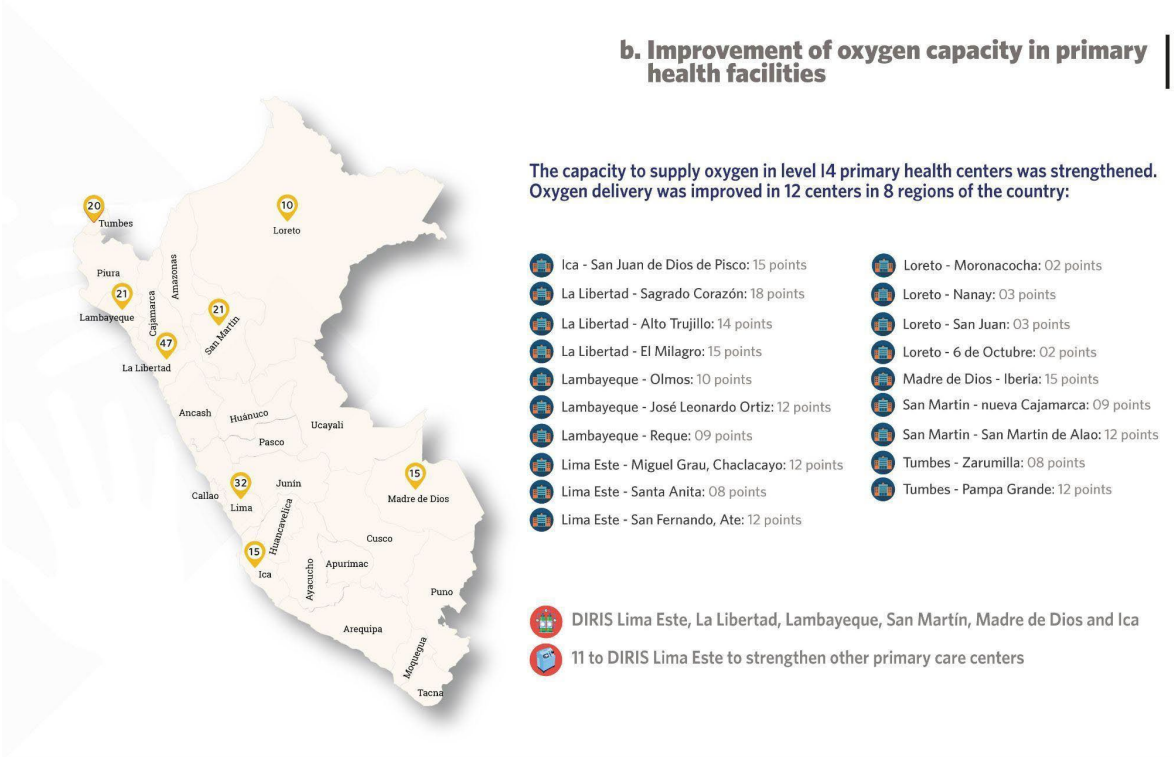

Figure 2. Improvement of the installed capacities to delivery oxygen in primary care health centers

Manifold panels of oxygen cylinders were installed in facilities of the following regions: DIRIS Lima Este, La Libertad, Lambayeque, San Martín, Madre de Dios and Ica, while a manifold of liquid oxygen microbulk tanks and another of oxygen cylinders were installed in Tumbes region. Additionally, 11 concentrators were donated to the DIRIS Lima Este to strengthen other primary care centers.

In a joint effort with another of the implementers of a USAID-financed project, 70 10m^3-oxygen cylinders were donated, distributed in the following regions: Huánuco (5 in Puesto de Salud San Pedro de Cholón, 5 in Puesto de Salud La Morada, and 5 in Puesto de Salud Yanajanca, 5 Centro de Salud Monzon), Ucayali (10 in Centro de Salud Aguaytia, 5 in Centro de Salud San Alejandro, 5 in Centro de

Salud Curimaná, 5 in Centro de Salud Neshuya and 5 in the Centro de Salud Von Humboldt), San Martín (1 in Puesto de Salud Madre Mía, 2 in Centro de Salud Sion, 1 in Puesto de Salud Nuevo Jaén, 2 in Puesto de Salud Shumanza, 2 in Puesto de Salud Santa Rosa de Mishollo, 1 in Centro de Salud Ramal de Aspuzana, 1 in Puesto de Salud San Martin, 1 in Centro de Salud Puerto Pizana, 1 in Puesto de Salud Pólvora, 1 in Puesto de Salud Pushurumbo. 1 Puesto de Salud Santa Cruz, 1 in Puesto de Salud Nueva Esperanza, 1 in Puesto de Salud Porvenir, 1 in Puesto de Salud Cajatambo and 1 in Puesto de Salud Huicte), and Pasco (1 in Puesto de Salud Cedro). Also, 27 10m^3-oxygen cylinders were donated to the Red de Salud Trujillo (9 for Centro de Salud Sagrado Corazón, 9 for Centro de Salud Alto Trujillo, and 9 for Centro de Salud El Milagro), 35 to DIRIS Lima Este, 20 to Instituto Nacional Penitenciario and 10 to Centro de Salud Reque in Lambayeque.

This activity will continue using some remaining funds of the first year of the project, between October and December 2021, 01 oxygen generating plants were implemented in the "Madre de Dios" region which were delivered to Centro de Salud San Martín de Porres de Iberia in Madre de Dios.

	First year		Second Year	
Items	Number	Region	Number	Region
Cylinders	164	Huánuco, La Libertad, Lambayeque, Pasco, San Martín, Ucayali	0	
Oxygen concentrators	112	Lima, San Martin	19	Arequipa (6) Cusco (10) Ucayali (3)
Oxygen points	395	Callao, Ica, La Libertad, Lambayeque, Lima, Madre de Dios, Loreto, San Martín, Tumbes	100	La Libertad (12), Lambayeque (2), Arequipa (50) y Lima (36)
Manifold panel system	15	Ica, Lambayeque, Lima, Madre de Dios, San Martín, Tumbes	1	Lambayeque (01)
Plants strengthened	1	Lambayeque	3	Madre de Dios (1) La Libertad (1) Lambayeque (1)

Table 1. *Summary table of oxygen assets provided in COVID-19 response*

c) Implementation and improvement of Temporary Oxygenation Care Centers

Aligned with current local regulations, the Carabayllo Temporary Oxygenation Care Center - DIRIS Lima Norte was implemented, with 45 beds and 45 oxygen concentrators. Since it was not possible to install

6 beds with their concentrators due to lack of space, the Temporary Oxygenation Care Center of Ancón –DIRIS Lima Norte was supported with 6 oxygen concentrators. The Lurin Temporary Oxygenation Care Center - DIRIS Lima Sur was implemented with 10 oxygen concentrators and 10 beds.

During the second year of the project were implemented 5 Temporary Oxygenation Care Center: CS Ciudad de Dios – Arequipa with 06 oxygen concentrators and 6 beds, CS Iparia – Ucayali with 3 oxygen concentrators – Ucayali, CS Masisea – Ucayali with 02 oxygen concentrators, CS Maras (5 oxygen concentrators) and CS Ccapacmarca (5 oxygen concentrators) in Cusco. It is important to indicate that all these concentrators complement the ones that they already had in these health establishments. All these concentrators are currently operational and powered by energy from solar panels.

d) Evaluations of the oxygen ecosystem

To evaluate the oxygen ecosystem at different healthcare levels, information was collected in 1 Health Region (GERESA Lambayeque), 1 Territorial Region of Lima (DIRIS Lima Norte), and 2 level-I4-healthcare facilities. These evaluations were performed by an external consultant, and the results were shared with each authority of the studied healthcare centers for further decision-making.

Moreover, to identify the capacity and viability to provide intensive care to COVID -19 patients in 17 healthcare facilities, we used the "*Critical Care Facility Assessment Tool*" offered by USAID, which evaluates the capacity according to equipment and infrastructure, oxygen resources, infection control, access to medicines and human resources in response to necessary care for COVID-19.

e) Strengthening the management of corpses of patients with COVID-19

The project contributed to the strengthening of hospital morgues, enabling refrigerated containers to preserve the bodies of deceased people while they await their burial. 4 containers were placed in 4 hospitals in 4 regions of the country: Hospital José Cayetano Heredia - Piura (1), Hospital Hipólito Unanue - Lima Este (1) and Hospital Regional de Lambayeque - Lambayeque (2). In addition, 4 freezers were donated to Hospital Regional de Iquitos - Loreto.

f) Strengthening the respiratory protection for healthcare providers

To improve the respiratory protection for healthcare workers, complete personal protective equipment (PPE) was distributed in 6 hospitals in 3 regions of the country: Hospital Hipólito Unanue - Lima Este (1000), Hospital de Barranca - Lima Provincias (40), Hospital de Huacho - Lima Provincias (40), Hospital de Chancay - Lima Provincias (40), Hospital de Huaral - Lima Provincias (40), Hospital Sergio Bernales - Lima Norte (1000).

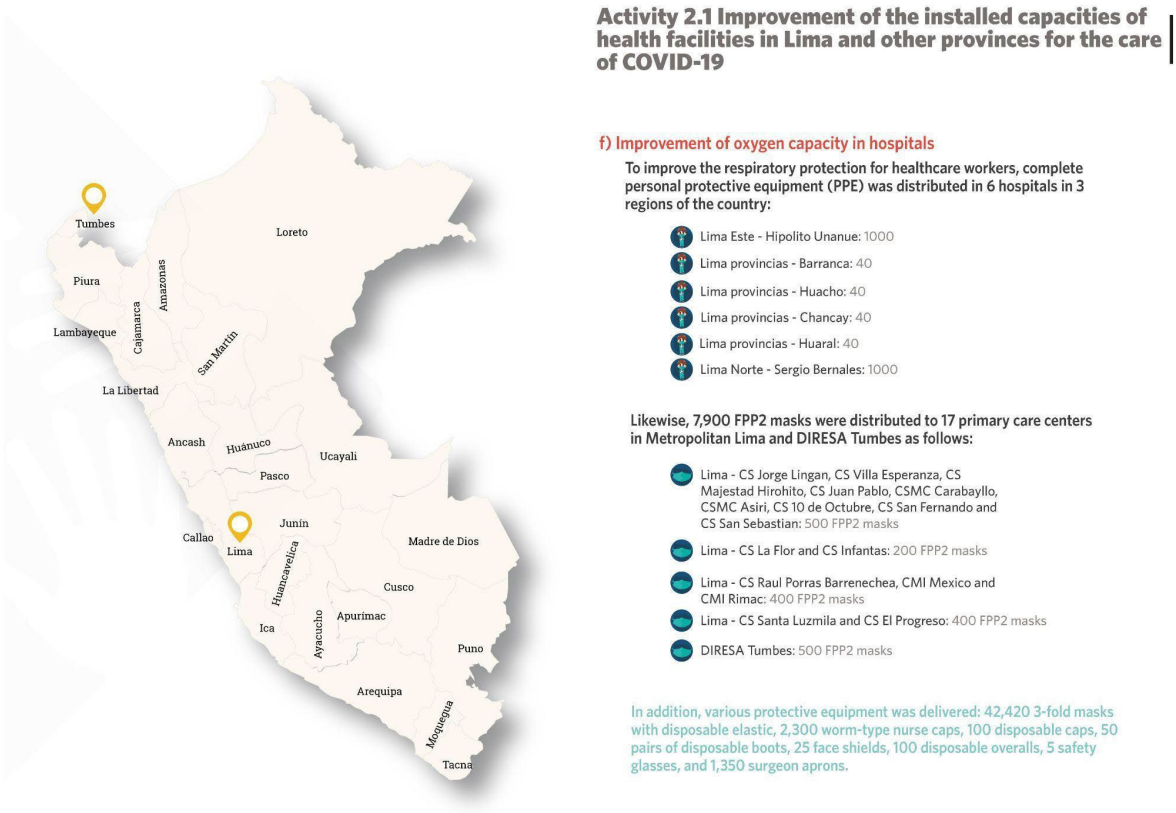

Figure 3. *Control Infection: respiratory protection equipment*

Likewise, 7,900 FPP2 masks were distributed to 17 primary care centers in Metropolitan Lima and DIRESA Tumbes as follows:

- 500 FPP2 masks were delivered to each of the following health centers: CS Jorge Lingan, CS Villa Esperanza, CS Su Majestad Hirohito, CS Juan Pablo, CSMC Carabayllo, CSMC Asiri, CS 10 de Octubre, CS Catalina Huanca, CS San Fernando, and CS San Sebastian.
- 200 FPP2 Masks were delivered to each of the following health centers: CS La Flor and CS Infantas.
- 400 FPP2 Masks were delivered to each of the following health centers: CS Raúl Porras Barrenechea, CMI México, and CMI Rímac
- 400 FPP2 Masks were delivered to each of the following health centers: CS Santa Luzmila and CS El Progreso.
- 500 FPP2 masks were delivered to DIRESA Tumbes to support the reactivation of primary care centers.

In addition, various protective equipment was delivered: 42,420 3-fold masks with disposable elastic, 2,300 worm-type nurse caps, 100 disposable caps, 50 pairs of disposable boots, 25 face shields, 100 disposable overalls, 5 safety glasses, and 1,350 surgeon aprons.

Activity 2.2: Increase access to continuous and quality care for COVID-19 and non-COVID-19 conditions

a) Implementation of call centers

The national mandatory social immobilization made it necessary to promote virtual communication tools to provide health. Due to this, we implemented 6 virtual call centers through the AUDARA System. This system makes it possible to connect a network of healthcare workers with their patients through different annexes. This favored a patient to resume the call at any time through a welcome panel. Around 79 teleoperators (DIRIS, GERESA, or DIRESA staff) were trained. Duration dates of these services can be seen in the summary table above. While the demand for services was initially focused on identifying confirmed and suspected COVID-19 cases, other demands related to other neglected diseases were soon observed. Thus, the call center favored the clinical care of patients with chronic diseases or mental health problems.

During the 2-years of the project, 807 728 COVID-19 and non-COVID-19 teleorientations have been made. In the second year of the project, the call center of the Hermilio Valdizan National Hospital ceased to be active in February 2022 and the call center of GERESA Lambayeque stopped operating in September 2022.

All the interventions contributed to teleorientation call with 1740 cares during the second year of the project, carried out by the SES clinical team

b) Home delivery of medicines

A home delivery system of medicines was implemented through a team of motorized vehicles and community health agents that made 1,145 deliveries until September 2021. This benefited people with non-communicable diseases and helped them to ensure their treatment adherence. The delivery of medicines was carried out in the jurisdiction of the DIRIS Lima Norte, for which the establishments in the jurisdiction were informed about the existence of this service funded by the project, gradually joining more establishments to the network *delivery*. We worked with a total of 18 primary care centers in Lima Norte.

During the second year, this activity continued using some remaining funds of the first year of the project, between October and December 2021, the project made 15 deliveries more. The delivery of medicines was carried out in the jurisdiction of the DIRIS Lima Norte, specifically in Puente Piedra district. The people to whom the medicine was delivered suffered from type 2 diabetes Mellitus or Arterial Hypertension.

Also, in the second year of the project supported the Installation of the medication service delivery for patients receiving care at the "Honorio Delgado - Hideyo Noguchi" National Institute of Mental Health in North Lima. From September 2022 to November 2022, 652 prescriptions have been delivered.

c) Active search for tuberculosis (TB)

In May 2020, an active search for TB was carried out, led by the rapid response teams from Lima Norte and Lima Este. This search included screening among people with respiratory symptoms in whom tuberculosis and/or COVID were suspected (cross-screening), as well as in people with infection resulting from COVID-19 and with the manifestation of persistent symptoms such as cough. This search was deployed both in homes (537 screened, 18 confirmed cases, from the COVID-19 contact census), COVID points (837 screened, 22 confirmed cases, in triages of health facilities), and in differentiated care for patients with resolved COVID-19 infection (226 screened, 5 confirmed cases). This search was carried out cross-sectionally in the last year and during the primary activities of the COVID response teams.

Using diagnostic imaging technologies and artificial intelligence, cross-screening between TB and COVID-19 was carried out in the 8 campaigns carried out by the mobile TB unit implemented by SES, which were held at the Ricardo Palma stadium and the CSMI Mexico.

Among all the activities, for the first year, a total of 5539 sputum tests were taken, of which 155 were positive in the GeneXpert MTB / RIF Ultra test.

d) Mental Health Care

A Chat Bot for Mental Health was implemented which allowed for the screening of mental health problems, using an SRQ (Self-reporting Questionnaire); a tool designed by the WHO for the screening of mental health problems including depression and anxiety. 176 psychologists from DIRIS Northern Lima, DIRIS East Lima and GERESA Lambayeque and 12 Quechua-speaking psychologists provide Psychological First Aid sessions. These trained professionals along with 8 SES psychologists met the demand generated by the Chat Bot. From April 14th, 2020, to October 30th 2020, 2,439 people were screened through the Chat Bot in 3 regions (jurisdictions of DIRIS Northern Lima, DIRIS East Lima and GERESA Lambayeque), of which 1,935 (77%) had health problems determined by the SRQ, of which 1903 (98%) received Psychological First Aid. 326 people (17%) of 1902 were referred to a psychiatrist because they needed specialized drug treatment. Additionally, 175 services were carried out in other provinces not considered within the project's intervention areas. Since November 2020, mental health

activities were stopped as they were taken over by the project *Bienestar,* or "Wellbeing" project financed by The Bureau of Population, Refugees, and Migration (PRM) of the U.S. Department of State.

Activity 3.1. Implementation of community education promoters, search and follow-up of COVID-19 cases, and socioeconomic support

a) Health education promoted through CHW

In a first stage, during the home visits for surveillance in COVID-19, 20 community agents were trained to provide health education with emphasis on the identification of alarm signs and symptoms to the general population, as well as basic care oriented to the proper use of personal protective equipment. They did 18,004 home visits.

In a second stage, as a result of the previous training, CHW actively collaborated in the differentiated triage "COVID Points" in the health facilities, having screened 9,558 people 4,547 people (47.6%) were suspected of having COVID-19. The work in COVID points allowed for the deployment of a series of activities in preventative counseling, the identification of symptoms for the differential diagnosis between tuberculosis and COVID.

In a third stage, CHW were trained in the identification of warning signs as a community monitoring tool for the detection of hypoxemia in COVID-19 patients. The CHW conducted daily face-to-face home visits to people with confirmed cases of COVID-19, who were offered clinical follow-ups during their isolation state, and were supported by a virtual tool (Chat Bot) to record the data. There are 4 CHW who made a total of 1,378 home visits for clinical follow-up, an activity that is still ongoing.

Community health workers understand effective measures of community participation in health, this favors mitigation plans against COVID-19 in the community. In this way, they are a key element within the health team.

b) Educating on COVID-19 to the community

During the home visits made by CHW, education was provided to the families on prevention and control of COVID-19. For this, communicational material was developed previously, and used during the home visits and distributed to the people. Additionally, through the project, additional information material was printed and shared with DIRIS Lima Norte for use during different DIRIS activities.

c) Socioeconomic support to the families affected by COVID-19

11,539 socioeconomic supports were provided, adding a total of 7,063 beneficiary families. The support consisted mainly of food packages and hygienic materials. In addition, direct financial support was provided to the "*ollas comunes*" (soup kitchens), through which access to food was improved for

the families that were members of these soup kitchens. El monto aproximado destinado a apoyos sociales sumo 150 mil dólares.

4.2. Activities of the second year (9/29/2021 – 11/30/2022)

Activity 1.1 Support in the epidemiological surveillance of COVID-19

For the second year of the project, an epidemiological surveillance of COVID-19 in the jurisdiction of North Lima (DIRIS Lima Norte) was implemented. At least 1400 persons were screened per week with rapid antigen tests for COVID-19. To achieve this objective, the intervention plan was elaborated where all the processes, decision algorithms and registration rules were established. The intervention plan was approved by DIRIS Lima Norte. The screening was carried out covering the districts: Rímac, San Martín de Porres, Los Olivos, Comas, Independencia, Carabayllo, Ancón, Puente Piedra y Santa Rosa. During this epidemiological surveillance, 2 seroprevalence studies were done: the first between September 2021 to November 2021 and the second between March 2022 to September 2022. As part of the epidemiological surveillance, participants were consulted about their vaccination status against COVID-19, for which some people were detected not to be vaccinated, therefore, coordination with DIRIS Lima Norte was done to support the vaccination of this group of people.

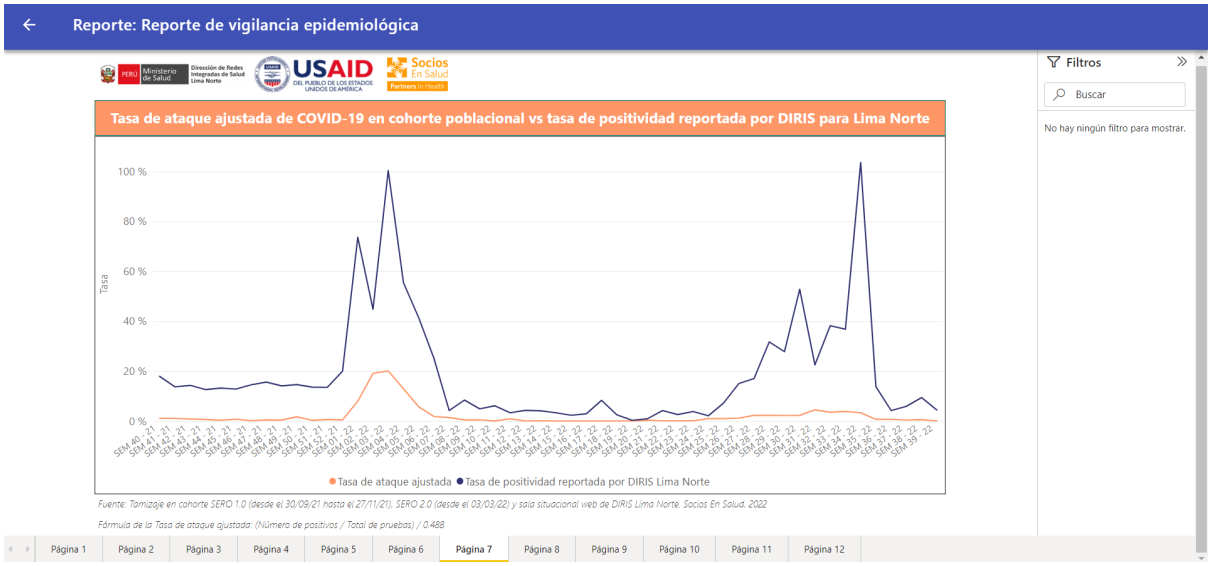

Figure 4. Dashboard of epidemiological surveillance of DIRIS Lima Norte

https://reportes.apps.sociosensalud.org.pe/Reportes/Categorias/TB/Subcategorias/SEROCOVID/Reportes/VigilanciaEpidemiologica

The epidemiological surveillance team carried out 23920 home visits made for contact tracking, It was made in The North of Lima, that corresponds to 9 districts (Puente Piedra, Ancon, Santa Rosa,

Carabayllo, Comas, Los Olivos, Rimac, Independencia, San Martin de Porres). From September 2021 until September 2022.

They could find new cases for COVID-19 and screening in vulnerable populations. As part of the work done during contact tracing, 260 COVID-19 tests were performed. The tests used were abbot brand nasal antigens (PANBIO) for follow-up, PCR was added for confirmation as it is a standard gold test, it was not considered within the follow-up protocol.

With all data collected by the epidemiological surveillance team, a dashboard to report indicators were developed (Figure 4).

Activity 2.1 Improving the case notification rates of essential public health programs

a) TB screening

During the second year, active TB screening continued, a total of 394 sputum tests were taken, of which 25 were positive in the GeneXpert MTB/RIF Ultra test.

For the identification of TB cases, one strategy to screen for TB was done among people with symptoms of suspected tuberculosis during the epidemiological surveillance activities. This strategy begun September 1st,2021.

The other strategy was done using chest x-rays with artificial intelligent to identify suspected cases to be ruled out TB testing with GenXpert tests. This last strategy begun in July 2022, 1st and beneficiaries were at-risk population living around prisons.

b) Mental health screening

The identification of mental health problems was carried out through the Wellness chatbot that identifies cases of mild and moderate risk; the latter being referred to the Community Mental Health Center. 180 cases were referred and of these, 142 were treated in a health establishment

Finally, 33 people were screened through virtual appointments with a psychologist. mental health problems began in November,

Since June, two new tools have been added for screening in mental health that are the GAD-7 to measure anxiety and the FCV-19S which have been implemented with the return of the visits witnessed by the psychologists of SES who are responsible for screening people referred by community health agents through virtual appointments

c) Hypertension screening

The screening of hypertension began on December 2021, 1st. Two population groups were prioritized: older adults and people with COVID-19. The screening of hypertension was performed by periodic measurement of blood pressure during follow-up visits done by community health workers (CHW) for the early detection of hypoxemia; and during the home visits of epidemiological surveillance CHW activities. The information reported by CHW were subsequently evaluated by the doctor in charge of the project, referring to the health establishment according to the participant's insurance if the person has a positive screening. From December 2021 to September 2022, 11189 measurements of blood pressure were done by CHW and also through self-measurements registered by participants, benefiting 1011 people, identifying 89 people with HTA and 124 people with uncontrolled HTA, and 207 cases to be referred, achieving effective care in the EESS for 133 (64%) people.

d) Diabetes screening

The screening of diabetes began on January 2022, 1st. The screening was done using glycosylated hemoglobin equipment and hemoglucotest. 921 measurements of glycosylated hemoglobin and hemoglucotest by CHW were performed, identifying 433 people with possible diabetes (pre-diabetes), 90 cases of diabetes and 138 cases of uncontrolled dm2. Of which 362 (56%) of them were effectively referred to EESS.

e) HIV screening

The screening of HIV began in December 2021. The screenings were carried out through home visits, medical campaigns and community brigades. The community brigades are made up of an obstetrician and a peer educator who belongs to the LGTBQ + community. 1013 HIV screenings were carried out on people with risky sexual behaviors, identifying 06 reactive cases. of which 06 were referred to EESS but only 3 started specific treatment

During the second year of the project, 795 positive cases were found: 19 positive cases of TB, 131 of high blood pressure, 460 people diagnosed with DM2, 06 positive cases of HIV and 179 related to mental health problems. It was possible to screen 16548 people: 793 in mental health, 631 in TB, 1013 in HIV, 3127 in DM2 and 10984 in Arterial Hypertension.

Of the people screened, it was possible to refer 33 positive cases of diabetes mellitus, 03 person with TB, 03 person with mental health problems, 03 cases of high blood pressure and 01 person with HIV; during the process, some of the referred persons chose not to attend or refuse the care appointment at the assigned health facility.

In addition, HIV tests were received, overcoming logistical difficulties, initiating screening and allowing the implementation of HIV screening campaigns to be included as a strategy to accompany the screening activities carried out previously.

A total of 16,548 screenings were carried out during this intervention and 795 people identified with Diabetes or TB or HIV were referred to the health system.

Activity 3.1: Self-monitoring and home clinical monitoring of SARV-Cov-2 infected patients

During the months of October 2021 and September 2022, the community health workers who were trained in the first year of the project have made a total of 3504 home visits and which have allowed to monitor 1002 people with COVID-19 to prevent and detect hypoxia early, avoiding the complication of the disease. On average, each home was visited 8 times, so there were a total of 8016 visits.

During home visits, CHWs carry out activities of identification of warning signs as a community monitoring tool for the detection of hypoxemia in COVID-19 patients and conducted daily face-to-face home visits to people with confirmed cases of COVID-19, who were offered clinical follow-ups during their isolation state, and were supported by a virtual tool (Chat Bot) to record the data. In addition, the CHW performed counseling on tuberculosis and trained to collect sputum and apply the wellness chatbot.

There are 10 CHW that carry out the visits in the districts of the jurisdiction of the DIRIS Lima Norte.

Activity 4.1 Preparing infection control plans to inform health authorities

From October 2021 to February 2022; 12 visits have been made to different regions of Perú to goal the 20 proposals to control infection plans. Of the 12 visits carried out, 20 risk assessments have been carried out and the infection control plans are in the process of internal validation.

The establishments visited are the following: C.S. Sagrado Corazón, C.S. Alto Trujillo, C.S. El Milagro, C.S. Olmos, C.S. Leonardo Ortiz, E.S. Reque, C.S. Nueva Cajamarca, C.S. San Martín de Alao, E.S. San Martin de Porres de Iberia, C.S. Santa Anita, C.S. San Fernando, and COT Carabayllo. The health centers mentioned are in Trujillo (3), Chiclayo (2), Lambayeque (1), Tarapoto (2), Madre de Dios (1), Lima Este (2) and Lima Norte (1).

In the pending visits, the documentation and the presentation of the plan have already been made, there has been an inconvenience in the Health Establishment "San Juan de Dios" due to the resistance of the medical director to authorize the development of the activity, in this situation the possibility of including the COT of Los Olivos de Pro - Lima and COT Florencia de Mora - Trujillo is being evaluated.

On the other hand, 03 COT (Rimac, Ancon and Puente Piedra) have been added to replace the health centers of Iquitos due to the difficulties generated by the political situation in this region.

In the month of March, the final report of the activity was sent to USAID which presented observations to the product delivered, in this period the actions to be carried out to resolve these observations were defined, which included making visits to the 20 health establishments that will be carried out in the month of April. Finally, visits and modifications to infection control plans have already been made, which have been sent to USAID for approval.

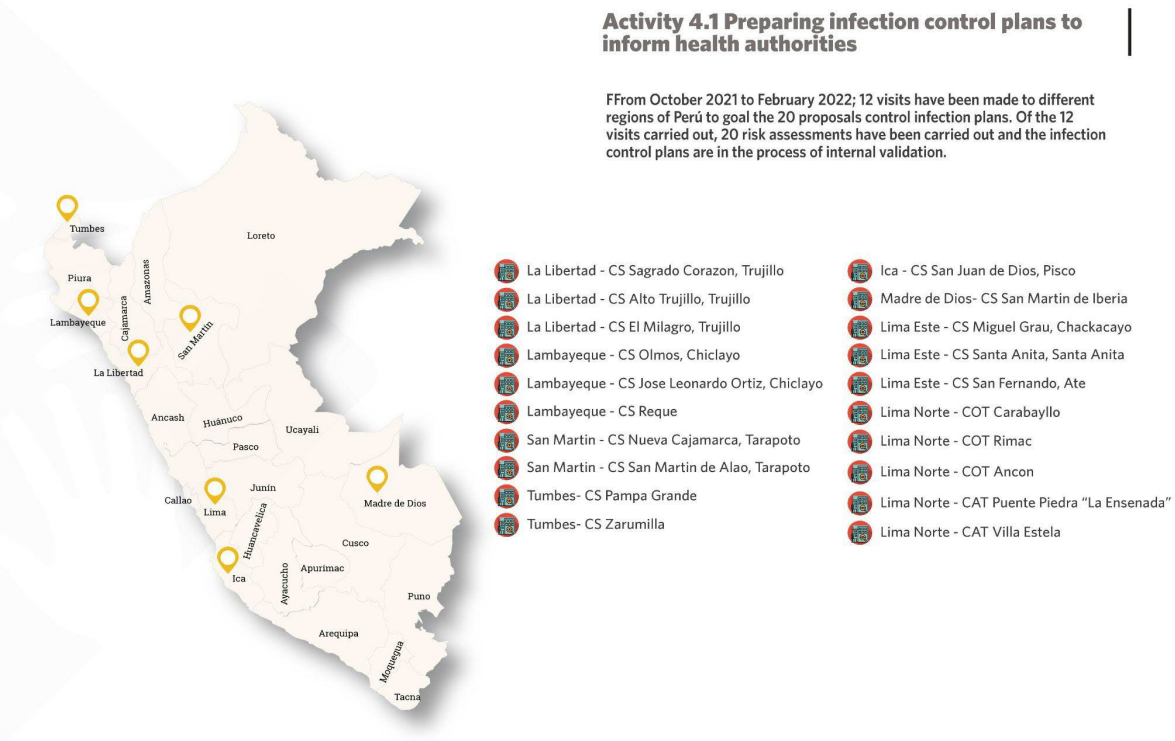

Figure 5. *Primary care health centers supported with control infection plan*

<u>Activity 5.1 Mapping of oxygen assets, assessing their status and drawing up a maintenance plan</u>

16 scheduled health establishments have been visited, 3 of the establishments visited are in the region of Lambayeque, 2 of La Libertad, 1 of Huánuco, 04 of San Martín, 2 of Madre de Dios and 03 of Ica.

- In the region of San Martín, the facilities were visited: Hospital de Tarapoto, Hospital de Bellavista, and the Hospital de Rioja and the Hospital de Lamas;

- In the Huánuco region, the Hemilio Valdizán Contingency Hospital was visited; but due to internal hospital issues, they told us that the intervention could not be carried out in that place, replacing it with the Tingo María hospital
- In the region of Ancash, where the Hospital of Caraz was visited.
- In the region of Lambayeque, 5 facilities have been visited, however only 03 of them have been considered because they manage to meet the established requirements. The facilities selected for evaluation were: Hospital Referencial Ferreñafe, C.S. Cerropon and C.S. Monsefú; during the identification visits, we realized that the Referencial Hospital of Ferreñafe has two plants of 10m3 and 20m3 which cannot operate in parallel since it presents problems in the feed board, that's why the corrective will be evaluated in order to be able to use at its maximum capacity when required; the C.S. Cerropón has an oxygen plant that they use is oil-free, but it does not have a water softening system implemented, so its use is not recommended, while it is not implemented, since this would reduce the useful life; and in the C.S. Monsefú, the oxygen plant requires evaluation to validate the attention capacity and the implementation of attention points in critical environments and a manifold for the filling of balloons.
- In the region of La Libertad, 03 facilities were visited: Rosa Sánchez De Santillán Hospital, Laredo Hospital and Puente Chao Health Center. In the first of them, it was identified that it has an oxygen plant that presents problems in the cooling system of the booster, the Manifold is 5 sockets but due to one the bad installation only allows to use 2 of them and the plant does not have a backup system in case of loss of electrical fluid. In the second of them, it was evidenced that the hospital has two oxygen plants, which are operating but there is no record of having had maintenance. Finally, in the C.S. Puente Chao, it was verified that the plant is under the administration of the municipality and operating correctly, so the evaluation will not be carried out.
- In the region of Madre de Dios, the Health Center "San Martin de Porres Iberia" was visited, where there is an oxygen plant but not a booster for filling the cylinders and it was possible to verify that the environment has an appropriate space for its operation. In addition, the Santa Rosa Hospital was visited, which has 02 medicinal oxygen plants in environments independent of the care areas.
- In the region of Ica, 03 health facilities belonging to the provinces of Pisco (02) and Chincha (01) were visited. In the hospital of San Juan de Dios, a medicinal oxygen plant and a cryogenic plant were identified in environments independent of the care areas and suitable for their

operation; in the San José de Chincha hospital, three medicinal oxygen plants were identified in appropriate spaces for their correct operation; and in the San Juan de Dios health center in Pisco, it was found that the supply of medicinal oxygen is carried out through the filling of oxygen balloons and has a "Back Up" system which is in a different environment to the care areas.

- In the region of Ayacucho, we coordinated with the regional government Visited the regional hospital and the Cora Cora hospital

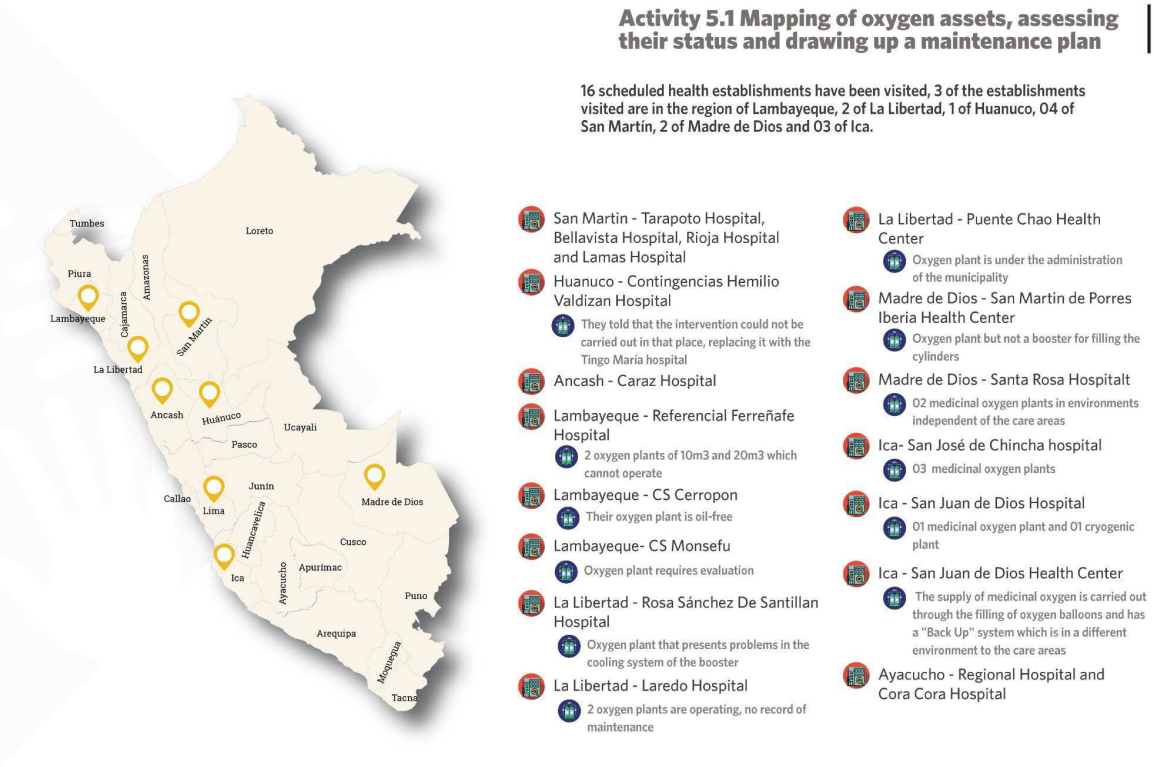

Figure 6. Health centers supported with oxygen assets evaluation

Activity 5.2 Preparing a training program for the operation and maintenance of oxygen assets

In January 2022, the formulation and design of the course was carried out, currently with the syllabus and the schedule in the process of approval by the National School of Public Health. Both products have been built in constant coordination with ENSAP and the General Directorate of Operations of MINSA (DGOS).

The course was carried out in virtual mode and its fundamental purpose was to have a vision of the concepts, operability, management, and maintenance of the medical oxygen supply systems. In

addition, the course had the issuance of certificates given to participants who successfully complete the three modules and pass the transversal course of "Ethics in Health Services".

The learning modules that the course will have been the following:

- Module I: Basic concepts for the medicinal oxygen production chain.
- Module II: Medical oxygen supply systems by producing plants
- Module III: Maintenance of medical devices for the production of medicinal oxygen.

During the month of February, the learning modules were developed, these being validated by DGOS and the educational resources were uploaded to the ENSAP web platform.

In coordination with the actors involved (ENSAP, DGOS, SES, CSG) the final selection of the participants admitted to the training program was made, which began on February 21 and had a total of 61 academic hours for the three modules described above and 40 academic hours for a transversal module of ethics in health services.

On the other hand, at the end of March, it has been possible to culminate with the training program, 157 were enrolled, of which 131 (84%) have managed to pass the course.

Figure 7. Regions supported with specialization course

The 2nd training called PREVENTION AND MAINTENANCE SPECIALIZATION COURSE IN MEDICINAL OXYGEN ASSETS in alliance with DGOS and certified by the Continental University, began on August 1, 2022 with 173 registered participants, who came from 13 regions of Peru, was It was given in asynchronous and synchronous modalities (8 sessions) and finally had a face-to-face workshop

delivered in 4 regions (Trujillo, Huancayo, Arequipa and Lima), resulting in 99 certified participants. This course concluded on September 30, with a duration of 80 hours.

Since the Amazonas and Pasco regions were not benefited from these trainings; Socios en Salud met with officials from the DIRESAs of both regions and this is how the training of the SPECIALIZATION COURSE IN PREVENTION AND MAINTENANCE IN MEDICINAL OXYGEN ASSETS began on October 31 and is currently under development. This course has 40 registered participants from both regions; in the asynchronous, synchronous modalities (8 sessions) and will conclude with the face-to-face workshop. (80 hours of duration).

Activity 6.1: Addition of oxygen solutions on primary health centers in rural or indigenous communities

In February 2022, the management process began for the purchase and delivery of solar panels for the oxygen assets of the Ciudad de Dios health center in the Arequipa region, whose installation was carried out in June 2022. In addition, infrastructure validation visits were carried out to verify compliance with the minimum conditions necessary for the installation of solar panels in CS Capacmarca (Cusco), PS Maras (Cusco), CS Masisea (Ucayali) and CS Iparia (Ucayali). In each of the health establishments mentioned, the number of solar panels required for the supply of energy was detailed according to the operational capacity of its Temporary Oxygenation Care.

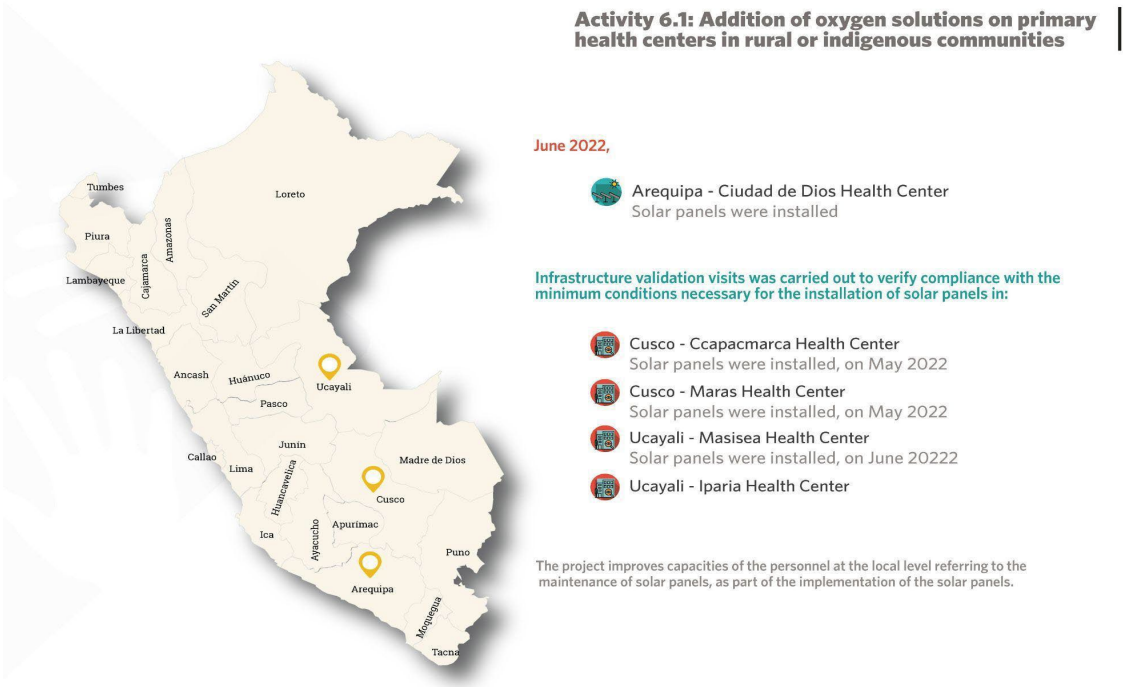

Figure 8. Health centers supported with panel solar

In May 2022, the installation of solar panels for the Maras and Ccapacmarca health establishments in Cusco were done. Similarly, on June 2022 in the region of Ucayali solar panels were implemented in the Masisea health center that is three hours from the city reaching it by river, this implied logistical difficulties for the transfer of solar panels which was overcome, successfully implementing solar panels that will allow access to fluid electricity in this health center for the first time.

The project improves capacities of the personnel at the local level referring to the maintenance of solar panels, as part of the implementation of the solar panels. The personnel of the health facilities have been trained and didactic use manuals were distributed that allow an adequate management of the solar panels as well as their maintenance. It should be noted that after this training, the health personnel in charge have been accompanied to solve possible queries or inconveniences that arise in the daily use of solar panels.

5. Lessons Learned

Knowledge Gap	Learning
Oxygen delivery capacity	
1. What considerations are necessary to consider to implement new oxygen points in a hospital?	1. One of the determining factors when estimating the number of oxygen points that should be installed at a healthcare facility was the capacity and frequency with which the facility refilled their oxygen sources, in such a way that the number of oxygen points did not exceed the refilling capacity.
2. What are the factors that determine what oxygen system is needed at a healthcare center? Do they need a combination of oxygen supplies?	2. I-4 healthcare facilities needed a combination of oxygen concentrators and oxygen tanks. If they only counted on oxygen tanks, they would run out faster as the tanks use a higher flow of oxygen that is not always necessary. On the other hand, the oxygen concentrators optimized the use of oxygen as it used only what the patient needed. But to implement the use of oxygen concentrators it is necessary to be sure that electricity is stable, constant and with adequate force.
3. What difficulties generate the acquisition of oxygen assets by institutions of the civil society?	3. There are PSA plants that are not officially owned by the general health directorates in the regions of Perú in which maintenance investment cannot be possible to make or a budget allocated for it until they are effectively transferred to the respective regional authority. For that reason, the regional health authorities decided not to include them in any evaluation or maintenance plans.
4. What is the risk to decrease the capacity building to generate oxygen that Peru acquired during the pandemic?	4. There was not a routine or corrective maintenance plan previously of our intervention, so the budget necessary to do that is not assigned from the regional government. If the government regional authorities are not planning this corrective or preventive maintenance, Perú will decrease the capacity building to generate oxygen sooner than the useful life of the equipment.
5. What are the criteria to determine the facility to implement the solar panels? How do we make the selection process more efficient?	5. The choice of the facility was made from a previous selection of three facilities determined by the local health authorities. For the implementation of solar panels, it is important to know if it has constant electricity, the category of the health establishment, as well as the population and number of services provided. This information allows us to prioritize implementation in places where they do not have constant electricity, providing them with a constant energy resource that allows them to provide 24-hour care.

6. During the implementation of the solar panels, how were the problems of transporting materials to remote communities addressed?	6. Constant coordination with the health department has allowed us to obtain the facilities to transport materials to the river areas with units belonging to the region. Having the complete materials for the implementation and then transferred to the health facility of the intervention also allows us to be efficient in delivery times, taking into account that in these localities there is no supply of the necessary materials for the implementation.
7. What more do we need to consider in this process of implementation of solar panels?	7. The implementations are carried out in one stage, that is, the deliveries of the batteries must be carried out at the same time as the solar panels. This will be a fundamental requirement for the selection of the provider that will execute the service.
8. Has the implementation of solar panels other advantages for the health centers?	8. The implementation of the solar panels also made it possible to operate other biomedical equipment that was stored without use due to lack of energy.
Training courses	
1. What actions must be considered to improve the success completion rate of virtual training programs with ENSAP?	1. From the training program developed with ENSAP, it has been possible to demonstrate the impact of academic tutors on the rate of completion of the evaluations achieved through continuous accompaniment to the participants through reminders, answering queries and monitoring students who do not manage to finish the evaluations. In addition, to improve the experience of the participants, it is considered pertinent to increase the synchronous sessions to improve the interest and feeling of accompaniment in them.
2. Do all personnel in charge of the management of oxygen assets have access to participate in the virtual training programs with ENSAP?	2. The rules of ENSAP for including participants to its course excluded persons to receive training. It is important to be flexible when we are in an emergency situation. It is always necessary to have other alternatives as an open access course to train this other group of personnel in charge of the management of oxygen assets.
3. What needed to be considered to elect the thematic manager and the academic manager?	3. In order to obtain a thematic manager with pedagogical capacities, it is necessary to look for professionals in the faculties of the universities according to the respective subject; likewise, to comply with the implementation times, it is essential to help the ENSAP with a manager during the period of preparation of a course or program.

4. What is the importance of the participation of the focal point of Dirección General de Operaciones de Salud (DGOS) of the Ministry of Health in the success of the training course?	4. The coordinator designated by DGOS must be committed and have constant communication with the participants so that they commit to the course, and must also be a proactive actor in negotiations with related state institutions so as not to have inconveniences in the assistance of participants in face-to-face workshops.
Epidemiological surveillance	
1. Where and when is the best use of rapid antibody COVID-19 tests to guide clinical and public health decisions?	1. Initially, the rapid antibody COVID-19 tests were used for individual contact tracing of positive COVID-19 cases, but after it was observed that a more optimal use was in the studies of seroprevalence in high-risk areas like markets and public transportation, what helped better understand the community behavior of the pandemic. On the other hand, in healthcare facilities pregnant women were being tested with rapid antibody tests on the day of delivery and if the result was positive, there was no scientifically accurate way of knowing if the pregnant woman had been infected days or weeks before. The situation was evaluated, and it was decided that it was convenient to perform the serological test as part of the array of tests taken at different times during pregnancy, including several days before delivery to be able to make better decisions at the time of delivery.
2. What is the benefit of using antigen tests compared to RT-PCR tests?	2. The performance of the antigen tests was evaluated, which showed adequate and comparable results with respect to the RT-PCR tests, after which the use of antigenic tests was promoted due to their lower cost and faster results. It was very useful for ruling out COVID-19 in asymptomatic contacts.
3. In what way can RT-PCR tests reach more people at a community level?	3. Access to molecular tests was limited as only certain laboratories in the country had them. It was learned that it was necessary to bring molecular tests closer to the community, so mobile diagnostic units were implemented.
4. What other advantages has community epidemiological surveillance?	4. The periodic household visit allows to facilitate communication of different topics of the health promotion according to the risk for each family, inclusive how the member must work in a safe form (control infections measures).
Clinical follow-up of COVID-19 patients	

1. What situations occurred during the clinical follow-up by the patients and families?	1. One of the difficulties that has been encountered during the clinical follow-up of the COVID-19 patients' execution was the resistance of patients with hypoxemia to go to the health center of their jurisdiction, affecting their timely attention. People affected by COVID-19 cited religious reasons and feelings of loneliness as the main variables for refusing to go to a health facility in a timely manner. It is necessary to implement a home health service for these people to avoid complications due to a delay in receiving precocious appropriate therapy. The project could implement support for people who don't accept going to health centers, starting the corticosteroid early at home and identifying which patient could be at risk of using drugs such as tocilizumab early.
Support to response of public health system	
1. Do health centers have the capacity to care for patients with other diseases of public health importance?	1. Health centers have the capacity to care for all new patients who are diagnosed with TB and HIV. This is not the case for mental health conditions, hypertension, and diabetes. Before implementing any strategy to actively search for any disease, we must ensure that there is enough capacity in the health system to care for everyone in a timely manner to avoid people ultimately not being able to access the health system. The health system does not have the capacity to provide service to the migrant population because the vast majority of them do not have health insurance.
2. Could we use technological resources to manage the demand of health services?	2. The use of technology such as the Chatbot of mental health allows us to manage the demand, prioritizing those that require urgent attention or greater speed; while most can be supported by telemedicine. Of the latter, some will not need more face-to-face medical attention.
3. What barriers would there be to use these technological resources and how could they be addressed?	3. The implementation of telemedicine is difficult because the phones used in this system are from the health care workers (HCW). When the HCW used their phones, they lost their privacy. Audara systems or other similar devices allow the HCW´s phones to hide their identities. In addition, the Audara system allows having many telephone lines available at the same time, so when a person dials the telephone exchange, they are immediately connected to the line that is free, reducing the bottleneck.
4. What technological strategy would be feasible and acceptable to the community?	4. Telemedicine is a great alternative to follow-up patients in treatment with prolonged therapies. Telemedicine allows to give orientation to persons to decrease the stress and avoid saturating the health system.

5. How does medicine delivery help the health system?	5. Medicine delivery for chronic disease is so important to maintain controlled disease such as diabetes, hypertension and schizophrenia, so complications and admission to the hospital are not increasing contributing to decrease the health expenses.
6. What strategy should be implemented to meet the goal of delivered medicines?	6. In order to meet the goals of prescriptions issued, it is necessary to reinforce the involvement with the other areas of the health establishment, through weekly meetings and/or direct communication to the board of directors for their support and pressure for articulated work.
7. What were the causes for not reaching the goal of medicines distributed on a daily basis?	7. Opening the information of users who meet the requirements to be beneficiaries of the delivery of medicines to their homes, among the areas involved is information technology, it is the one who provides the beneficiary base, among the reasons for the drop in coverage during the intervention was the return to the face-to-face medical attention to patients, whereby patients and/or family members pick up the medication directly from the pharmacy, rejection of the delivery of medications because the new service does not transmit security.
8. What to do to have greater support from the health establishment for the distribution of medicines?	8. In order to have a response from the health facility's board of directors, it is necessary to issue periodic progress reports in order to search for strategies to increase prescriptions issued by said institution.
9. What is the appropriate and necessary number of containers to refrigerate the corpses of patients deceased by COVID-19?	9. The project donated containers that were converted into mortuaries; however, this number was not enough because the cremation process took longer than a regular burial, which saturated the capacity of the refrigerated containers. It is necessary to strengthen a system to manage the cadavers during any pandemic.
Community health worker	
1. How could community health agents participate in a safe way in the fight against COVID-19?	1. It was learned that it is feasible to safely include CHW in the work of detecting suspected cases of COVID-19 in their communities, since no increase in COVID-19 infections was observed in the CHW compared to the general population.
2. Additionally, is there any way of optimizing their labor?	2. It was learned that it was necessary to develop an electronic instrument that allowed management of the CHW work in a better way. This instrument was created and after its implementation it was considered a viable and timely tool, with the potential to be used not only during the pandemic and throughout distinct CHW communities.
Social support	

1. What kind of hygiene supply could the social protection area contribute?	1. At first it was decided to give soap as a part of the hygiene kits; however, it was observed that not all of the population had adequate access to water, so it was decided to also provide hand sanitizer.
Control infections measures	
1. What do the personnel of the primary care centers need to know about infection control measures?	1. The primary care centers need to know about control infection measures to facilitate the process and the information that is required to be collected. In addition, there must be a greater number of people involved in the activity of carrying out the complete infection control plan related to the routinary activities they are doing in their services.
2. How many days are necessary to collect information from health facilities for the development of their infection control plans?	2. If we have remote or inaccessible establishments, we should have two to three days per visit, since if there are personnel who must provide us with information from their area and they have a day off, they allow us to return to collect the information.
3. Is virtual coordination efficient for the development of infection control plans?	3. The information for filling out the forms must be completed in person; it is very difficult to complete information virtually with EESS personnel due to the load of activities they already have.
4. Is any external advice necessary for the development of infection control plans?	4. The technical advice of a recognized expert in infection control should have been obtained to refine the tools with which the team had to work from the beginning. Likewise, it was very important to have a meeting that defines the exact scope in which the plan should be worked on, including its methodology.

6. Impact

6.1 Oxygen delivery

Since the start-up of the oxygen concentrators and oxygen points donated by PIH to the different Ministry of Health establishments and institutions, until September 30,2022, it is estimated that approximately 41,800 personas have benefited from the oxygen delivery throughout Perú.

COTs in Carabayllo demonstrated that it is possible to manage severe COVID-19 cases at a time when the health system is saturated; In addition to receiving transfers from the most complex hospitals of patients who were weaning from oxygen. There was a 72% increase in severe cases admitted in 2021 compared to 2020 (18% in 2020 vs 32% in 2021); and 41% of the patients referred to COT in Carabayllo came from home after the clinical follow-up teams evaluated them at their homes, 35% came from the health centers after the patients were evaluated in the COVID areas and 19% came from transferred from the most complex hospitals to finish their weaning from oxygen. The latter made it possible to free up beds faster in hospitals so that they can care for severe COVID-19 cases in their acute phase of hypoxemia.

The experience on implementation of the Temporary Oxygenation Care Center (COT by its acronyms in spanish) in Carabayllo district, in the North Lima region, to increase the capacity to deliver oxygen, served as the basis for approving Health Directive N° 139-MINSA/DGSP-2021 "Directive that establishes the implementation of Temporary Oxygenation Care Centers" through Ministerial Resolution 1210-2021-MINSA of October 29, 2021.

6.2 COVID-19 Screening

The COVID-19 Screening was made through different strategies, causing important impacts:

- Screening in COVID points: The performance of diagnostic tests for COVID-19 were facilitated in first level healthcare facilities in North Lima that previously lacked or had very little capacity to diagnose COVID-19 through laboratory such as rapid antibody tests. In that way, the “Centro Materno Infantil México” went from performing 5 to 6 tests per day to carry-out 70 rapid antibody tests per day; the Carlos Protzel Health Center and the Laura Rodríguez Health Center went from carry-out 0 daily rapid antibody tests to carry-out 30 daily tests per day each, while the Rimac Health Center went from 0 daily rapid antibody tests to 25 tests per day.

- Contact tracking: The number of Quick Response Teams from North Lima and East Lima was increased. From the 60 Rapid Response Teams that DIRIS Lima Norte had, each one comprised by a

doctor and a nurse, the project contributed with 5 of them that were also strengthened with 2 community health agents for each Rapid Response Team of the project; these community agents actively supported with the identification of community contacts through interviews and health counseling. In a similar way, in East Lima, the project contributed by making another 5 Quick Response Teams strengthened with community health agents, out of the total of 30 Quick Response Teams that DIRIS Lima Este had. On the other hand, the need for community surveillance through community health workers was understood, so that first-level care establishments began to organize to summon leading figures in their communities for the active notification of suspected cases.

- Screening in population/risk spaces: The COVID-19 screening was carried out in groups and spaces with high risk of acquiring COVID. COVID-19 tests, such as rapid antibody tests and molecular RT-PCR tests, were carried out in drivers and bus fare collectors in two of the terminals in a transport company that before the support provided by the project, it was operating with minimal capacity because it was unable to offer COVID-19 screening to its workers. Furthermore, PIH provided guidance to develop a safety and security plan against COVID-19 that allowed them to reliably restart their activities. Moreover, the detection of COVID-19 was carried out in elderly population of nursing homes, who before the support given didn't have enough diagnostic tests despite being about a population from a high risk. After the intervention, positivity for COVID-19 was detected in 45% of those screened, which helped to make prompt decisions to isolate infected people and prevent contagion in the rest of the members of the asylum.

In addition, COVID-19 tests were carried out on workers in markets in North Lima, where previously limited diagnostic tests were carried out, but, which according to national data, were sources of contagion. Diagnostic tests were carried out on a total of 1396 workers from 8 markets in North Lima, which allowed them to isolate infected workers and continue with their commercial activities more safely. Also, 2 weeks before our involvement in the markets, a visit in order to observe the compliance with the security measures was made, to guide them in the proper control of COVID-19.

Finally, the experience of the implementation of COVID-19 screening in the pregnant population of North Lima helped to develop a directive for the correct management of rapid tests in the referred population.

- Increase in access to COVID-19 care in North Lima, due to Teleconsultation: Measures the increase in COVID-19 care, thanks to the implementation of teleconsultation, in favor of accessibility to health services. This activity was carried out during the first phase of the project. This strategy had a great impact at the time, and the fact is that the fear of contagion in health establishments meant that the

population did not go to them, so other strategies had to be used, one of them being teleconsultation. In the jurisdiction of Lima Norte, 26% of the entire population had access to health services through this strategy.

- Number of COVID-19 cases referred in a timely manner to the Health Facility that saved from dying in North Lima: measures the number of lives saved from dying from COVID-19 in times when there was no vaccine or appropriate medications, due to a referral timely to the Health Establishment. This is related to the intervention we carried out in which we identified patients in the community and monitored them throughout the disease process. In relation to this, and after the work of health personnel and community health agents, it was possible to convince and coordinate the referral of 15 people to establishments where they could access oxygen and treatment and thus manage to save their lives.
- During the second year, the aforementioned strategies have been maintained and the screening for the seroprevalence study has been carried out in North Lima, managing to sift 2148 people; with which knowledge will be generated that will be shared with health authorities for consideration in decision-making.

6.3 TB Screening

Through the different activities of the project that are focused on identifying infected people with TB (detection in COVID-19 points, in homes, in campaigns and in post-COVID patients) in North Lima, the total of detected people (n=180) represented the 4.5% of the total number of cases detected throughout North Lima during the same period of the project. From 180, 95% were linked to the health facility and started treatment. The remaining group did not show symptoms or radiographic findings, which is why they continue to be monitored to recognize the presence of active tuberculosis.

During the second year, using the strategy of TB Mobile, the rate of positivity was 1 positive for each GeneXpert MTB Rif/Ultra done.

6.4 Mental Health Care

The development of the Mental Health ChatBot created through the project, made it possible to reduce gaps in mental health care in a context such as the pandemic, in which access to face-to-face services was limited. The ChatBot was implemented in 4 regions: Lima Norte, Lima Este, Lambayeque e Iquitos; but how the ChatBot was spread by social networks, it reached too a few patients from 21 of the 24 regions of the country; and provide care to 997 people with mental disorders through different strategies such as psychological first aid, psychosocial support for grief, psycho-education,

relaxation techniques, and mental health self-care. This intervention was carried out using the chatbot. As is known, all the factors related to the COVID19 pandemic had implications for the mental health of the population, so it was important to be able to cover this problem, which was done very efficiently through the use of a technological tool that was able to help 61% of the vulnerable population of North Lima. Likewise, to measure the impact of said intervention, three months after the first intervention, the revaluation was carried out with the same instrument, finding that 40.4% of the people who received emotional support no longer had mental health problems.

6.5 Diabetes and hypertension screening

Through the different activities of the project that are focused on identifying infected people with diabetes among COVID-19 patients, 4.5% of new probably diagnosis of diabetes and 10% of new probably diagnosis of hypertension was done. Among elderly people of the cohort of epidemiological surveillance, 5% of new probably diagnosis of diabetes and 17% of new probably diagnosis of hypertension was done.

6.6 HIV screening

Among COVID-19 patients in clinical follow -up who are at high HIV-risk, none were reactive to the rapid HIV test. Among vulnerable groups tested without previous diagnosis of HIV, 8.6% were reactive to the rapid test.

6.7 Social protection and support

In addition to the socio-economic support granted individually to people with economic and social needs, the project financially supported the “Ollas Comunes” (soup kitchens) which are family units that are grouped together to prepare food in a single pot, to support each other, and ensure access to a pot and adequate food. In this way, 2 common pots from the Agustino district and 5 common pots from the Carabayllo district were supported. The financial support provided to 3 of the 5 communal pots supported by the Carabayllo district resulted in the creation of formal "Soup kitchens" that receive direct support from the government; these are the soup kitchens “Andy y su Pueblo 2da etapa”, “Madres Empoderadas del Alto Perú” and “Mujeres Vencedoras de Nueva Amanecer”. The 2 common pots that did not become soup kitchens could not do so since, according to local regulations, they were in the same jurisdiction as other soup kitchens.

6.8 Epidemiological surveillance

The epidemiological surveillance team has a better percentage of vaccination rates among the older 60 or more among the families included in the cohort of the epidemiological surveillance. The MINSA reports a vaccination rate of 55% among older 60 or more for DIRIS Lima Norte compared with the 80% reported by epidemiological surveillance team among the cohort with follow-up by them. Measures the percentage of the population of the Lima Norte region that is benefiting from the alert system for new waves of COVID-19, which allows measures to be taken in real time. This indicator is directly related to the epidemiological surveillance that was carried out in different places in North Lima. In relation to this, it should be mentioned that 1% of the population of North Lima, that is, more than 3,600 people, benefited from epidemiological surveillance.

6.9 Clinical follow-up of COVID-19 patients

The community clinical team could follow-up to 1002 patients with COVID-19, 40 (4%) developed hypoxemia. From these 40 only 2 (5%) died. The clinical follow-up derived and validated a score to define the risk to develop hypoxemia only using 5 variables. The score assigned zero or the following points if: 60 or more age - 2 points; male - 2 points, antecedent of hypertension - 1 point, antecedents of diabetes - 1 point and obesity - 1 point. The patients were classified according to the risk to develop hypoxemia as follows: low risk (0 -1 points), intermediate (2 - 4 points) y severe (5 - 7 points). The risk to develop hypoxemia in the severe group was 21% which decreases to 8% if people have at least 3 vaccines.

This team implemented home oxygen delivery care because 60% of patients in follow-up who developed hypoxemia did not want to go to the health center to receive oxygen. One principal clinical intervention was to begin dexamethasone precocious at home; that's why the Number of cases that did not reach health establishments due to good home care response from SES in North Lima in the 1st and 2nd wave of COVID-19 measures the number of cases that did not reach health establishments, avoiding saturation of the themselves, when Lima was going through the first and second waves. As described, it was possible to monitor patients with COVID-19 at their homes, this helped ensure that only serious cases reach hospitals, preventing them from becoming saturated. Due to this intervention, we were able to prevent 51 cases from going to a health facility, receiving treatment at home and helping to avoid saturating health services, leaving them free to be used for more complex cases.

6.10 Post-acute sequelae of COVID-19

The clinical team evaluated 989 persons at a median of 4.7 months after diagnosis of COVID-19. All persons were evaluated with quality-of-life questionnaires, chest X-ray (CXR), spirometry, electrocardiogram (ECG), and echocardiogram. Participants reported post-acute pain or discomfort (73.9%), significant respiratory symptoms (68.3%), economic insecurity (55.4%), low energy (31.0%), depression in 20.7%, cognitive impairment in 8.0%, ventricular hypertrophy or dilation in 41.7% and diastolic dysfunction or impaired ventricular relaxation in 34.3%.

6.11 Strengthening the capacities of the health system

During this second year of the project, it seeks to strengthen the capacities of the health establishments of the first level of care for the control and prevention of infections, for which risk assessment visits have been carried out that are the basis for the elaboration of the infection control plan that will be carried out for each health establishment, this is intended to improve the health care of health personnel and prevent hospital-acquired infections. As a consequence of this activity, a course of infection control is going to be elaborated to benefit the personnel of the primary care level and they could elaborate the infection control plans to decrease the risk of acquiring nosocomial infections.

In addition, the design of the training program for the operation and maintenance of oxygen assets allowed the training of health personnel linked to the use and manipulation of oxygen assets from 100% of the regions of Perú. This intervention measures the availability of accredited human resources in operation and maintenance of oxygen equipment, essential for the treatment of moderate and severe COVID-19. This was carried out through the training of personnel in all regions of the country and in total there were 230 certified participants. In relation to this intervention, it can be indicated that after its execution, there is currently an average of 8 people trained in preventive and corrective maintenance of oxygen assets in each of the 25 regions of the country. It is worth mentioning that in approximately 40% of the regions before the start of the course, there was no person with this knowledge. It is important to mention that the history of courses developed by the ENSAP was 68% approved, different from our case, whose level of approval was greater than 80%.

6.12 Community health workers

Another problem identified during the pandemic was the low number of health professionals to realize all activities related to response of COVID-19. In the intervention the community health workers were able to identify people with COVID-19, follow-up to them and do educational promotion in control infection measures at home and reinforce the needs to be vaccinated. We must also highlight the

importance of the number of COVID-19 patients identified by the promoter that shows the COVID-19 cases identified by community volunteers to slow progress to severity and decrease transmission. Another problem identified during the pandemic was the low number of health professionals to identify patients with COVID19, in addition to the fact that it was known that this containment intervention had to be done in the community, which is why one of the most successful strategies was to involve in this identification to health promoters, who in our intervention were able to identify 3645 people with COVID19, who had timely access to treatment and a better prognosis.

7. Dissemination of results and experiences

The work carried out as part of the project has been shared with the local health authorities on a regular basis. All the evaluations of the oxygen assets and the infection control plans were shared with the respective authorities in the regions. Likewise, the progress of specific activities of the project has been registered in the shared databases between SES and the local health authorities, in such a way that a continuous exchange of information was maintained.

A meeting was held to exchange experiences with similar projects that were being carried out in the neighboring countries of Ecuador and Bolivia, which allowed generating learning for future interventions. Therefore, Fundación Esquel from Ecuador adopted the mental health approach implemented in Peru since September 2021 and adapted to needs in Ecuador. A final meeting was held with Esquel to share the final results of our project. This last meeting served to reinforce our compromise to collaborate in future proposals.

Our experience related to the epidemiological surveillance and community clinical follow-up were shared in the Seventh Global Symposium on Health System Research 2022[2]. Our experience related to the TB screening in patients with antecedent of COVID-19 was shared in The Union World Conference on Lung Health 2022.[3] Our experience implementing COTs were shared in the conference "Intercambio de experiencias, historias y buenas prácticas en Atención Primaria de Salud para enfrentar la pandemia de la COVID-19 en Perú".[4]

[2] https://healthsystemsresearch.org/hsr2022/program/
[3] https://conf2022.theunion.org/programme/
[4] https://www.paho.org/es/peru/i-etapa-intercambio-experiencias-historias-buenas-practicas-atencion-primaria-salud

Five videos were elaborated to disseminate the work done by the project which can be seen in the following links:

https://www.youtube.com/watch?v=NjG7pchs-pI&list=PLxu6EyV9NVJDDcAsn79kmgJGwV800dexb&index=5

https://www.youtube.com/watch?v=eWtPhUTro58&list=PLxu6EyV9NVJDDcAsn79kmgJGwV800dexb&index=2

https://www.youtube.com/watch?v=JZhcq49CcDI&t=51s

https://www.youtube.com/watch?v=LMHlBHp9stI&t=1s

https://www.youtube.com/watch?v=lj1rFL8gprA&t=7s

Our experiences during the execution of this project are shared too in 5 scientific reports: Diagnostic Performance Assessment of Saliva RT-PCR and Nasopharyngeal Antigen for the Detection of SARS-CoV-2 in Peru; Digital chatbots to close gaps in access to health care, Integrated screening and testing for TB and COVID-19 in Peru; Mobilizing digital technology to implement a population-based psychological support response during the COVID-19 pandemic in Lima, Peru; and Prevalence of SARS-CoV-2 antibodies among market and city bus depot workers in Lima, Peru. There are 4 more scientific reports in progress.

The final report of the project will also be shared with the local health authorities.

8. Conclusion

- The project, "COVID-19 Response in Peru," has made it possible to serve people directly and indirectly affected by COVID-19 in Metropolitan Lima and in different regions of the country.
- Efforts and activities have been optimized to provide joint care for COVID-19, tuberculosis, chronic diseases, mental health, and social protection, to reduce the impact caused by the current pandemic and reduce care gaps.
- Community involvement was encouraged in each of the activities, as a pillar to strengthen commitment in decision-making with a view to the protection of human subjects against COVID-19.
- The project is strengthening the capacities of health personnel linked to the supply of medicinal oxygen to improve their performance and the oxygen supply systems of the health system.

- The project has increased the capacity building of health facilities located in rural areas through the implementation of solar panels that allow their access to electricity.
- Work was coordinated with the different health authorities throughout the peruvian territory to prioritize care and support in the communities and in the establishments of greatest need.

9. Annex: Photo Gallery

9.1 Support in the epidemiological surveillance of COVID-19

Figure 1. COVID-19 Training and Training to Rapid Response Teams, April 2020

Figure 2. Collaborative work between Socios En Salud and DIRIS Lima Norte for the formation and training of rapid response teams

Figure 3. Rapid Response Team during home visits in Carabayllo, North Lima

Figure 4. Rapid Response Team during home visits in El Agustino, East Lima

Figure 5. Home visit to a family affected by COVID-19 by response teams, North Lima

Figure 6. COVID-19 Test Screening in Home Visits, North Lima

Figure 7. Interpretation and counseling of COVID Tests to families, North Lima

Figure 8. Community Agents Providing Counseling in Markets, North Lima

Figure 9. Response team during symptom interview with market workers, North Lima

Figure 10. Active search for COVID-19 in markets, North Lima

Figure 11. Joint Intervention between Health Promotion (DIRIS Lima Norte) and USAID Response Teams in Markets

Figure 12. Screening of COVID Tests in Transport Companies

Figure 13. Community agents conducting interviews and counseling with transport company personnel

Figure 14. Community Response Team in COVID Screening in Transportation Companies

Figure 15. Taking molecular tests on older adults in Nursing Homes, North Lima

Figure 16. COVID screening in differentiated triages of North Lima (CSMI Mexico)

Figure 17. Community Agent in Home Interventions, North Lima

Figure 18. Community Agents in conjunction with COVID-19 Case Search Response Team

9.2 Improvement of the installed capacities of health facilities in Lima and other provinces for the care of COVID-19

Figure 19. Installing TOC Carabayllo

Figure 20. Health facilities with oxygen points and networks installed, or with concentrators installed / Iquitos - Lambayeque – East Lima

Figure 21. Installation of Oxygen Manifold Panels, Trujillo

Figure 22. Oxygen Concentrators for COVID-19 Management at Carabayllo Support Hospital, Lima

Figure 23. Health facilities with medical equipment installed such as beds and oxygen concentrators, TOC Carabayllo, North Lima

9.3 Increase access to continuous and quality care for COVID-19 and non-COVID-19 conditions

Figure 24. Implementing ChatBOT Wellness

Figure 25. Implementing ChatBOT Wellness

Figure 26. Conference to share experiences in Mental Health at the Esquel Foundation, Ecuador.

9.4 Implementation of community education promoters, search and follow-up of COVID-19 cases, and socioeconomic support

Figure 27. Strengthening Local Community Health Workers (Anti-COVID Commands) through Community Mapping, North Lima

Figure 28. Providing Socioeconomic Support to Families Affected by COVID-19

9.5 Improving the case notification rates of essential public health programs

Figure 30. Monitoring of vital functions to patient al home

Figure 31. Patient care in medical campaign

9.6 Self-monitoring and home clinical monitoring of SARS-Cov2 infected patients

Figure 32. Monitoring at home of patient Affected by COVID-19

Figure 33. Taking temperatures by community agents

9.7 Preparing infection control plans to inform health authorities

Figure 34. Measurement of air filters in hospitalization areas

Figure 35. Air flow measurement

9.8 Mapping of oxygen assets, assessing their status and drawing up a maintenance plan

Figure 36. Team of oxygen asset evaluators in a hospital of North Lima

9.9 Preparing a training program for the operation and maintenance of oxygen assets

Figure 37. Maintenance workshop for oxygen assets in La Libertad region

Figure 38. Workshop participants receiving instructions to practice in an oxygen plant

9.10 Addition of oxygen solutions on primary health centers in rural or indigenous communities

Figure 39. Residents of Masisea on the day the solar panels were delivered

Figure 40. Inauguration of solar panels in Yura Health Center (Arequipa)