



COVID-19 RESPONSE MECHANISM

PRINCIPAL RECIPIENT INFORMATION SESSION

Project BOXER and Capacity Building

31 August 2023

Agenda

Topics	Presenters	Time
1 Introduction	Elizabeth Hamilton	5 min
2 Medical Oxygen Training Program: Project BOXER and Capacity Building	Andrew Johnston and Jen Morin	25 min
3 Q&A		30 minutes

2

Medical Oxygen Training Program

Project BOXER and Capacity Building

Medical Oxygen Training Program

Project BOXER Training and Capacity Building



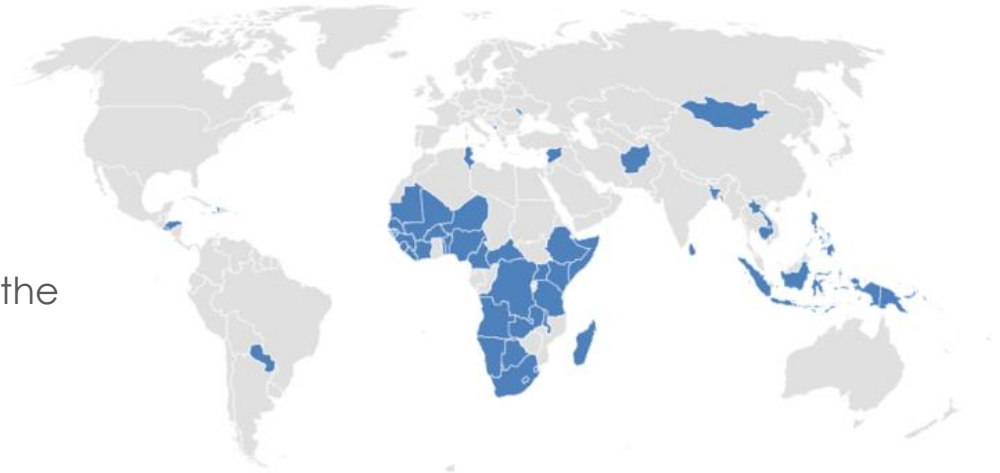
Project BOXER: TA for C19RM Bulk O2 Investments

Project Scope/Objective: To provide technical assistance (TA) that will support the implementation, monitoring and oversight of Pressure Swing Adsorption (PSA) plants and relevant Global Fund oxygen investments **to ensure sustainability and maximized impact of increased global oxygen capacity.**

TA Provider: Build Health International (BHI)

Who is BHI?

A design-and-build nonprofit dedicated to delivering dignified, high-quality healthcare solutions in low-resource settings throughout the world.



Project BOXER is providing technical assistance to 50 out of 59 countries procuring PSA plants via C19RM

Project BOXER Info Session

Topic: PSA Plant Training Programs

Presenter: Andrew Johnston, Director of Medical Oxygen Education and Training, Build Health International



As Director of Medical Oxygen Education and Training, Andrew works with the BHI oxygen team to provide accessible, engaging, and thorough training for countries with existing or incoming oxygen plants. Andrew has two decades of international development experience and studied international education, adult development, and community mobilization at Harvard. On Project BOXER, he applies his experience and education to build local capacity to operate and maintain lifesaving medical oxygen infrastructure. Andrew follows the rapidly evolving training needs of Project BOXER partners and works with BHI's Project BOXER team to develop effective trainings that make complex concepts understandable. In doing so, he seeks to empower Project BOXER stakeholders to sustainably maintain their PSA plants and oxygen delivery systems.

Project BOXER Info Session

Topic: PSA Plant Training Programs

Presenter: Jen Morin, Mechanical Engineer and Project BOXER Focal Point, Build Health International



Jen is a Mechanical Engineer serving as one of Build Health International's focal points for Project BOXER. Her primary focus is the development of oxygen plant specification recommendations in partnership with the Principal Recipients of the Global Fund's oxygen grants. As more plants move from specifications development to site preparation and capacity building, Jen has dedicated a portion of her time to the development of management materials for Project BOXER. She helped to lead two management trainings in Sierra Leone and Timor-Leste and will be leveraging her experience with these Project BOXER trainings to address future training requests from countries looking to receive training through Project BOXER.

Information Session Outline

1. Why Project BOXER Training?
2. Overview of Project BOXER Training
3. Ongoing Support
4. Training Process
5. Training Request Form
6. Questions and Answers (~30 mins)



Why Training?

The Situation

- In most health systems receiving PSA Plants, **biomedical technicians lack adequate knowledge** of how to maintain and safely operate **PSA plants or oxygen delivery systems**.
- **Senior leadership** is often unprepared to successfully and **sustainably integrate PSA plants** into health systems and hospitals.
- PSA plants are challenging to maintain and include **components that are not found in other hospital equipment**.
- Critical **biomedical equipment maintenance management systems** are historically **overlooked**.

Observed Consequences

- Staff **could not operate or maintain** the plants.
- **Short useful life of new PSA plants. Frequent breakdown** and unnecessary damage.
- **Lack of spare parts** meant broken plants could not be repaired.
- **Oxygen safety** was not adequately addressed. **Serious accidents**.
- Frequent **interruptions in the oxygen supply**.
- Significant **losses in investment**.
- **Reliance** on expensive **commercial O2 sources** when PSA plants broke down.
- **Dependency** on service contracts.
- **Inability to perform maintenance** after service contract ends.

Our Recommendation

Training and capacity building

Health systems with internal knowledge of PSA plants **maintain oxygen access** because they are **far better positioned to:**



Address PSA plant underperformance



Manage their service contracts



Continue PSA plant maintenance after service contract ends

BHI's Medical Oxygen Program

BHI developed a **PSA plant and oxygen delivery training** curriculum in **early 2022**. Over the past year, BHI has trained **over 558 biomedical engineers, technicians, and facilities maintenance staff**.

BHI has delivered training in **Burkina Faso, Cameroon, Guinea, Lesotho, Liberia, Mali, Nepal, Rwanda, Sierra Leone, and Sudan**.

Three types of oxygen training are available to **C19RM recipients** as a part of **Project BOXER**:

1. **Management Training**
2. **Maintenance Training**
3. **Training of Trainers (Advanced Maintenance)**

All trainings are available in **English** and **French**!

*Other languages may be possible upon request.



Project BOXER Training and Supplier Training

During the installation of a new PSA plant, suppliers conduct a training for site staff. However the **quality of these trainings can vary**. An additional Project BOXER training **reinforces key concepts** and emphasizes important practices to maintain an efficient PSA plant. The Project BOXER training consists of the **following benefits**:

- **More Comprehensive:** Length of training **5 days** instead of **1-3 days**
- **Technical Detail:** Increased level of **depth and detail**, pulling from BHI's observations from our work in **over 25 countries**
- **Neutral: Brand-neutral** and **impartial**
- **Safety:** Strong emphasis on medical oxygen **safety and risk mitigation**
- **Long-term Sustainability:** Focused on **capacity building for sustainability**
- **Experience and Lessons Learned:** Share lessons learned from **accidents and repairs**
- **Post-training Support:** Ongoing engagement through **virtual support** and **community of practice**



Sierra Leone: Kevin Ndefi presents management training slides



Rwanda: David Acolatse demonstrates using an oxygen analyzer

Project BOXER Oxygen Training Programs

	Level of Expected PSA Knowledge	Length	Target Audience	Recommended Timing	Training Objective
Management Training	No Prior Knowledge	2 Days	MoH leadership, Hospital Directors and Senior Management	Prior to installation or commissioning	Ensure that senior management is fully briefed on the function and operating requirements of PSA plants including maintenance and safety. Health sector leadership is prepared to successfully integrate new PSA plants and oxygen delivery equipment into health systems.
Maintenance Training	Beginner	5 Days	Biomedical Engineers & Technicians, Facilities Managers, Hospital Operations Staff	Immediately after installation or commissioning	To prepare biomedical engineers, technicians, facilities managers, and plant operators to safely and sustainably operate and maintain PSA plants by providing the knowledge and building the skills necessary to: implement daily and ongoing preventive maintenance, perform daily maintenance check, and troubleshoot and conduct routine repairs.
Training of Trainers	Intermediate	5 Days	Experienced Engineers or Technicians with Supervisory or Training Roles	After commissioning, once master trainer candidates have been identified	To empower advanced technicians to train others on PSA plants and to conduct complex maintenance and repairs independently. An advanced version of the maintenance training that prepares experienced engineers and technicians to conduct more sophisticated maintenance, troubleshooting, and repair of PSA plants.

Management Training



Ministry of Health
Senior Leadership

Hospital Directors and
Senior Management

Two Day Training

No Experience Required

Objective: To ensure that senior management is fully briefed on the function and operating requirements of PSA plants including maintenance and safety. Health sector leadership is prepared to successfully integrate new PSA plants and oxygen delivery equipment into health systems.

Management Training - Approach

- **Classroom sessions** to build conceptual understanding of PSA plants and oxygen delivery systems
- Briefing on **budgeting, human resources, supply chain, warranty, service contracts**
- **Site visit** to PSA plant for practical, hands-on learning
- Videos and case studies to raise awareness for medical **oxygen safety and risk mitigation**
- Review of plant operator **daily checklists** to familiarize management with deliverables
- **Examples** of circumstances that led to plant failures **from BHI's Find & Fix work**
- Discussion of **spare parts** and **preventative maintenance**

Training Agenda

	Day 1	Day 2
8:00 AM	Registration and Check-In	Check-In
8:15 AM		Assessment Feedback
8:30 AM	Introduction	5 - Overview of PSA Plant Maintenance: Daily and Preventative Maintenance
8:45 AM		
9:00 AM	1 - Intro to Medical Oxygen and PSA Plants	6 - Spare and Replacement Parts Supply: Planning, Budgeting, and Management
9:15 AM		
9:30 AM		
9:45 AM		
10:00 AM	Tea	Tea
10:15 AM		
10:30 AM	2 - Basics of PSA Components & Function	7 - Human Resources Needs and Planning for PSA Plant Maintenance
10:45 AM		
11:00 AM		
11:15 AM		
11:30 AM	Q&A	Q&A
11:45 AM		
12:00 PM	Lunch	Lunch
12:15 PM		
12:30 PM		
12:45 PM		
1:00 PM	3 - Practical Session (At PSA Plant)	8 - Find and Fix Observations and Lessons Learned
1:15 PM		
1:30 PM		
1:45 PM		Tea
2:00 PM		
2:15 PM	Tea	9 - Planning and Budgeting Consultations
2:30 PM		
2:45 PM		
3:00 PM	4 - Safety: PSA Plants and Oxygen Delivery Systems	10 - Next Steps
3:15 PM		
3:30 PM		
3:45 PM		
4:00 PM		11 - Training Wrap-Up: Photos, Certificates
4:15 PM		
4:30 PM	Day 1 Wrap-Up	
4:45 PM		

Administrative
Assessment
Break
Classroom
Practical
Questions and Answers

Management Training - Classroom Sessions

Topics Include:

- Introduction to **medical oxygen** and **PSA plants**
- **Safety** and **hazard mitigation**
- Overview of **PSA components and function**
- **Find and Fix observations** and Lessons Learned
- **Operating requirements** for PSA Plants
- Overview of **PSA plant maintenance**
- **Human Resources** including **staffing requirements** and **capacity building** for PSA Plant Maintenance
- **Budgeting** for PSA operations, oxygen delivery, and maintenance
- **Looking ahead** - PSA plant **management** for **sustainable oxygen supply**



Sierra Leone Senior Management Training: A health sector leader poses a question during the Budgeting for PSA Operations module.

Maintenance Training



Biomedical Engineers and
Technicians

Facilities Managers

Hospital Operations Staff

Five Day Intensive Training

Beginner Level

Objective: To prepare biomedical engineers, technicians, facilities managers, and plant operators to safely and sustainably operate and maintain PSA plants by providing the knowledge and building the skills necessary to:

- implement daily and ongoing preventive maintenance.
- perform daily maintenance check.
- troubleshoot and conduct routine repairs.

Maintenance Training - Approach

- **Classroom sessions** to provide a detailed, technical description of PSA plants and oxygen delivery systems.
- **Site visits** to PSA plants for practical, hands-on learning.
- **Pre-training, daily, and post-training learning assessments.**
- **Adaptation** of a BHI-designed **daily checklist** and **preventative maintenance plan** to **specific PSA plants.**
- Development of an **online community of practice** for ongoing technical support and engagement.

Training Agenda

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM	Registration and Check-In	Check-In	Check-In	Check-In	Check-In
8:15 AM		Assessment Feedback	Assessment Feedback	Assessment Feedback	Assessment Feedback
8:30 AM					
8:45 AM	Introduction	4 - Safety: PSA Plants and Oxygen Delivery Systems	8 - PSA Oxygen Generator	12 - Overview of PSA Plant Maintenance	16 - Find and Fix Observations and Lessons Learned
9:00 AM					
9:15 AM	Pre-Assessment			13 - Daily Checklist, Preventative Maintenance Plan, and Repair Log	17 - PSA Plant Infrastructure Considerations
9:30 AM					
9:45 AM	Tea	Tea	Tea	Tea	Tea
10:00 AM					
10:15 AM					
10:30 AM	1 - Intro to Medical Oxygen and PSA Plants	5 - Safety: PSA Plants and Oxygen Delivery Systems (Cont'd)	9 - Booster Pump	14 - Troubleshooting Common Problems	18 - Post-Test
10:45 AM					
11:00 AM					
11:15 AM					
11:30 AM	Q&A	Q&A	Q&A	Day 4 Assessment	Q&A
11:45 AM					
12:00 PM	Lunch	Lunch	Lunch	Lunch	Lunch
12:15 PM					
12:30 PM					
12:45 PM					
1:00 PM				Travel	
1:15 PM	2 - Basics of PSA Components & Function	6 - Fire Extinguisher Demonstration	10 - Cylinders and Oxygen Delivery Systems		19 - Training Wrap-Up: Photos, Certificates, Tools
1:30 PM					
1:45 PM					
2:00 PM					
2:15 PM					
2:30 PM	Tea	Tea	Tea		
2:45 PM					
3:00 PM	3 - Air Compression and Purification	7 - Practical Session (Onsite)	11 - Practical Session (Onsite)	15 - Practical Session (Offsite)	
3:15 PM					
3:30 PM					
3:45 PM					
4:00 PM					
4:15 PM					
4:30 PM	Day 1 Assessment	Day 2 Assessment	Day 3 Assessment	Day 4 Wrap-Up	
4:45 PM	Day 1 Wrap-Up	Day 2 Wrap-Up	Day 3 Wrap-Up	Travel	

Administrative
Assessment
Break
Classroom
Practical
Assessment Feedback / Q&A
Travel

Maintenance Training - Highlights

Practical Sessions

- Trainees have the opportunity to **hone existing skills** and **apply concepts** learned in classroom sessions, **learn tips and techniques** from instructors, and **gain experience** with PSA plant components that may not be present in their own plant.

Assessments

- Participants will take **daily assessments** during the training, beginning with a **pre-training assessment** and ending with the **post-training assessment**. These are designed to help BHI instructors **gauge learning**, **address any weak areas**, and **provide remediation** during the training.

Materials

- Trainees receive: electronic copy of training presentation, PSA daily **maintenance checklist** (52 weeks), preventative **maintenance plan**, and PSA **repair log**.

Maintenance Training Highlights



Rwanda: Steve Mtewa teaching about a component in the oxygen booster compressor




Rwanda: Trainees taking their daily assessment.

[illegible]

	Manufacturer	Model	Serial Number
Air Compressor			
FSA Filter			
Oxygen Sensor/Compressor			

Preventative Maintenance Log

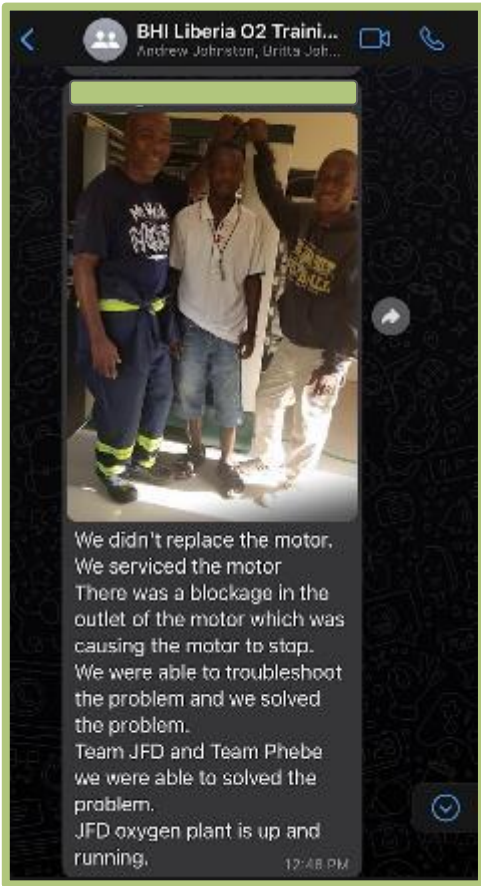
Component	Service	Recommended Frequency	Hours	Date	Initials	Hours	Date	Initials	Hours	Date	Initials	Hours	Date	Initials	Hours	Date	Initials
Air Compressor	Change air filter																
	Change oil																
	Change oil filter																
	Change all evaporator elements																
	Inspect belt (if equipped)																
	Clean all dryer condenser radiator																
	Clean aftercooler and intercooler																
	Change contracting filter #1																
FSA Filter	Change contracting filter #2																
	Change contracting filter #3																
	Change contracting filter #4																
Oxygen Sensor/Compressor	Change contracting filter																
	Check oil level																
	Check for leaking water																
	Clean cooling fans																
	Clean air-line filter																
	Change 10 and 200 stage piston ring																



Ongoing Virtual Support

Ongoing Support: Each training cohort is invited to joining a country-specific WhatsApp **community of practice** where trainees can:

- Ask **Project BOXER technical assistance team** and other trainees for **troubleshooting advice** and **crowdsource ideas**.
- Keep each other **accountable** to stay up to date by sharing **daily checklists**, **preventative maintenance logs**, and **repair logs**.
- Stay in touch with other biomedical engineers, technicians, and managers.
- Stay connected for additional Project BOXER resource releases.



Liberia: The Liberian Biomedical Engineer/Technician virtual support group. **Left:** Phebe Oxygen Plant thanking BHI's Steve "Grandpa" Mtewa for his assistance. **Right:** Operators from JFD Oxygen teamed up with Phebe Oxygen Plant and were able to assist one another in troubleshooting and solving a motor issue at JFD.

Training of Trainers



Experienced engineers and
technicians with supervisory
or training roles

Five Day Intensive Training

Intermediate/Advanced Level

Objective: To empower advanced technicians to train others on PSA plants and to conduct complex maintenance and repairs independently. An advanced version of the maintenance training that prepares experienced engineers and technicians to conduct more sophisticated maintenance, troubleshooting, and repair of PSA plants.

Training of Trainers (Advanced Training) - Approach

- **Customized agenda based on needs.** Agenda can focus on **training of trainers (TOT)** or on **advanced** training on PSA plant maintenance and repair.
- **TOT classroom sessions** to prepare trainers to provide technical training on PSA plants and oxygen delivery systems
- **Advanced practical training** in PSA plant **maintenance and repair** with **a focus on complex components such as the air compressor or the booster compressor**
- **Site visits** to PSA plants for practical, hands-on learning
- Trainees take an **increased role in the training by delivering supervised practical and theoretical lessons.**
- **Theoretical and practical pre-training, daily, and post-training learning assessments**
- Development of an **online community of practice** for ongoing technical support and engagement
- **Support developing a training curriculum** and conducting onsite training, if applicable

Training of Trainers - Classroom Sessions

Topics include:

- Introduction to **medical oxygen** and **PSA plants**
- Overview of **PSA components and function**
- **Safety** and hazard mitigation
- **Air compression and purification**
- **PSA oxygen generator**
- **Oxygen booster pump**
- **Principles of PSA plant operation**
- **Oxygen delivery systems**
- **Find and Fix observations** and **lessons learned**
- PSA plant **maintenance checklists** and **planning**



Nepal: Pedro Castro and advanced training candidate comparing PSA and liquid oxygen plants

Project BOXER Training: Ongoing Support

Active post-training support is essential to helping trainees build skills and increase independence, as well as keeping PSA plants functioning. Ongoing support is a key contributor to PSA plant **sustainability**.

Monitoring and ongoing support through Project BOXER can include:

- Review of completed **Daily Maintenance Checklists** and **Preventative Maintenance Logs**.
- **Virtual support** from **Project BOXER technical assistance team**.
- Access to closed **Whatsapp chat group** or **other platform**.
- **Community of practice** (technicians supporting other technicians).
- **Scheduled check in calls** (individual or group).
- Access to **online content**.
- **Refresher training**.



Guinea: Jean Christian Ujeneza conducts hands on training in French at Donka Hospital in Conakry.

Project BOXER Training Process: Planning

1. PR submits a formal request for training by completing the [Training Request Form](#).
2. BHI schedules a consultation within two days of receiving training request.
3. BHI and PR meet to discuss the specific training needs.
4. BHI holds coordination calls with PRs and, as needed, with other in-country stakeholders, to refine needs and strategy for the trainings.

Following the consultation, the **BHI team** handles the following logistics:

- Developing Terms of Reference and strategy for the training.
- Presenting training materials and provides hands-on training with the PSA plant.
- Providing trainees with copies of training materials.
- Awarding certificates to trainees at the completion of the training.

The **Principal Recipient (PR)** is responsible for remaining logistics, including (but not limited to):

- Identifying a venue for the training.
- Sending invitations to trainees and confirms attendance prior to training.
- Arranging lodging and transportation for trainees, if required.
- Arranging per diems and transport payments for trainees.
- Providing refreshments during training.

Project BOXER Training Process: Financials

The following training costs are covered by **the Global Fund** through **Project BOXER**:

1. BHI's costs (staff time, flights, accommodations, etc.)
2. Training materials
3. Training certificates
4. Visibility and communications items (i.e. banners, signage)

The **PR** is responsible for the in-country training costs including:

1. Venue
2. Trainee lodging and meals
3. Transportation (to venue, PSA plant, etc.)
4. Trainee per diems

Project BOXER Training Process: Timeline



Training Request Form

Following this information session, this form will be circulated via email to all Principal Recipients.

<p>Email *</p> <p>Your email <input type="text"/></p>	<p>Do you have training plans already established? For example, training provided by the supplier or by other partners? If you are going to receive training from the supplier, who is this supplier?</p> <p>Your answer <input type="text"/></p>
<p>If different from the email address provided above, who should BHI contact to arrange a training consultation?</p> <p>Your answer <input type="text"/></p>	<p>Are there any special circumstances that BHI and TGF need to be aware of?</p> <p>Your answer <input type="text"/></p>
<p>For which country are you requesting the training?</p> <p>Your answer <input type="text"/></p>	<p>IMPORTANT: Training at the PSA plant requires a lot of administrative preparation. A BOXER project training will take place more quickly if the PR and its partners in the country are able to organize the main aspects of the training, including the location of the training, the transport of the training participants, the per diems participants, meals for participants during the training, and transportation of participants and trainers to PSA plants for hands-on sessions during the training. Please indicate your ability to support these aspects of the training.</p> <p><input type="radio"/> We are able to arrange all aspects of training mentioned above.</p> <p><input type="radio"/> We need to discuss this during the consultation.</p>
<p>What type(s) of training do you require?</p> <p><input type="checkbox"/> Training in the management of PSA plants</p> <p><input type="checkbox"/> PSA plant maintenance training</p> <p><input type="checkbox"/> Advanced training (training of trainers) on PSA plants</p>	
<p>What is the planned start date of the training(s)?</p> <p>Date</p> <p>mm/dd/yyyy <input type="text"/></p>	

After this form is submitted, the Project BOXER team will contact the PR within two business days to arrange a consultation. In that meeting, we will discuss unique training needs (hospitals to receive training, number of trainees, etc.)

Thank you!



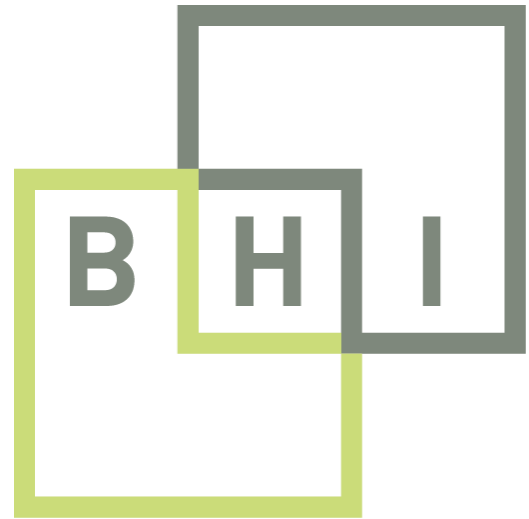
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AIDS, Tuberculosis and Malaria

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Scan the QR code below to let us know





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