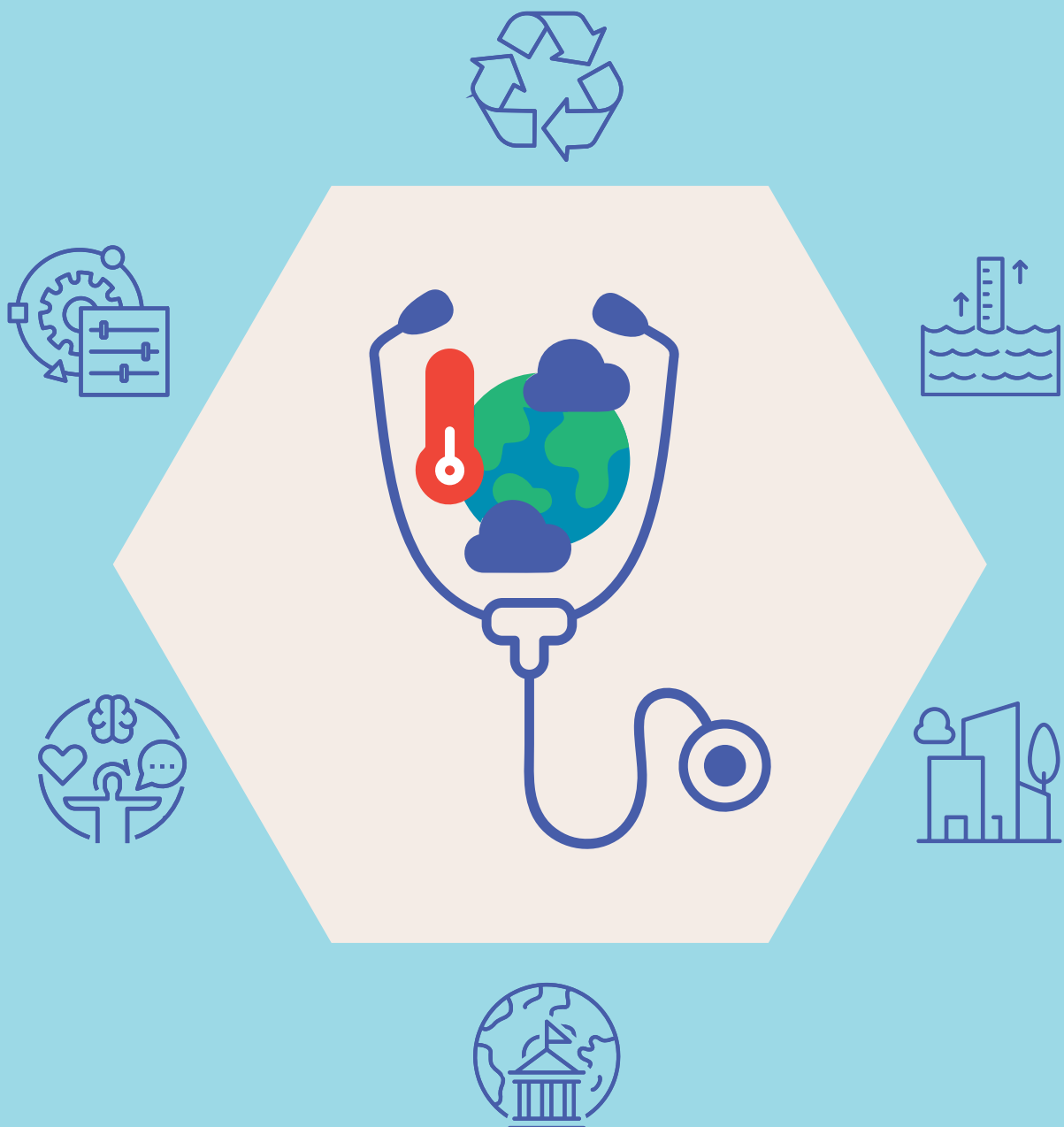


# Climate X Health Challenge

A compendium of climate responsive solutions in public health

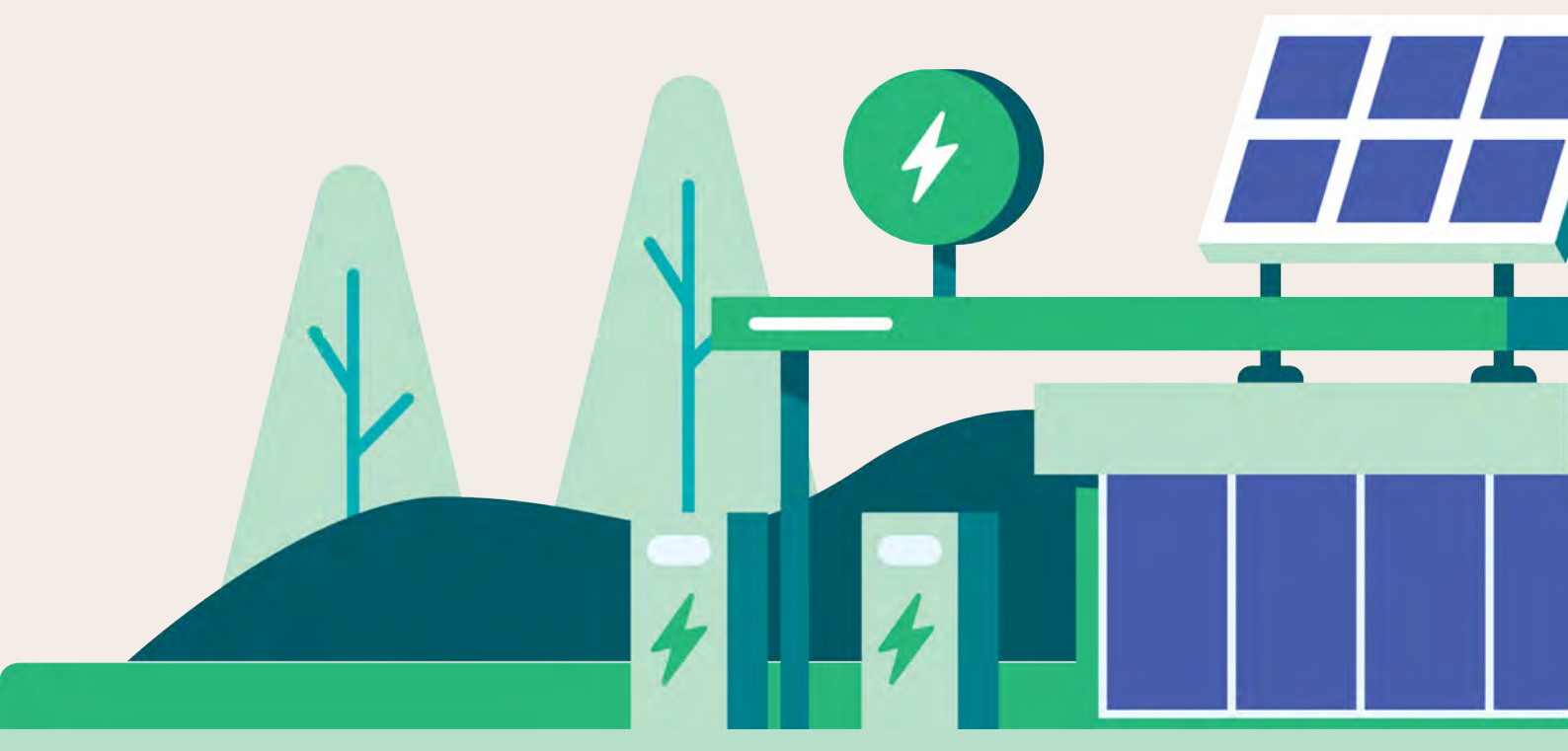




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# Foreword



Climate change is one of the tallest challenges the world faces today. Its detrimental impacts have an implication on every facet of human life, including health. Stressors and climate-related hazards such as landslides, floods, droughts, pollution, etc. are likely to exacerbate disease burdens in the form of diarrheal diseases, vector-borne diseases, respiratory issues, among others. In fact, research estimates suggest that climate change is likely to cause an additional 250,000 deaths every year between 2030 to 2050.

Health care systems that are resilient to climate change-induced impacts are the need of the hour. This means scaling and improving access to health care and devising solutions and equipment that reduce the carbon footprint; use resources available in abundance; and can anticipate, adapt, and recover from the impacts of climate change on public health. Globally, efforts have been initiated to build and strengthen climate resilient health systems but we need more innovative solutions urgently.

It is time to turn the conversation around climate change and health into concrete and intentional action. India's G20 Presidency this year, and the COP28 scheduled to be held in UAE in November 2023, are excellent opportunities to table crucial discussions on building climate resilient health care systems. These platforms can drive global commitments and action by incorporating health considerations into national climate plans, fostering collaboration, and developing robust policy frameworks.

PATH has been working to accelerate health equity through technology and innovation for more than 40 years and across 70+ nations. PATH, in partnership with the Office of the Principal Scientific Advisor to the Government of India, SELCO Foundation, Scope Impact, the Rockefeller Foundation, C-Camp, CDP, Social Alpha, and Environment Defense Fund launched the Climate X Health Challenge to identify and spotlight innovations that can help build climate resilient and environmentally sustainable health systems while also building community resilience and enabling community action. Through this effort, our aim has been to accelerate near-ready climate responsive solutions in public health settings.

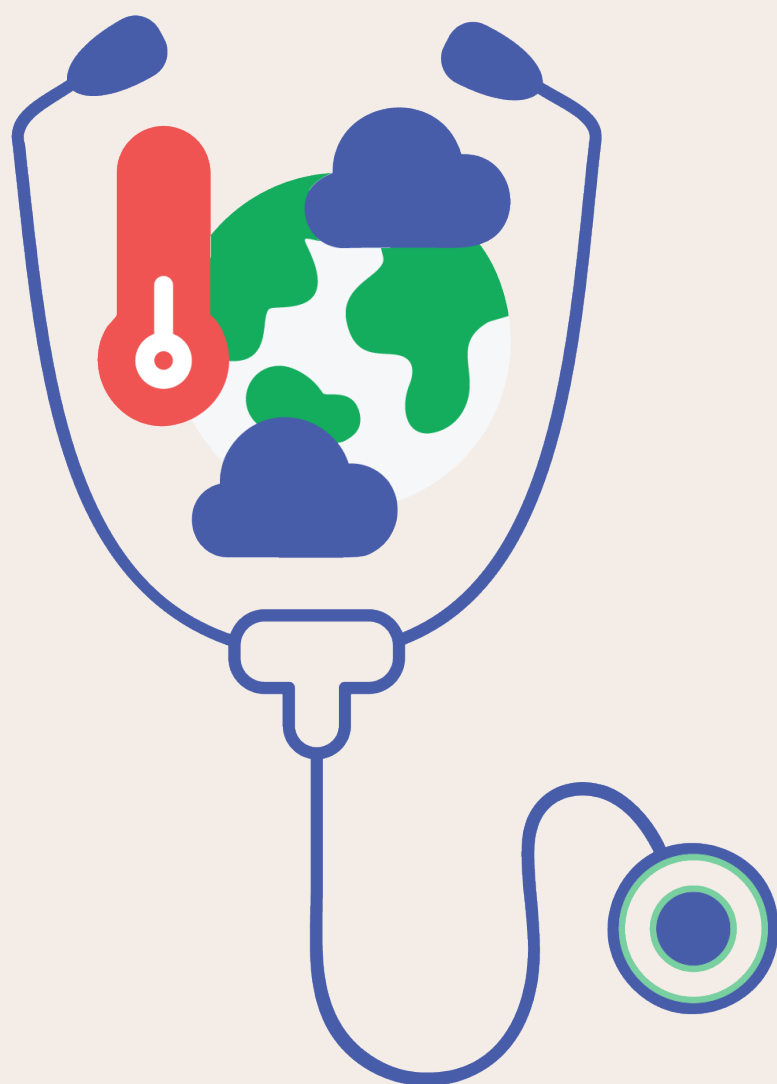
I am proud of the winning ideas that are showcased in this compendium, which show great potential to mitigate the health impacts of climate change. I am truly excited to see the impact they will create in the coming years in public health systems across low- and middle-income countries. I look at this compendium as a reference point for new efforts in this direction.

I hope this motivates people across the sector to think deeply about how technology and innovation can be harnessed to support the implementation of a One Health approach and mitigate impacts of climate change on public health.

A handwritten signature in dark ink, appearing to read 'Neeraj Jain'.

**Neeraj Jain**

Country Director, India and  
Director, South Asia PATH





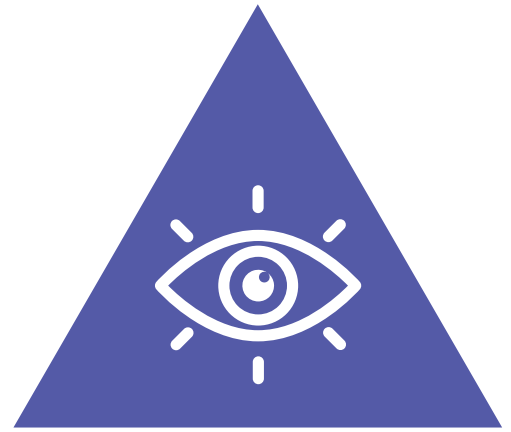
## Program Philosophy

The effects of climate change on human health are bound to exacerbate in the coming years. Between 2030 and 2050, climate change is expected to cause an estimated 250,000 additional deaths per year and a loss of \$2-4 billion every year globally. The climate crisis threatens to undo the last fifty years of progress in global health and can severely jeopardize the realization of Universal Health Coverage (UHC).

Robust and climate-resilient health systems are the primary line of defense against climate-related shocks and stressors since they provide the much-needed care to communities affected by impacts of changing climate conditions such as vector-borne and diarrheal diseases as well as climate-related hazards such as heatwaves, floods, wildfires, and air pollution.

The presence of functional health facilities during extreme events such as landslides, flash floods, heatwaves, droughts, etc is critical to ensure timely treatment and care for the people affected and to monitor diseases. There is a need to build resilient healthcare facilities that are sustainable and can respond efficiently to climate change calamities.





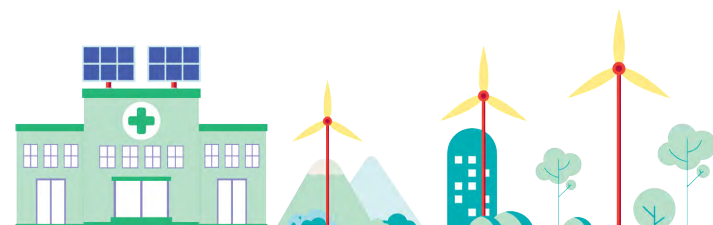
## The Vision

The World Health Organisation (WHO) identifies four elements for providing safe and quality care in the context of climate change:

- ④ Adequate health workforce who are empowered and informed to respond to environmental challenges.
- ④ Sustainable management of water, sanitation, and healthcare waste services.
- ④ Sustainable energy services.
- ④ Appropriate infrastructure, technologies, products, and processes, including operations that support the efficient functioning of a healthcare facility.

PATH, through this challenge, provides a platform for low-cost, scalable, and replicable innovations which promote health systems' capacity, resilience, and adaptability to extreme climate change risks and related health effects. The challenge is a platform for innovators to showcase their solutions and innovations, which can be adopted and implemented in the existing public health facilities in low- and middle-income countries in South Asia and Africa.

Our vision is to accelerate the deployment of near-ready climate-responsive solutions in public health settings that focus on tackling the impact of climate change vis-à-vis public health.







## Focus Areas

**CLIMATE X HEALTH** sought product and process innovations and solutions on adaptation, mitigation, environmental governance, or local community participation for climate-resilient health systems and related health risks in India and similar low and middle-income countries.

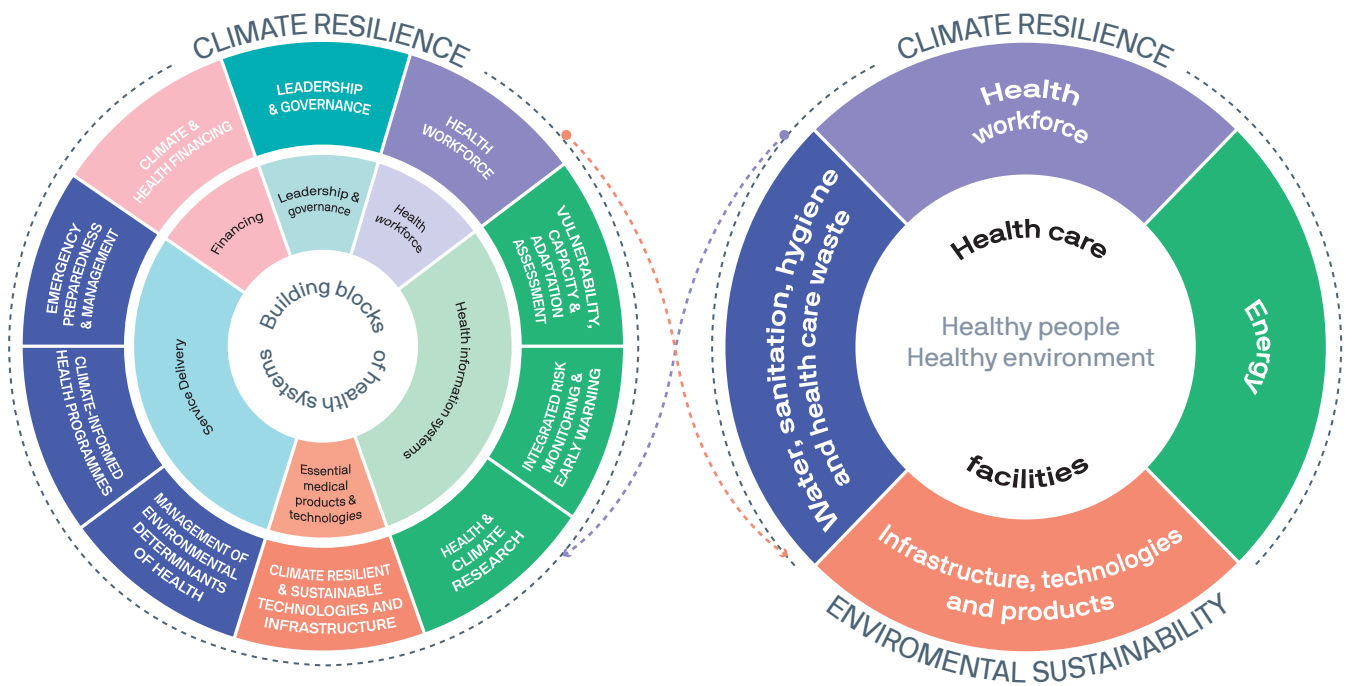


**Product Innovations:** Innovative technological products that help in reducing the carbon footprint of healthcare facilities, help forecast climate-related risks, provide early warning signals, and help predict climate-induced health hazards.



**Process Innovations:** Innovative solutions in the form of data analysis tools, communication and information collaterals, information, and communication technology (ICT) solutions, standard operating procedures (SoPs), capacity building and mentoring solutions, etc. that help build climate resilience and facilitate healthcare facilities and health system to respond to climate-related health risks.








There are three programmatic focus areas broadly:

### 1. Decarbonising public health facilities:

Innovations that help reduce the carbon footprint of public health facilities and make operations more sustainable. The innovations within this focus area may include the following:

- 
**Innovations in healthcare infrastructure:** Energy efficient, low or zero carbon, benign building design solutions for public health facilities. These shall include low-carbon architecture frameworks, cost-effective renewable sources to power the health facilities, SoPs and frameworks to track and monitor energy use and carbon emissions of health facilities, etc.
- 
**Energy efficient medical devices and equipment:** Medical devices and equipment that are energy efficient, and innovative solutions to track and monitor the energy use of equipment and devices used in public health facilities.
- 
**Zero carbon solutions for transportation:** Innovative zero carbon solutions such as e-mobility for patient transportation, sample collection and transport, and delivery of vaccines and medicines.

## 2. Risk mitigation and adaptation for health system preparedness:

Innovations that track and collate weather and meteorological data for use in public health facilities to respond to climate-related risks and hazards. These shall include:

- 📍 **Early warning forecast systems for health systems:** Innovations that combine the use of on-ground measurement data and predictive analytics to monitor the spread of climate-related illnesses and help in predicting impending disease outbreaks and epidemics. These shall also include innovative solutions that generate event-based alerts regarding heat waves, extreme precipitation, deteriorating air quality, etc that can be used by health facilities, and local administrations to enhance preparedness.
- 📍 **Climate change induced health vulnerability and risk mapping:** Solutions for assessing and mapping climate associated health vulnerabilities, risk assessment, and stratification. Examples shall include innovations working on preparing heat-vulnerable maps, areas of deteriorating air quality, as well as digital and AI/ML enabled solutions and innovations to map and track change in the ecology of vectors responsible for diseases such as dengue, malaria, filariasis, etc.

## 3. Enhancing community engagement and capacity development on climate-induced health risks:

Innovations that engage communities in addressing the effects of climate change on health and build the capacity of the health workforce to address climate-related health risks. These shall include:

- 📍 **Capacity development of health workforce on climate risks:** Innovative capacity building, and mentoring solutions, learning management, and decision support systems for healthcare providers for enhancing their knowledge, skills, and competencies for dealing with climate-related health risks.
- 📍 **Enhancing local community participation and local governance on climate-induced risks and hazards:** Solutions that empower communities with quality information and decentralized planning tools to adapt to the impact of climate change on human health. These shall include evidence-based participatory planning tools and templates for decentralized planning and development, solutions to increase the capacities of community structures and local institutions to respond to climate-induced health hazards, and Information Communication Technology (ICT) solutions for enhancing community literacy.



## Program Partners



PATH is a global nonprofit dedicated to achieving health equity. With more than 40 years of experience forging multisector partnerships, and with expertise in science, economics, technology, advocacy, and dozens of other specialties, PATH develops and scales up innovative solutions to the world's most pressing health challenges.



### **Office of the Principal Scientific Adviser to the Government of India**

Office of Principal Scientific Adviser to the Government of India provides pragmatic and objective advice to the Prime Minister and cabinet on matters related to science, technology and innovation with a focus on application of science and technology in critical infrastructure, economic and social sectors in partnership with Government departments, institutions and industry.



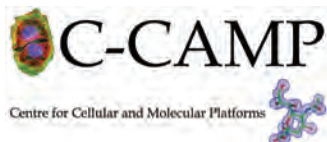
SELCO Foundation seeks to inspire and implement solutions that alleviate poverty by improving access to sustainable energy to underserved communities across India in a manner that is socially, financially and environmentally sustainable.



Scope Impact is a global social innovation company working at the intersection of health and climate.



The Rockefeller Foundation's mission is to promote the well-being of humanity and make opportunity universal and sustainable.



Centre for Cellular and Molecular Platforms (C-CAMP) is an initiative of the Department of Biotechnology, Govt. of India. Established in 2009 with a mandate to enable cutting edge Life Sciences Research and Innovation, C-CAMP is India's one of the most exciting life sciences innovation hub bringing together academia, industry and the start-up ecosystem - all on one platform.



CDP began working in India in 2008 and was formally registered in 2012, working on disclosure and driving climate action. It serves as a source of knowledge for hundreds of Indian corporations, from those that are just beginning on the road to corporate environmental disclosure to those looking to improve sustainability and make commitments to reduce environmental impact.

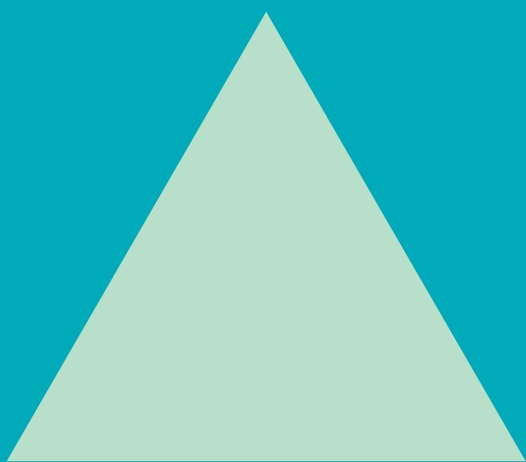


Social Alpha architecture is built around a not-for-profit platform, Foundation for Innovation and Social Entrepreneurship (FISE) and operates through a nationwide network of technology and business incubation infrastructure, sponsored, and enabled by Tata Trusts, Government of India and a number of academic, philanthropic, and corporate partnerships.



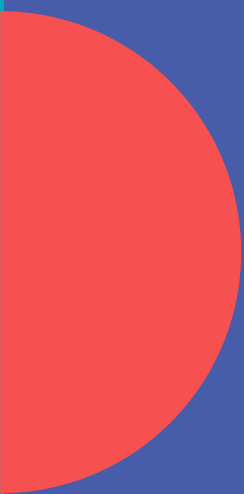
Environmental Defense Fund (edf.org) is a not-for-profit that seeks to support an Indian pathway to shared, sustainable prosperity. We support government, business, and other partners to demonstrate the viability of sustainable livelihoods (in agriculture, livestock, and fisheries), to demonstrate shareholder value creation through responsible business, to establish market-based mechanisms like carbon markets as well as to catalyze the climate tech ecosystem in India.

# WINNERS



# DECARBONIZING PUBLIC HEALTH FACILITIES

Innovations that help reduce the carbon footprint of public health facilities and make operations more sustainable are a part of this theme. These innovations ranged from healthcare infrastructure, energy efficient medical devices and equipment, and zero carbon solutions for transportation.



# Radiography 7000 C DigitalDiagnost C90

ORGANISATION: PHILIPS (NETHERLANDS)

## The health challenge at hand

- Every year around 3.6 billion diagnostic medical examinations are performed globally, of which, around half are X-ray examinations.
- With an average rate of 4%, retakes account for 86.4 million unnecessary exposures globally, leading to a significantly increased dose per patient, hospital costs, and overall energy consumption.
- An average radiology department uses energy equivalent to a town of 852 people.

## Description of the innovation

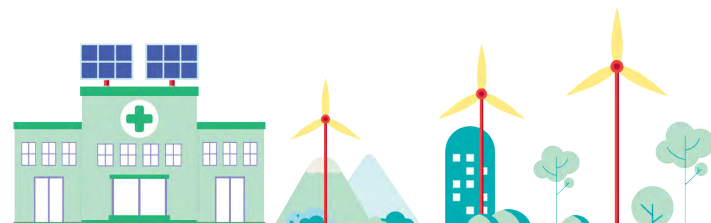
The Radiography 7000 C – DigitalDiagnost C90 is a ceiling mounted radiography solution designed to meet the diagnostic imaging needs in the most demanding institutions. It is equipped with a live tube head camera, versatile room configurations, and examination automation technologies.

## Innovative element of the solution

- Allows to comfortably see more patients per day and shorten patient wait times by decreasing the time to diagnosis with innovative tools that help drive workflow efficiency.
- Designed to avoid unnecessary exposures for patients through a bone suppression software and the live camera package. This helps avoiding around 28 retakes per week.
- Demonstrated a 39% reduction in energy consumption compared to previous solutions.

## Scalability in low-and-middle income countries

- Acts as a cornerstone to an effective diagnosis, especially in LMICs.
- High-performance system that can be tailored to meet clinical and budgetary needs.
- Can be configured in a flexible manner, while putting operational safety through the intuitive user interface first.





## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

Radiography 7000 C – DigitalDiagnost C90 was commercialized in 2018 and is in circulation since 2019.

### Capital and operational costs

- Improved workflow and reduced time-to-diagnosis results in faster informed decision-making and reduction in operational costs.
- With SkyFlow, 34 seconds can be saved on average on every examination compared to with a grid.
- The Eleva Tube Head speeds up the technical workflow by another 28 seconds per examination compared to the previous release of Philips' DigitalDiagnost.

### Current deployments

The Radiography 7000 C – DigitalDiagnost C90 is available in nearly 160 countries and helps health care staff provide better care with approximately 1500 installations.

### Impact so far/ Expected impact

- Thirty nine percent reduction in energy consumption compared to previous systems while improving workflow and time-to-diagnosis.
- Faster workflow of 17.3% compared to a typical examination using the previous release of Philips DigitalDiagnost
- Physicians see 15 more patients per day and save up to eight hours overtime per week.

### Efficacy of the innovation

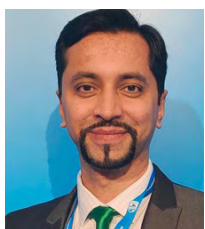
- All clinical benefits are being validated and substantiated according to FDA/CE requirements.
- Sustainability benefits are being validated through internal EcoDesign requirements, investigating environmental impact of the product in respect to energy, packaging, substances, and circularity.



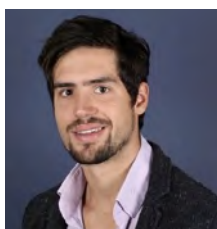
## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Karan Nayyar**  
DXR Sr. Product Manager



**Philip Sauer**  
DXR Product Management Trainee



**Saskia Verbunt**  
Director - Sustainability  
and Access to care



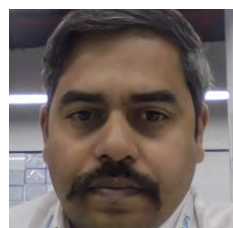
**Siddharth Sindhwani**  
Sr. Manager - Sustainability  
and Access to Care



**Yair Kerkmeester**  
DXR Product Management  
Trainee



**Iris Timmers**  
DXR Sr. Product Manager



**Pavankumar Sonkar**  
Sustainability Engineer



**DXR Team**

### The health challenge at hand

- Conventional methods of chemical disinfection (CD) to sanitize surfaces are expensive (consumables), slow, unreliable (being highly dependent on the skill and supervision of the cleaning staff), and have a negative impact on the environment.
- UV disinfection is expensive, dangerous to humans and animals, damages surfaces, and facilitates the development of highly resistant pathogens.
- UV/CD are not able to effectively counteract the phenomenon of recontamination.

### Description of the innovation

Biovitae is a UV-free LED lighting technology that utilizes a combination of multiple wavelengths in the visible light spectrum which are effective in killing bacteria, fungi, mold, spores, and viruses on surfaces and air. Biovitae may be used in health care facilities to provide passive surface/air safety from infectious pathogens such as SARS-CoV-2, simply by switching on the light.

### Innovative element of the solution

- Overcomes many of the issues found today with implementing common infection prevention and control (IPC) solutions including CD or UV since the light emanated is safe for continuous exposure to humans/animals.
- Reduces operational costs for facilities since it does not require any trained cleaning staff (passive system) or consumables (i.e., chemicals).
- Can continuously sanitize, even in overcrowded facilities, since there is no need for a cleaner to be physically present or require emptying a room to allow for sanitization.
- No training is required to use Biovitae, which can solve the issue of hiring and retaining trained cleaners.
- Reduces reliance on environmentally harmful CD and UV (ozone gas).

### Scalability in low-and-middle income countries

- Does not require any training to use or install, making it suitable for LMICs.
- Available to license the technology to existing lighting manufacturers to convert their products and incorporate the safe sanitizing effect.

## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

The product is in the market and needs an average 30-day lead time for deliveries.

### Current deployments/ Status of deployment

Biovitae is at TRL 9 and has the following major health care and operating room installations:

1. Aeroporti Di Roma Fiumicino – Emergency Hospital, Italy
2. Montevergine Hospital - Campania, Italy
3. Montezemolo Polyclinic inside Corte Dei Conte (Court of Auditors Rome), Italy
4. Next Generation Hospital, Italy

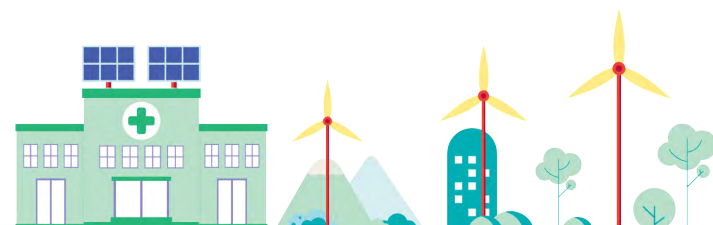
Biovitae is participating in the Joint Research Platform for Healthcare Infrastructures, an innovative technological platform created by the Politecnico di Milan where companies can test and implement advanced strategies for innovation in the areas of projects, technology, organization, building and management, encouraging collaboration between university, companies and the public administration sector. Biovitae will provide for the continuous sanitization solution to reduce the risk of hospital acquired infections by controlling the proliferation of dangerous pathogens.

### Impact so far/ Expected impact

Biovitae reduces the risk of hospital acquired infections and product contamination due to its potent efficacy on multi-resistant pathogens and biofilms. Biofilm is considered the most dangerous vehicle for the transmission of infections as well as the main cause of antibiotic resistance and hospital-acquired infections. CDs/UV are not effective on biofilm, whereas Biovitae is highly effective on biofilms offering an indispensable tool for hospitals and cleanrooms. It is expected the Biovitae can reduce the costs associated with hospital acquired infections significantly. Biovitae enables buildings to incorporate a continuous and passive environmental sanitization system, effective on SARS-CoV-2. Biovitae counteracts the phenomenon of antibiotic resistance by promoting the development of a healthy immune system, through the control of bacteria, viruses, and other microorganisms on surfaces and the environment.

### Efficacy of the innovation

The virucidal, bacterial, as well as the environmental sanitation efficacy has been established through multiple tests conducted across Europe.



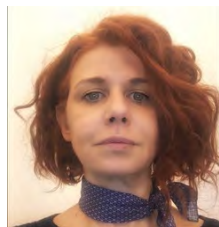
## A LOOK AT THE INNOVATION



## TEAM MEMBERS



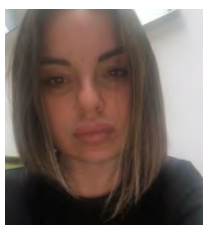
**Mauro Pantaleo**  
CEO



**Chiara Cavallo**  
Marketing Director



**Omar ElFata**  
CBDO



**Annalisa Paníco**  
Commercial Director Italia



**Carmelo Cartiere**  
Co-Inventor



**Rosario Valles**  
Co-Inventor



# RENA - Fan Retrofit Air Cleaner

ORGANISATION: SWACCH.IO (INDIA)

## The health challenge at hand

- Breathing clean air for children is imperative to ensure their healthy and normal development. At Swachh, we believe that clean air is a human right – yet existing solutions that reduce indoor pollution or particulate matter (PM10, PM2.5) are expensive.
- Indoor air purifiers typically cost more than ~US\$120) for filtering one room, and filter changes every three months typically mean an additional US\$~100 - \$250 in operational costs per year.
- The high total cost of ownership ensures that air purification solutions are unaffordable for most households, schools, public offices, and public health centers in India and the developing world at large.

## Description of the innovation

RENA is an air filter that is secured onto ceiling fans, turning the fan into an air cleaner. It consists of a filter base and removable filters for each blade of the fan. RENA filters are either single-use or washable (multi-use). Single-use filters are made of biodegradable, compostable materials for sustainability.

## Innovative element of the solution

- Can be fitted onto majority ceiling fans. The filter base is installed in minutes and filter replacement takes a few seconds.
- Works in winter and summer via modes which reduce the circulation by ~95% in winter and ~10% in summer.
- Comes with either washable multi-use filters which can be reused and with a higher efficiency single use filter media that is compostable and sustainable.
- Removes PM2.5, PM10, allergens and pollen.
- Highly affordable and repurposes the fan as both air circulation and cleaning device.

## Scalability in low-and-middle income countries

- LMICs have fewer resources to adapt low emission technologies but also suffer the most given growing economies flooded with construction activity, and other sources.
- Being affordable, RENA helps improve the air quality by reusing existing infrastructure.
- Reduces airborne pathogens which is suitable for LMICs.



## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

Manufacturing automation ongoing, mass production via injection molding process. Eighty boxes/day capacity currently. Lead time is 2 to 3 weeks via road supply chain.

### Capital and operational costs

Capital investments is estimated at less than US\$7,000, current operational expenses are estimated at less than \$2,000/month, and capital required for automation/scaling is estimated less than US\$75000.

### Current deployments

TRL8/9. Early deployments in schools, hospitals elderly care centers, households. The team is preparing for automation.

### Key achievements

- Reduced price of device to US\$12 with design improvements.
- Improved air quality by up to 89% in an elderly care center with high compliance following closed windows/doors and demonstrated 25% improvement in air quality with low compliance with open windows/doors.
- Approved for impact assessment as a multi-layered solution to air quality via GMDA, DPCC projects for school deployment; includes RENA as one of the main solutions.

### Impact so far/ Expected impact

- Improved air quality by up to 85% to 90% for PM2.5 with a 90% to 95% cost reduction. (Real world testing at Aurum Assisted Living Centre, Antara Assisted Living Centre)
- Reduced airborne transmission of pathogens by 10% or more in a hospital ward. (CFD results and existing research around air filtration and pathogen transmission)
- Improved air quality by up to 20% to 30% for PM2.5 in low compliance areas. (Sensor used is Active Buildings - Sarva, co-located at IIT Delhi's CPCB BAM Station.)
- In schools, up to 50% improvement in particulate matter exposure among students.
- In primary health centers/hospitals, 50% or more improvement in particulate matter exposure among patients and staff.
- Energy saved due to lower operational cost for a 40W air purifier running constantly is 320 kg CO2 from coal powered thermal power. (Estimates of Emissions from Coal Fired Thermal Power Plants in India Moti L. Mittal Department of Environmental and Occupational Health, University of South Florida, Tampa, Florida, USA)
- If used in addition to conventional HEPA air purifiers, it increases the life of HEPA filters by 2 to 3 times.

## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Karan Rao**  
Founder & CEO



# COMMUNITY ENGAGEMENT AND CAPACITY DEVELOPMENT

Innovations that engage communities in addressing the effects of climate change on health and build the capacity of the health workforce to address climate-related health risks were a part of this theme. These innovations ranged from capacity development of health workforce on climate risks to Enhancing local community participation and local governance on climate-induced risks and hazards.



# Making Menstruation a Non-Issue

ORGANISATION: PROJECT BAALA (INDIA)

## The health challenge at hand

- Sixty-two per cent of menstruators living in rural India are still using clothes or unhygienic means to stem their menstrual flow, pointing to the urgent need for scaling up menstrual hygiene solutions.
- Seventy percent of menstruators are unaware about periods at the onset of their first period.
- Sixty one percent cannot afford purchasing sanitary pads because of financial restrictions and the topic is still shrouded in stigma and misinformation.
- This adversely affects health and well-being of menstruating women, undermines gender equity, and disrupts educational attainment and workforce participation.

## Description of the innovation

Project Baala is an innovative menstrual health solutions provider working to end period poverty and period illiteracy while generating employment through:

- Sustainable absorbents
- Awareness modules
- Livelihood model

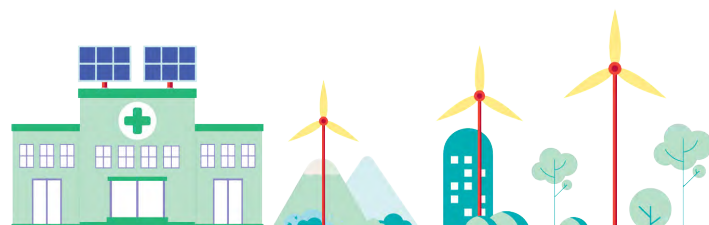
Baala is on a mission to ensure every menstruator has access to affordable and sustainable menstrual hygiene solutions.

## Innovative element of the solution

- There are several nongovernmental organizations (NGOs) and social enterprises working to promote menstrual health sector through awareness workshops or manufacturing low-cost sanitary napkins.
- Project Baala has designed a three-pronged solution, targeting the verticals of education, environment, and economic independence. What sets the solution apart is a holistic 360-degree approach to addressing issues of menstrual health and hygiene.

## Scalability in low-and-middle income countries

- Given the impact of the organization's work, especially in marginalized communities and comprehension as well as analysis of the deep-rooted issues surrounding menstruation, Project Baala is equipped to undertake the task of revolutionizing menstrual hygiene management (MHM) in LMICs.



## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

The Baala pads are manufactured in facilities based in Delhi NCR, at a peak production of 5000 pieces/day. We have an inventory of 90,000 kits, thus allowing no delay in implementation once projects are set in place.

### Capital and operational costs

Approximately US \$ 553,000

### Current deployments

The Baala awareness interventions and Baala pads are fully deployed. A new innovation, hydrophobic pad, is being piloted in 2023. Based on feedback, the product will be finetuned and formally introduced as a product choice for our users.

### Key achievements

- Since 2017, Project Baala has distributed 1.5 million reusable pads and conducted 4000+ awareness workshops among 500,000 women and girls across four countries and 25 states of India.
- Since 2021, 250+ women have benefitted from the livelihood model, resulting in increased financial independence, self-confidence, and transforming period practices.
- Acceptability rate of Baala pads is 77.5%.
- Awareness material has been translated into four languages and 85% beneficiaries have reported improved knowledge related to menstruation.
- Results of rigorous surveys suggest a social return of investment of \$10.43, in the form of better health, increased income, environmental waste prevention, and decrease in spending on alternate menstrual absorbents.

### Impact so far/ Expected impact

- Demonstrated high acceptability and usage in most parts of India. However, users residing in areas with less water and high rainfall find it difficult to effectively adopt a reusable pad based on washability and drying in sun.
- Soon to be introduced hydrophobic pad is perfect for usage in drought prone or tropical areas. With this product, the hope is to provide a solution to menstruators who reside in these areas.



## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Soumya Dabriwal**  
Founder



**Aradhana Rai Gupta**  
Co-Founder

# SOSO CARE

## ORGANISATION: SOSO CARE (NIGERIA)

### The health challenge at hand

The difficulty to seek medical attention and the collection of recyclable waste are two challenges that loom over the Nigerian population, and more broadly, among people in other African countries.

### Description of the innovation

SOSO CARE is a micro mobile health insurtech which aims to enable millions of people to access quality health care across over 2000 hospitals and pharmacies by accepting cash or recyclables as premium.

### Innovative element of the solution

Linking recyclables to healthcare is like using one stone to kill two birds which includes access to quality healthcare to reduce self-medication as well as infant and maternal mortality. SOSO CARE is solving environmental problems by promoting sanitation and public health. It is creating jobs for agents who distribute insurance while also fighting poverty by reducing unplanned medical expenses leading to out-of-pocket health financing.

### Scalability in low-and-middle income countries

SOSO CARE is currently active in three cities in Nigeria and can be replicated across countries in Africa and Asia where there is urgent need for health care access and environmental intervention.

## THE CURRENT STATUS

### Capital and operational costs

Funds are required to sustain and drive insurance penetration while also building behavior change on recycling. Costs include material cost spent on recyclable products, operations, marketing, and finding the right talent.

### Current deployments/ Status of deployment

Deployed in three cities in Nigeria namely Rivers state, Kaduna and Abia state.

## Key Achievements

- Enabled significant number of families to access quality healthcare using their trash as premium.
- Promoted behavior change by accepting recyclables as premium.
- Helped families unlock income meant for healthcare needs.
- Recovered over 200 tons of plastics from entering the ocean or ending in landfill.

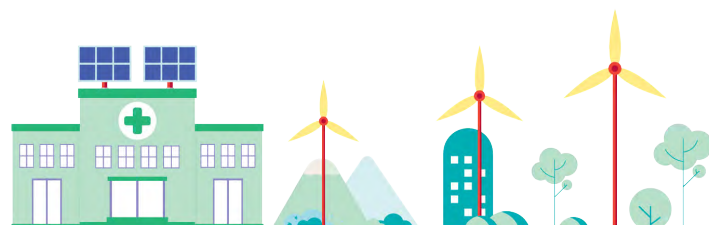
## Impact so far/ Expected impact

Solution is already deployed and has reached significant households helping them to access care and unlocking income meant for health care.

## Efficacy of the innovation

Insurance to millions of people living below poverty line is nothing but an expensive luxury. To millions of others who has failed to trust or claim third party motor insurance, insurance doesn't work. At SOSO CARE we are using a dual benefit approach, By linking recyclables to healthcare, our mission is to bring millions of people into the fold of healthcare irrespective of their socio economic status while also building behaviour change towards recycling. The work has been also showcased by BBC and Reuters.

## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Veronica Ijeweché Agana**  
Co-founder and Product Lead



**Nonso Oporum**  
Digital Lead and Co-founder



**Ben Offor**  
Head of Risk and Innovation



**Abdulakeem Sulushuaib**  
Partnership and Engagement  
Lead



**Marian Nkem Smart**  
Head of Account and  
Compliance



# Mobile Vaani Early Warning System (EWS)

ORGANISATION: GRAM VAANI COMMUNITY MEDIA PRIVATE LIMITED/ONIONDEV TECHNOLOGIES PRIVATE LIMITED, in partnership with SEEDS (Sustainable Environment and Ecological Development Society) (India)

## The health challenge at hand

- Bihar is highly vulnerable to flooding, lightning, and cold and heat waves.
- Current early warning systems (EWS) are limited by a lack of location-specific disaster forecasts for early identification of risks; alerts/information is not in local, accessible, or actionable languages/ formats; there is lack of a mechanism to reach vulnerable communities (for sourcing and disseminating information); and low engagement with users at local level.
- While community-owned EWSs do exist, reach is limited by restrictive communication channels (colored flags, phone calls).

## Description of the innovation

Mobile Vaani EWS is empowering communities to prepare and manage extreme climate change related health risks, through voice-based technology suites.

## Innovative element of the solution

- Mobile Vaani EWS integrates Gram Vaani's existing time-tested accessible voice-led information system to expand partner SEEDS's community-led alert system into a comprehensive and scalable alert and information management system.
- The technology suite will engage communities as well as address the system/ supply side needs. Disaster prediction will be pulled from trusted portals and will be conveyed to communities in hyperlocal and contextual formats.
- GIS-assisted hazard maps and recommendations for disaster resilient community structures will be proposed to the communities and validated. Geospatial visualizations of historic trends and vulnerabilities will be provided for decision makers to review and effectively manage disasters.

## Scalability in low-and-middle income countries

- The technology being developed will be open-source and adaptable for use in other geographies as well.
- The unique combination of technology-assisted and community-led model will present a scalable and replicable model for adoption in any disaster-prone or affected area in the world.
- Mobile Vaani EWS is implemented in rural areas, making it suitable for LMICs.



## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

- Over a period of two years, the plan is to fully deploy and scale up the Mobile Vaani EWS.
- Leverage existing government and partners' disaster prediction and alert portals/APIs; Gram Vaani's existing voice-enabled technologies, case manager application, automated Q&A for response management and GIS technology.
- Parts of the technology suite can be readily deployed on ground with minimal support from the partners' end.
- Undertake participatory design and prototype the solution before deployment. Technology will be used on simple feature phones by community members and smartphones available with community volunteers and resource people. There may be a risk in working in new geographies for the project, which we will mitigate by first starting in our existing key geographies where trust with community members has been fostered. This will help showcase impact and quickly deploy it in other geographies.

### Capital and operational costs

There is a capital cost of developing the GIS-based technology suite and purchasing some hardware to be deployed at block and district levels. In total, these one-time expenses will be around US \$104000. For the two-year period of deployment, testing, and fine tuning of the proposed platform, the operational cost will be around US \$172000.

### Current deployments

Mobile Vaani EWS, the time-tested voice-based participatory media system, trusted by the local communities and government bodies in our core participation geographies. Working on advanced stages of building an easy-to-use GIS application that leverages remote sensing data and artificial intelligence to identify the most suitable sites for various works such as Natural Resource Management works. This will be directly used by us and external partners such as field staff and officials implementing disaster resilience and early warning activities, aimed at improving health outcomes.

### Impact so far/ Expected impact

- The two-way, voice-first mobile information system will improve timely information access for isolated and less literate communities.
- Especially benefit women, people living with disabilities, older adults, and other disadvantaged groups who are disproportionately less tech-savvy, less educated and unable to directly access information on existing information portals.
- Poorer community members, typically not online, will benefit from mobile technology co-developed to meet their needs and designed for their engagement.

In the advanced stages of building an easy-to-use GIS application that leverages remote sensing data and AI to identify the most suitable collection of sites for various works such as Natural Resource Management works. This will be directly used, as well as employed by external partners such as field staff and officials implementing disaster resilience and early warning activities, aimed at improving health outcomes.

### Efficacy of the innovation

- A measurement framework in the early stages of the project will be developed to track indicators such as unique users, volume, type of content created and disseminated etc.
- Qualitative evidence of impact/ user experience will be gathered through focus groups discussions and interviews with a sample of users.

## A LOOK AT THE INNOVATION

**आपदा प्रबंधन विभाग**

**इंद्रवज्र ऐप**

- ⚡ आपदा प्रबंधन विभाग ने बिजली के खतरों से बचने के लिए **इंद्रवज्र ऐप** विकसित किया है।
- 🕒 यह ऐप बिजली गिरने से **40-45 मिनट** पहले चेतावनी जारी करती है।
- 📍 यह एप्लिकेशन **20 किमी** क्षेत्र के भीतर बिजली गिरने की घटना का पूर्वानुमान करती है।
- 📱 यह ऐप **गूगल प्ले स्टोर** से डाउनलोड की जा सकती है।

#BiharDisasterManagementDept

@ipdbihar @iprd\_bihar

## TEAM MEMBERS



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**Vijay Sai Pratap**  
Co-founder, CEO



**Rachit Pandey**  
Chief Technology Officer



**Rohit Singh**  
Vice President - Innovations  
and Partnerships



**Sayonee Chatterjee**  
Vice President - Gender and  
Child Rights



**Paramita Panjal**  
Director - Content Operations  
& Program Lead Education



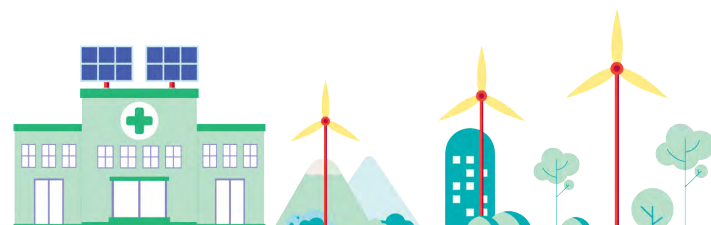
**Kapil Dadheech**  
Director - Tech Operations



**Deepak Kumar**  
Program Manager



**Esha Kalra**  
Consultant



# RISK MITIGATION AND ADAPTATION

Innovations that track and collate weather and meteorological data for use in public health facilities to respond to climate-related risks and hazards are a part of this theme. These innovations include Early warning forecast systems for health systems, and climate change induced health vulnerability and risk mapping.



# Community Health Integrated Platform (CHIP)

ORGANISATION: KHUSHI BABY (INDIA)

## The health challenge at hand

- Public health data in India is typically aggregated at the district level and measured through randomized samples every five years through the National Family Health Survey.
- Given substantial intra-district and even intra-village variation on socioeconomic and health indicators, the ability to target public health interventions for specific communities is limited. Moreover, limited tools exist to understand the relationship between spatial factors and disease burden.

## Description of the innovation

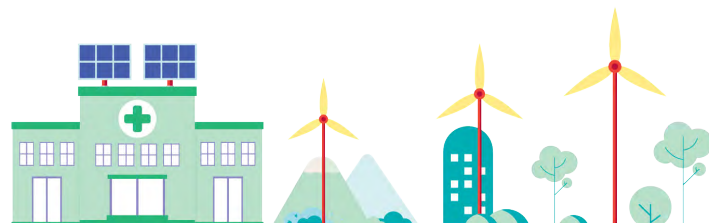
Khushi Baby is integrating a climate health module within the flagship CHIP allowing health officials to better understand relationships between geospatial predictors and public health outcomes, as defined by machine learning models. The tool enables 250+ block health officials across Rajasthan to better understand local predictors of disease burden and design targeted interventions.

## Innovative element of the solution

- CHIP's climate health module helps to identify which communities are at highest risk, under the highest burden of disease, and in most urgent need of resources.
- This effort begins with primary epidemiological analysis from reported prevalence rates of key performance indicators between different geographies and over time.
- After this, filters of health worker data quality, identify spatial outliers, interpolate outcomes for areas of underreporting are applied, and spatially relevant predictors for the outcomes using multivariate geospatial regression techniques are identified.
- This enables the tool to output map-based visualizations with village-level granularity on key performance indicators for health officials to take sub-district level action.

## Scalability in low-and-middle income countries

The geospatial analysis tool is being developed as open source and may be extended to other LMICs. Tool performance is subject to data availability.



## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

MVP of the geospatial analysis engine expected to launch in May 2023.

### Capital and operational costs

Server related costs are estimated at \$60000 per year.

### Current deployments

Currently in research and development (although has been piloted).

### Key achievements

Over 70,000 community health workers have used CHIP to track the health of 40 million beneficiaries in Rajasthan, India, gathering geo-referenced data on social determinants and primary health care outcomes.

The Ministry of Health and Family Welfare, Government of India, has committed US\$13 million for scale-up of the platform across Rajasthan.

### Impact so far/ Expected impact

- With the integration of a climate health module in CHIP, health officials will be able to understand associations between meteorological data, malnutrition, and anemia; air pollution data, mining occupations, and respiratory illnesses; rainfall, vegetation, and vector and water-borne disease outbreaks; and climate data, health facilities, and village-level multidimensional poverty index.
- These geospatial insights will enable targeted interventions to add climate resilience to the public health system.

### Efficacy of the innovation

Validation studies are planned for Q4 2023.



## A LOOK AT THE INNOVATION

### Community Health Integrated Platform



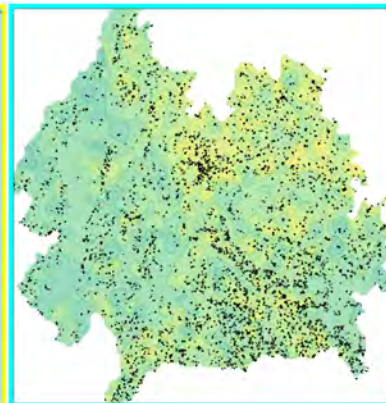
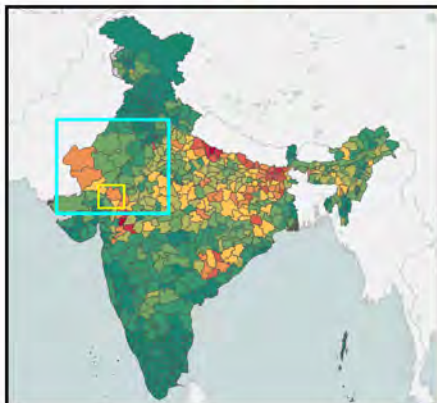
### CHIP Geospatial Analysis Engine

Spatial interpolation

Spatial outliers

Spatial predictors

Automated Impact Evaluation



## TEAM MEMBERS



**Ruchit Nagar**  
CEO



**Md Shahnawaz**  
COO



**Mohammad Sarfarazul Ambiya**  
Chief Data Scientist



# Technology Enabled Resilient Health Care Delivery in the Sundarbans

**ORGANISATION: IKURE TECHSOFT PVT. LTD. (INDIA)**

## The health challenge at hand

- Out of 102 islands in Sundarbans, 54 are inhabited and have zero doctors.
- Many of the islands of Sundarbans, approximately 11 of them, are not even connected to proper roads or decent healthcare facilities. It takes almost five hours on average to reach the main town for a doctor check-up.
- There are zero tertiary care units in these islands in case of healthcare emergencies. Lack of proper healthcare and inaccessibility of healthcare increases the disease burden of the region that in turn raises the mortality rate of the vulnerable population.

## Description of the innovation

The solution involves developing a climate resilient digitally-enabled health care system through digital technology, a network of hub and spoke clinics, and trained community health workers to address the primary healthcare needs of the last mile communities in Sundarbans with the aim to influence planetary health.

## Innovative element of the solution

A unique population health management solution that combines a digital technology platform Wireless Health Incident Monitoring System (WHIMS) for delivery of the primary healthcare needs through the network of hub and spoke health care clinics that is connected to the last mile communities through trained frontline health workers.

The health care workers facilitate telemedicine from the patient's home thcrossing the barrier of geographical inaccessibility.

## Scalability in low-and-middle income countries

- iKure aims to scale up through partnership with corporates wherein it will provide the know-how and technology and also strengthen the public health care infrastructure.
- iKure is setting up a Living Lab in Baruipur, West Bengal, a collaborative ecosystem bringing researchers and healthcare practitioners together for generating knowledge, information and innovation to cater to health needs of the community at the last mile.

## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

iKure has established an integrated care model enabled by the community health workers (CHW) who provide primary healthcare services through community mobilization. iKure has established ecosystem partnership with the public health care system, and low-cost private healthcare providers, under which diagnostics collected by the community health workers are shared in real time with doctors in these hospitals, who suggest treatments and prescribe medication through the WHIMS platform to the health workers, who relay this information to the patients. The evidence-based data collected using WHIMS platform will offer huge potential to drive policy and advocacy on the health status of the rural community. This data is used for research interventions corresponding to new innovations.

### Capital and operational costs

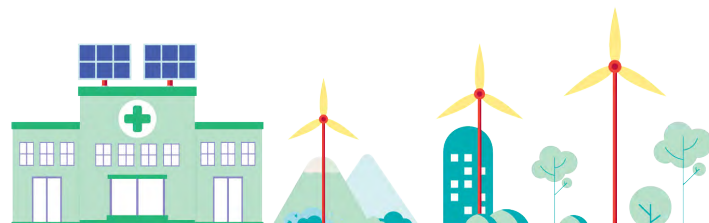
The average approximate capital and operational expenses is US \$80000.

### Current deployments/ Status of deployment

iKure has trained and empowered community health workers among the communities who are identified to be significantly impacting community's health and wellness and promote livelihood at a grassroots level even for pregnant women with the aim to reduce the MMR of West Bengal. The digital health platform implemented a telemedicine solution, Electronic Medical Record (EMR) for maintaining the patient health records, mobile apps integrated with POC medical devices that are used by CHWs and doctors for the treatments. iKure with the mission to create zero mortality in primary healthcare, builds a stronger and resilient healthcare system which caters to the healthcare needs of the population. iKure has plans to set up a total of 200 clinics across five states in India in the next four to five years (own model) with five own clinics and 20 sponsored clinics and programs through partnerships with multiple organizations.

iKure is associated with several reputed partners, ACT, Adani Foundation, MSD for Mothers. The details of the collaboration are provided below:

- iKure-ACT partnership is providing Diabetes, Maternal Health and Hypertension Management in a successfully setup health facilities in Satjelia, West Bengal.
- iKure & Adani Foundation Group collaboratively launched a joint primary healthcare intervention at Dhamra Port, Orissa focusing on delivering primary health care & tele-consultation services driven by trained iCHAs & integrated advanced technology to the communities nearby presently for door-step services and enrolling patients on our application for live monitoring of their health for treatment adherence and follow-up care.
- iKure in partnership with Merck for Mothers is providing comprehensive healthcare to pregnant women in Jharkhand through frontline health workers which included ANMs, ASHAs and iCHA workers. Our program engages in periodic training and capacity building of frontline health workers. We have touched 80 subcentres across 4 blocks in Khunti district in Jharkhand and successfully registered 2850 pregnant women, 80% of whom were in their first trimester. With Santen, 94.5% diabetic retinopathy screened and 92% patients shown improved awareness.





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## Key achievements

- Sixty-five percent of iKure patients experienced an increase in access to primary healthcare.
- Ninety percent of the patients coming to the clinic experience savings on total medical expenses.
- iKure clinics provide monthly savings of US\$50 to \$60 on medical services.
- iKure Community Health Activists earn an average of US\$98 per month.
- Ninety seven percent of non-iKure patients incurred higher medical expenditure.
- One-fourth of non-iKure patients incur four times or more in total medical expenses.

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## Impact so far/ Expected impact

- Improved healthcare access
- Improved livelihood generation of frontline health workers
- Reduced wage days loss and improved life span of the communities
- Reduced burden of preventable diseases.
- Jubilant Bhartiya Foundation achieved 13,750 teleconsultations provided and 4,679 patients availed pathology services.
- With MSD for Mothers, 77% uptake of institutional delivery and 80 sub-centers covered, four blocks touched to serve 2800 pregnant women.
- With Japan International Cooperation Agency (JICA), 44,000 tele-consultations conducted and 30,000 beneficiaries catered.



## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Sujay Santra**  
Founder & CEO



**Dr. Tirumala S. Mandal**  
AVP Research and  
Communication



**Golden Frankly**  
AVP Innovation and Strategy



**Sanoop S. Satish**  
Technology Lead

# Temperate Primary Healthcare

**ORGANISATION: TEMPERATE TECHNOLOGIES PRIVATE LIMITED (INDIA)**

## The health challenge at hand

- There is a severe lack of space cooling in primary healthcare facilities, especially in rural areas.
- This directly impacts health care outcomes. It reduces effectiveness of drugs and lowers the productivity of healthcare workers.
- The conventional solution is air conditioning, but it has high operational cost and high environmental costs. It consumes a significant amount of power and uses high GWP refrigerant gases.
- Both these factors lead to high CO2 emissions.

## Description of the innovation

A low-power cooling system based on proprietary technology that provides cooling equivalent to a 1.5-ton AC system from a single solar panel. The cooling system consumes 80% less power than traditional refrigeration-based systems and maintains a comfortable indoor temperature of 20–25°C even when outdoor temperatures exceed 45°C.

## Innovative element of the solution

- The cooling system is based on a new low-power cooling technology called dew point cooling. Dew point cooling uses indirect evaporation to cool close to the dew point temperature of the ambient and much below the wet-bulb temperature.
- For the ambient conditions of 40°C temperature and 30% relative humidity, it cools to 22°C directly without any refrigeration system. It uses 80% less power than refrigeration systems and does not use a compressor or any refrigerant gases.
- Can be installed and serviced easily by local technicians in rural areas.

## Scalability in low-and-middle income countries

- Extremely suitable for LMICs as it uses 80% less power than traditional refrigeration systems, needs only a single-phase connection, works well with low-quality power, and can be powered from a single solar panel.
- Can be installed and serviced easily by local technicians even in rural areas.

## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

Current production capacity is 15 units a month and the current lead time is 45 days. The team is in the process of setting up a larger manufacturing unit with a capacity of 200 units a month. Once this facility is operational, it is expected that the solution will be available off-the-shelf.

### Capital and operational costs

The capital cost of the cooling unit is US\$984 to \$1300. The system consumes about 260 watts of power. In addition, it uses up to 40 liters of water a day. The system needs maintenance about once a year. The maintenance can be done by a local plumber and uses supplies worth about US\$1.2.

### Current deployments/ Status of deployment

Five installations of the cooling system are complete demonstrating the technology and the solution.

### Key achievements

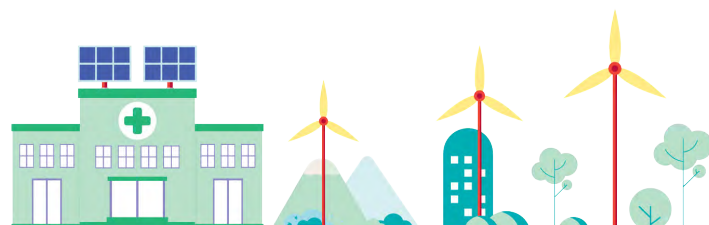
- All the installations done so far are in cold rooms for short-term storage of fruits and vegetables. Four of these installations are in rural areas near the farm gate. Two of the farm gate installations are off-grid and completely solar-powered.
- More than 1,100 farmers have access to these cold rooms.

### Impact so far/ Expected impact

- Can be used in primary healthcare facilities and community centers for space cooling. In primary healthcare centers, it can help in maintaining effectiveness of drugs, increasing productivity of healthcare workers and comfort for patients.
- In community centers, it can provide cooling to children and the elderly. In addition, it has applications in emergency use in disasters and medical camps, e.g., during heat waves.

### Efficacy of the innovation

A validation study for use of the cooling system for short-term storage and transport of fruits and vegetables is currently ongoing.



## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Dr. Vishal Singhal**  
CEO



**Dr. Abdul Nazim**  
R&D Program Manager



**Rishabh Anand**  
Project Manager





# NOTABLE MENTIONS



# Grassroot Women as Health Data Collectors in Nuh District on the Principles of Data Justice for Building AI Models on Climate X Health

ORGANISATION: ZMQ DEVELOPMENT (INDIA)

## The health challenge at hand

- At the grassroots level, data is not collected with the involvement of local communities.
- The data in general is devoid of local context making data contextually weak to predict outcomes and provide solutions.

## Description of the innovation

The solution is based on the principles of data justice. It involves developing community-specific data gathering tools (mobile-based) which is done through establishing story-telling labs on issues of climate change and its impact on health, nutrition and agriculture in the communities. With this approach, a pool of local women (often organized under self-help groups) is created who generate data for the in-house AI4D platform for processing and predictive analysis.

## Innovative element of the solution

- ZMQ has created innovative strategy and tools for women at the grassroots to work as data collectors on climate-induced health risks.
- The data collected by the women will be fed into ZMQ's AI4D platform for data tagging and labeling. AI-based algorithms will be rendered to predict outbreaks and mitigation strategies.

## Scalability in low-and-middle income countries

- The solutions provides new opportunities for communities across the LMICs to build tools based on Data Justice for high-quality predictions and appropriate solutions. As the solution is conceptualized for the grass root level community outreach and participation, the data generated for solution development, belongs to the communities directly and further people that contribute to produce the data points own the design and features of the solutions generated based on the principles of data justice. The methodology of story telling facilitates community engagement for identifying ground level issues and risk mitigation and adaption strategies further.



## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

The platform is ready and the team is exploring opportunities in India and East-Africa to run pilot projects on climate change induced health impact.

### Capital and operational costs

The platform and technology tools are ready. The team is seeking operational costs for each new project. The operational cost ranges from US\$50,000 to US\$400,000 based on the size, its complexity and location.

### Current deployments

The solution framework is ready and in use and two pilot projects have been implemented:

- Tuberculosis (TB) prediction in slums of Mumbra and Kausa in Thane District in Maharashtra where local (girls) volunteers screened 56000 presumptive TB cases to predict TB outbreaks in spatiotemporal microcosms.
- Working with 150 self-help group women in Mewat to collect data on TB, childhood pneumonia, and other vector-borne diseases to identify outbreak patterns. This will help in building mitigation strategies.

### Key achievements

- ZMQ uses a community-centric approach in designing digital tools and solutions. ZMQ establishes grassroot storytelling and gaming labs to capture local context and stories through a bottom-up design approach.
- The AI4D platform is also based on the same principles where community are first trained to understand the impact of climate change in their context and then are built to be part of mitigation strategy by collecting contextual and climate impact data to further predict outcomes of change and build mitigating strategies.

### Impact so far/ Expected impact

We have already tested two pilot projects using the solution and approach:

- TB prediction in slums of Mumbra and Kausa in Thane District in Maharashtra where our local (girls) volunteers screened 56000 presumptive TB cases to predict TB outbreaks in Spatiotemporal microcosms. We have identified seven slum sub-cluster which show alerts of outbreak and we have shared our outcomes with Thane Municipal Corporation to take control measures.
- And now we are using 150 SHG women in Mewat to collect data on TB, Childhood Pneumonia and other vector borne diseases to identify outbreak patterns. This will provide the District Health Department of Nuh (Haryana) with the outcomes. ZMQ teams on ground with the district health department will build mitigation strategies based on the outcomes.

### Efficacy of the innovation

- Process documentation of Mumbra and Kausa TB prediction project is ongoing and a scientific research study and publication is planned. The Mewat childhood pneumonia project will be published in a research journal after complete data is analyzed and predictions models are tuned.

## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Subhi Quraishi**  
CEO



**Hilmi Quraishi**  
Director Social-Tech  
Innovations



**Jadev Singh**  
Director Design



**Hemlata Yadav**  
Head Development  
Communication

# EMVOLIO – Portable Medical Grade Refrigerator

ORGANISATION: BLACKFROG  
TECHNOLOGIES PRIVATE LIMITED (INDIA)

## The health challenge at hand

- The vaccine cold chain is to store and distribute the vaccine safely from the manufacturer to the point of administration.
- Even though the temperature is regulated and monitored till the peripheral levels with advanced equipment, the last mile transportation is usually done with the help of ice boxes (vaccine carriers).
- Unfortunately, ice boxes, the predominant mode of last mile transportation for vaccines are not equipped for this task.
- Since they have no mechanism for temperature control and regulation, there exists the risk of accidental freezing and/or thawing, rendering the temperature-sensitive vaccines ineffectual.
- It is imperative for any refrigeration mechanism to have a temperature monitoring and regulation system.

## Description of the innovation

- Emvolio is a portable, battery-powered medical grade refrigerator that will strictly maintain any pre-set temperature for over 12 hours.
- The device helps in maintaining a strict temperature of 2°C to 8°C that will provide a platform for delivery of vaccines and other biologicals especially for last mile transportation.

## Innovative element of the solution

- Patented technology that ensures all contents in the cold chamber are blanketed in strictly temperature-controlled air.
- Underlying refrigeration mechanism is solid state cooling with a smart Proportional Integral Derivative controller, which guarantees precise temperature maintenance without the risk of noxious refrigerant leakage or cross contamination.
- Unique design promises uniform cooling and rapid temperature stabilization.
- 1.8-liter capacity enables it to carry 30-50 vials which is standard for a day long immunization session.
- Other capabilities include continuous temperature monitoring, location tracking, state of charge indication, communication with headquarters via live tracking, and vital statistics for improved coverage.

## Scalability in low-and-middle income countries

- The target population will be those within low-income groups, subsistence, and extreme poverty. This may be of particular concern in rural and inaccessible areas where limited infrastructure necessitates the administration of vaccines outdoors under direct sunlight or under extreme hot or cold weather.
- With Emvolio, this vulnerable population can be reached by staff nurses or health officials and vaccinated without the risk of loss of potency prior to administering.

## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

- Approvals, manufacturing, and deployment (six months): The program will be initiated with the country's Ministry of Health, providing approvals and necessary clearances for the use of Emvólio. Blackfrog will also seek funding assistance from non-governmental/private for the cost of the product. The equipment will be manufactured at Blackfrog headquarter in Manipal, India.
- Training and commissioning (three months): The team will travel to the sites to give hands-on training on the product. This will include seminars on the importance of strict temperature control in vaccine delivery, proper cold-chain handling methods, and the role of data monitoring in improving vaccine supply chains.
- Monitoring and evaluation (six months): Apart from training and troubleshooting support, Blackfrog will be responsible for constantly monitoring the assets on the ground. An impact assessment study will be conducted that will enable the health authorities to take an informed decision for further procurement. Improvement in the vaccine delivery process will be studied, and a broader case on vaccine-wastage averted will be made.
- Soft marketing and outreach with impact dissemination (three months): Brand-positioning for Blackfrog as a reliable cold-chain solution provider will focus on evidence-based impact-related success stories, and reports will be disseminated online, events and through print media. Due credit to funder-donors, partners, and supporters in the region will be given. This exercise will help in pricing evaluations for different continents, localizing the promotional collaterals, and rewrapping the solution to meet the cultural differences.

### Capital and operational costs

- In 2021-22, the operational expense was US\$190,000 and the capital expense was US\$136,000.
- In 2022-23, the operational expense was US\$361000 and the capital expense was US\$150,000.

### Current deployments/ Status of deployment

- Engaged with health workers across 12 states in India and worked on training, servicing, and creating awareness of the larger role that cold chain plays in public health.
- Conducted qualitative research in the past and gained deep insights on the motivation and modus operandi of field health workers.
- A total of 700+ devices deployed across 12 states in India.
- Efforts are going on to expand the market globally. 100 units to be deployed in the Republic of Kenya for strengthening their immunization efforts.
- Currently more than 700 devices have been deployed for human vaccinations in and around 12 states and one Union Territory of India with majority in Assam, Meghalaya, Manipur, and Tamil Nadu. Small volumes have been supplied to private entities for biological specimen transport.



- Apart from these domestic deployments, some units in the Middle East, which are currently being used for forensics on a trial basis. With the help of USAID through IPE Global, we are deploying 100 units in Kenya in the month of July (efforts currently ongoing).

## Key achievements

More than 1,50,000 vaccination doses have been administered across hard-to-reach areas in across the country.

## Impact so far/ Expected impact

- The team intends to create a platform to educate the public on the challenges in immunization, create awareness and demand for the solution, and convene potential partners and influencers.
- Blackfrog will engage key personnels on collaborative discussions and fostering partnerships towards a stronger health system for immunization.
- The team will conduct an impact assessment study that will enable health authorities to take an informed decision for further procurement. Improvement in the vaccine delivery process will be studied, and a broader case on vaccine-wastage averted will be made. Ultimately, the solution intends to:
  - Shift away from rudimentary ice-based systems.
  - Progress towards renewable energy.
  - Provide assured cold chain and visibility in the supply chain.

## Efficacy of the innovation

- The device has cleared the highest standards of electrical safety of medical devices of IEC 60606-1 that has been tested at TUV – Rheinland and ICAT. Emvolio falls under class B category of IEC which is ideal for usage in any household environment.
- Set to clear the PQS testing for the E003 TS01.1 category of transportable, battery powered vaccine storage appliances. Emvolio is CE marked and has been designed according to FDA standards. Emvolio has three product patents and seven design patents along with trademark for Emvolio and Black Frog.
- Comparative studies using data loggers to compare the cold life of passive vaccine carriers (conventional methods) with that of active vaccine carriers (Emvolio) are ongoing.





## A LOOK AT THE INNOVATION



## TEAM MEMBERS



**Mayur U Shetty**  
CEO



**Donson D Souza**  
COO



**Sharad B Anchan**  
Mechanical Lead



**Dr Rameez Saidarakath**  
Project Executive

## The health challenge at hand

- Due to lack of high-quality and expensive laundry infrastructure, public health care facilities avoid autoclaving of used fabric articles like bedsheets, uniforms, gowns, etc., and go for regular washing or outsource them to local unorganized laundry facilities.
- This regular washing in unorganized laundry facilities leads to an infectious environment and promotes cross-contamination of infections and infections after surgery.
- In India, up to 33% of admitted patients have a high-risk of acquiring hospital acquired infections (HAIs).
- Fabium® provides a low-cost alternative to autoclaving by augmenting the same low-electricity consumption washing alternative.

## Description of the innovation

Fabium® is a high-performance medical textile that reduces the carbon footprint and laundry expenses of hospitals by providing a cost-effective alternative to autoclaving. The fabric has high-performance antimicrobial functionality that destroys >99.9% of microbes on it within a duration of 30 minutes, eliminating the need for steam sterilization procedure.

## Innovative element of the solution

- Antimicrobial fabrics available in the market, but they usually inhibit microbes in a span of 24 hours, and have weak efficiency.
- A typical bacterium usually takes 20-30 minutes to duplicate when provided with nutrition thereby making those fabrics incapable of stopping any infection.
- Due to the high-performance antimicrobial functionality of Fabium®, when articles made from Fabium® fabrics are laundered in regular washing machines, they provide a similar level of sterilization as autoclaving of regular fabrics.
- Fabium® is non-toxic to the human skin, formaldehyde-free, and has been tested thoroughly at NABL-approved labs for its performance and properties.

## Scalability in low-and-middle income countries

- The technology is designed to both decarbonize public healthcare facilities and reduce operating expenses at the same time.
- It is ideally suited for LMICs where there is a lack of sophisticated laundry infrastructure, limitations on high-operating hospital budgets, and a dire need for high-quality hygiene and patient care.

## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

Fabium® products are currently available for health care facilities.

### Capital and operational costs

- Fabric articles made from Fabium® cost around 25% to 100% more (depending upon the quality and nature of clothing) compared to normal hospital supplies.
- However, the usage of Fabium® can save up to 90% of the everyday laundry operating expenses.
- This is achieved without any need for additional infrastructure, infection control practice, skilled labor in deployment, or special fabric maintenance in operations.

### Current deployments/ Status of deployment

- Currently seeking collaborations with public health care facilities especially Primary Health Centers and Community Health Centers in remote settings where there is a lack of sophisticated laundry infrastructure, limitations on high-operating hospital budgets, and a dire need for high-quality hygiene and patient care.

### Key achievements

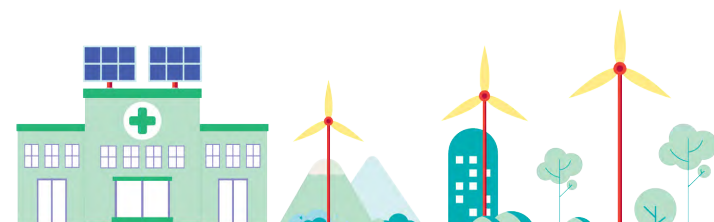
- This new alternative of the fabric laundry process with Fabium® fabric has successfully been modeled at small-scale setup using autoclaves and washing machines for multiple cycles of fabric laundering.
- The fabric has been tested thoroughly at NABL-approved labs for its performance and properties.

### Impact so far/ Expected impact

- One Fabium® bedsheet has the potential to save around 13000 liters of Carbon dioxide per day.
- Low electricity consumption will cut laundry and electricity expenditure, allowing hospitals to provide a better quality of care for their patients even in remote settings.

### Efficacy of the innovation

- The next step is to partner with a public health care facility and demonstrate the reduction in operating costs and low-electricity consumption. It will be validated by the laundry department and Infection Control Committee of the facility.





## A LOOK AT THE INNOVATION



## TEAM MEMBERS



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Advisor: Asst. Professor,  
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# Watsan Natural Water Purifiers

ORGANISATION: WATSAN ENVIROTECH PRIVATE LIMITED (INDIA)

## The health challenge at hand

- Potable water is not available in the last mile in most villages in India.
- Watsan Envirotech provides purifiers of all ranges, from standalone to larger community models to water ATMs (Automated teller machines) to enable conversion of any source water to drinking water.

## Description of the innovation

- Watsan Natural Water Purifiers are made using nano-technology.
- Do not need electricity to run, do not waste water, membranes do not have to be replaced often.
- Lasts longer and has a “do it yourself” model, so that there is no need of an annual maintenance contract (AMC) as well.

## Innovative element of the solution

- It runs without electricity, wastes no water, needs no filter media to be replaced.
- Watsan makes custom purifiers which are region specific with features to remove arsenic, fluoride etc.

## Scalability in low-and-middle income countries

73% of India's population resides in rural areas. So far, Watsan Natural Purifiers have only reached 4,00,000 households, therefore, there is huge need of scalability in LMICs. The deployments are PAN India, excluding J&K and Goa, spread across the period of 2015 to 2022. The sales and distribution is through NGOS like World Vision, Water Aid, Water.org, United Way Mumbai, Habitat for Humanity, etc and few CSR by ONGC, AGS Health, and other Rotary clubs.

## THE CURRENT STATUS

### Product and manufacturing readiness with lead time

The present infrastructure has a capacity to make at a time 65,000 water purifiers per month, but so far 5000 nos per month is the highest supply in any given month between 2015 to 2022. Thus, for scope considerations, the current infrastructure allows 10X scale up.

### Capital and operational costs

- Capex so far spent US\$31000.
- OPEX per year is US\$74000.

### Current deployments

Already in market and in growth stage.

### Key achievements

- Four hundred thousand (4,00,000) standalone filters deployed.
- Five thousand (5000) fluoride removal filters deployed.
- Three thousand (3000) arsenic removal filters deployed.
- Fifty (50) larger capacity filters (200 and 300 liters) deployed.
- Ten (10) community capacity filters (1500 and 2500 liters) deployed.

### Impact so far/ Expected impact

- Through this solution, potable water is available at many unreached households, tribal areas, and rural pockets. The device has also been made available in extreme geographic border security posts at Wagah and Kargil.
- Due to the availability of potable water, water-borne diseases have reduced in many schools and anganwadi.
- Significant amounts of energy and water saved, reducing almost 3 trillion tons of carbon emission.

### Efficacy of the innovation

The product is accredited and branded by DST, CSIR, CIPET (for food grade plastics).

## A LOOK AT THE INNOVATION



## TEAM MEMBERS



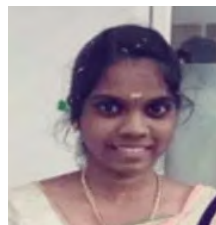
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