

2023

# **Saving Lives Through Safer Surgery**

ANNUAL REPORT

# SAVING LIVES: A year of impact in safer surgery and anesthesia

**This past year was Lifebox's most ambitious and successful to date.** We improved anesthesia safety, strengthened surgical teamwork, and reduced surgical infection on a scale we have never achieved before. And it was only possible thanks to our partnerships. This report is therefore about partnerships; partnerships with healthcare providers, between medical institutions and professional societies, and between Lifebox and our ever generous funders. We cannot overstate the pride we have in these partnerships which created Lifebox and continue to underpin everything we do.

Amidst global crises, our dedication to providing lifesaving surgical care remained steadfast. In partnership with the Ukrainian Society of Anesthesiologists, we provided pulse oximeters and surgical headlights to the anesthesia workforce during the war.

Our surgical infection reduction program - Clean Cut - also received remarkable adaptation and scale-up. More than 10,000 women in Ethiopia participated in our randomized trial - CLEAN-CS - to improve the safety of cesarean sections. We began a research study with our partner Smile Train to adapt Clean Cut for cleft patients across two countries, and launched work with the Johnson & Johnson Foundation to tackle the high incidences of wound infection in long bone fractures in Malawi. Preliminary results show significant improvements in all three adaptations.

We continue to build upon our evidence-based approach that informs and shapes our work with six peer-reviewed Lifebox publications this year. This work is driven by our newly established and growing clinical team based across nine countries.

Perhaps most significantly, we bridged a major gap in anesthesia worldwide with the new Smile Train-Lifebox Capnograph. For years, anesthesia providers across the globe have shared their experiences of working without this essential device; the stress of not knowing what is happening to their patient, the agony of choosing which patient will be monitored by the hospital's only capnograph, and the memories of patients harmed due to lack of monitoring. Lifebox and our core partner Smile Train are hugely proud to have made available an affordable, high quality capnograph suited for use in low-resource settings. We want to express our gratitude to all organizations and individuals that have supported Lifebox and Smile Train in reaching this milestone. We look forward to continuing our collaboration as we work, together, towards closing the global capnography gap.

Thank you to our supporters, partners, donors, and our global network of healthcare providers that work alongside us to drive improvements in surgical and anesthesia safety.



*Pauline Philip*

**Pauline Philip, DBE**  
**Lifebox Chair**



*Kris Torgeson*

**Kris Torgeson**  
**Lifebox Global CEO**



**248 million**  
**patients having**  
**safer surgery**

# CAPNOGRAPHY: Addressing The Global Capnography Gap

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Capnography has been used universally in operating rooms in the United States for more than three decades - providing real-time information with every breath during anesthesia. A capnograph immediately detects when a patient is not getting adequate oxygen, avoiding devastating harm.

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**Yet capnography is nearly entirely absent from low-and middle-income country operating rooms - with a 100% gap often found between capnography need and availability.**

Lifebox and partner Smile Train worked to address this major gap in anesthesia safety worldwide with a new high-quality, affordable capnograph suited for use in low-resource setting operating rooms. The Smile Train-Lifebox Capnograph meets robust specifications for the monitoring of both pediatric patients and use in low-resource settings, and underwent rigorous laboratory and field testing.

This year the first Smile Train-Lifebox Capnography workshop was held at Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia to pilot the new capnography education materials. More than 50 anesthesia providers participated from three Smile Train partner hospitals - Yekatit 12 Hospital Medical College, Kadisco General Hospital, and Zenbaba General Hospital - as well as members of the Ethiopian Society of Anesthesiologists to build skills in capnography.



As part of the Smile Train-Lifebox Safe Surgery and Anesthesia Initiative, we will scale this work next year, equipping 350 operating rooms - including in Benin, Philippines, and Uganda - with the new Smile Train-Lifebox Capnograph, and train anesthesia providers in its use. This is just the beginning.



“Though a gold standard during any surgery, capnography is only available in a few hospitals in Ethiopia. Health professionals familiar with its functions are also limited. This workshop builds the knowledge in our health professionals and encourages them to apply it, ultimately improving the safety of our surgical patients.”

**Dr. Ananya Abate,**  
**President of the Ethiopian Society of Anaesthesiologists**

“To make the best use of the capnograph, we have to schedule it for use by critical patients only. This means we are forced to discriminate between our patients when all of them should be receiving equal amounts of care.”

**Dr. Renda Suleman, anesthesiologist**  
**Yekatit 12 Hospital Medical College, Ethiopia**

“Capnography devices are found in ICU and operating theaters of only a very few hospitals ranging from primary to tertiary levels, in our country. So, we are not able to monitor our patients under anesthesia and identify problems such as wrong placement of the air tube. We have now received two capnography devices from Smile Train-Lifebox and our health professionals have been provided training. This is a great contribution that will help us save so many lives.”

**Dr. Elias Tewabe, CEO**  
**Yekatit 12 Hospital Medical College, Ethiopia**

# CLEAN CUT: Improving Surgical Safety With Clean Cut

Surgical site infections (SSIs) are a common but devastating complication of surgery. Patients that develop an SSI may be faced with hospital readmission, long hospital stays, prolonged courses of intravenous antibiotics, multiple surgeries, and even death. This also uses precious resources for hospitals.

Patients in a low-resource setting are twice as likely to die from a postoperative infection than a patient in a high-income country. The Lifebox Clean Cut program was developed to reduce this risk to surgical patient safety in low-resource settings. Clean Cut was developed to be scalable, requiring no major investments in new infrastructure or resources. Clean Cut results demonstrated reduced rates of infection and lasting impact.



This year Lifebox continued to scale and adapt Clean Cut to address different surgical safety challenges and contexts with implementation in four new countries this year and in two new languages. The program has now been implemented in 35 hospitals across seven countries to impact an estimated 208,000 patients.



## Clean Cut for Cleft:

In partnership with Smile Train, we launched Clean Cut for Cleft at three Smile Train Partner hospitals: Yekatit 12 Hospital Medical College and The All Africa Leprosy and Rehabilitation Training Center (ALERT) Hospital in Ethiopia and Le Centre Hospitalier Universitaire de Treichville in Côte d'Ivoire. This research study aims to improve perioperative care for cleft patients, including delayed bleeding, wound breakdown, and airway compromise.



## Clean Cut for Long Bone Fracture:

We commenced work in Malawi with support from the Johnson & Johnson Foundation to adapt Clean Cut to long bone fractures, which are cracks or breaks in the long bones of the body. Wound infection is the leading complication associated with such fractures and the program aims to improve surgical safety for orthopedic patients at Queen Elizabeth Hospital in Blantyre. A cohort of trainers is being trained to scale the program in Malawi and beyond.



## CLEAN-CS:

More than 10,600 women participated in Lifebox's randomized trial to improve the safety of cesarean section (c-section). C-sections are the most commonly performed major operation worldwide. Nine maternity hospitals in Ethiopia implemented Clean Cut, with initial results showing significant reductions in maternal postoperative mortality and neonatal mortality. CLEAN-CS is a Bill & Melinda Gates Grand Challenges Initiative, funded by UBS Optimus Foundation.

Tackling the devastating effects of surgical site infections with

# CLEAN CUT

A Lifebox surgical infection reduction program



Clean Cut establishes robust surgical quality improvement within hospitals and fosters strong surgical teamwork to strengthen 6 perioperative infection prevention practices:

Skin preparation	Antibiotic administration	Maintenance of the sterile field	Instrument sterility	Gauze counting	Use of the Surgical Safety Checklist

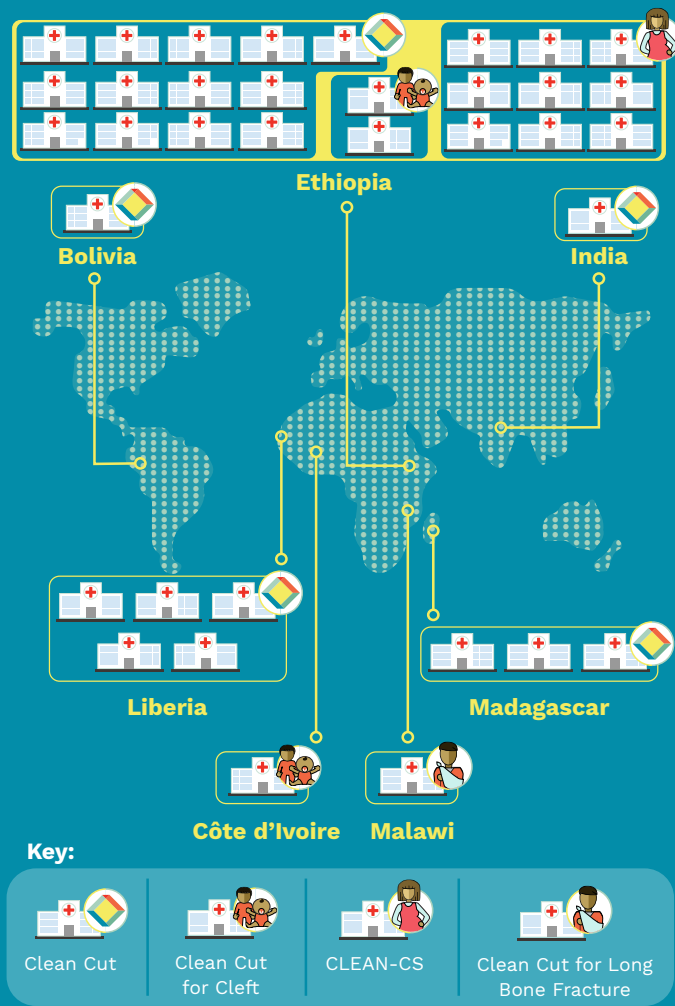
Clean Cut results published in peer-reviewed research demonstrating:

**35%** reduction in surgical site infections

**46%** reduction in risk of postoperative infections with high compliance to Clean Cut standards

Lasting impact with sustained improvements to infection prevention practices

35 Clean Cut partner hospitals in 7 countries

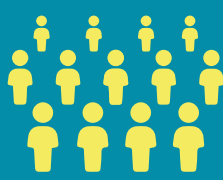


3 Clean Cut Adaptations to address different challenges to surgical patient safety

**Clean Cut for Cleft:**  
Research study with Smile Train for improved perioperative care for children undergoing cleft surgery

**Clean Cut for Long Bone Fracture:**  
Reduce rates of wound infection through safer orthopedic surgery in partnership with Johnson & Johnson Foundation

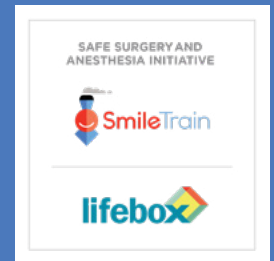
**CLEAN-CS:**  
A randomized trial to improve the safety of cesarean sections



**208,000**  
PATIENTS IMPACTED



# SMILE TRAIN-LIFEBOX SAFE SURGERY AND ANESTHESIA INITIATIVE



Launched in 2020, the Smile Train-Lifebox Safe Surgery and Anesthesia Initiative builds on the fruitful history between Lifebox and Smile Train to elevate the quality and safety of cleft and pediatric surgery through innovations, training, and research. Milestones this year include the new Smile Train-Lifebox Capnograph, a new workshop to build surgical teamwork, and launching a research study at three Smile Train partner hospitals.



## Team Cleft

The new multidisciplinary workshop brings together the three main professional groups – anesthesia providers, nurses, and surgeons – that work together as ‘cleft teams’. The workshop focuses on improving teamwork and communication processes during emergency events, as well as routine best practices for surgical safety. This year 55 perioperative providers from 11 hospitals participated in three pilot workshops held in Ethiopia, Kenya, and Uganda.



“Team Cleft training improves skills, knowledge, and professional relationships. That is, it helps professionals to develop their critical thinking and leadership skills, and it also promotes strong case management in cases where an incident has occurred.”

**Belinda Karimi, clinical nurse,  
Team Cleft Trainer, Kenya**



## Smile Train-Lifebox Capnograph

Tackling a major gap in anesthesia safety with an affordable, high quality capnograph suited for use in low-resource settings and developing a comprehensive training package for anesthesia providers.



## Clean Cut for Cleft

Adapting Clean Cut at three Smile Train partner hospitals for improved safety for children undergoing cleft surgery.



## Pulse Oximeters

Building on the work of Smile Train and Lifebox during the COVID-19 pandemic, which provided 8,800 pulse oximeters for the detection and management of COVID-19, we distributed 2,258 pulse oximeters this year to equip anesthesia providers with this essential device.



## A Critical Gap

We published the report '*A Critical Gap: pulse oximetry in low- and middle-income countries*' which details the impact of pulse oximetry through first hand experiences from anesthesia colleagues across Africa, including the role of oximetry during the COVID-19 pandemic, and highlights remaining gaps in the safe provision of anesthesia care.

“One case that always stays with me was a four-year-old boy [having] a skin graft operation. During the surgery, the pulse oximeter alarm sounded...[it] showed that his oxygen saturation and heart rate were plummeting, he had gone into cardiac arrest. The pulse oximeter saved that boy’s life, without a doubt.”

**Mubarak Mohamed,**  
**Head of Anesthesia**  
**Edna Adan University Hospital,**  
**Somaliland**





# ‘ANESTHESIA UNDER FIRE’: Providing Patient Care in Ukraine

“From the first day of the war, I’ve stayed in the hospital because my hospital was a first-line hospital for wounded patients. The first few days were really hard. We received 37 to 40 severely wounded patients. Myself and most staff of my hospital stayed and lived in the hospital.”

**Professor Sergii Dubrov, Kyiv Municipal Clinical Hospital, Chief of Anesthesiology and Intensive Care, National O. Bogomolets Medical University, President of the Ukrainian Society of Anesthesiologists**

“Pulse oximeters are helping us a lot to provide care for the mass casualties that we are faced with due to the war - enabling the rapid diagnosis and dynamic monitoring of patients at the stage of hospitalization. They are proving to be a critical tool for patient care. Thank you so much.”

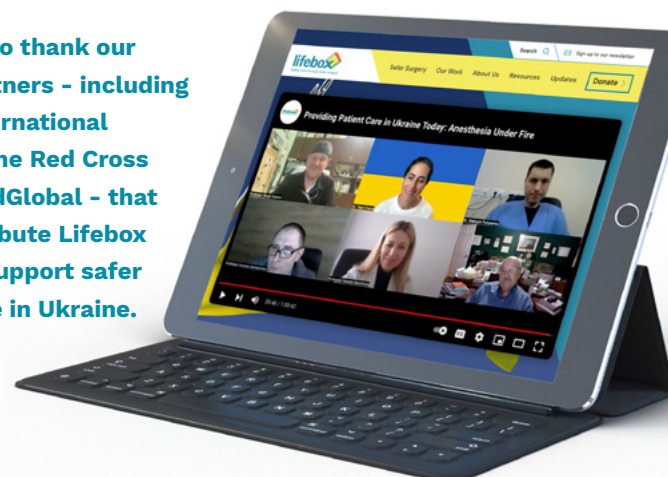
**Professor Natalia Matolinets, Anesthesiology and Intensive Care Department, Danylo Halytsky Lviv National Medical University**

We provided support to the Ukrainian Society of Anesthesiologists for essential ongoing anesthesia and surgical care in Ukraine at the onset of the war. Surgical teams face mass polytrauma casualties with patients suffering from multiple fractures, wound cuts, and burns at the same time.

With funds from the American Society of Anesthesiologists Charitable Foundation and BlueCheck Ukraine, Lifebox was able to provide essential tools including equipping an operating room, providing surgical headlights, and distributing 260 Lifebox-Smile Train pulse oximeters for patient care.

In April 2022 Lifebox co-hosted ‘Anesthesia Under Fire’ in partnership with the American Society of Anesthesiologists and the Ukrainian Society of Anesthesiologists. This online event shared the experiences of Ukrainian anesthesiologists providing patient care in Ukraine during the conflict. Chaired by Lifebox Global Governance Council member, Dr. Faye Evans, we want to thank our speakers Professor Sergii Dubrov, Professor Natalia Matolinets, Dr. Maksym Pylypenko, and Professor Andrew Semenenko for their commitment to patient safety during the most difficult of circumstances.

**We would like to thank our network of partners - including Diamedica, International Committee of the Red Cross (ICRC), and MedGlobal - that helped to distribute Lifebox equipment to support safer anesthesia care in Ukraine.**



# LIFEBOX RESEARCH

Lifebox delivers evidence-based, high impact, and scalable programs that are backed by peer-reviewed research. This year six articles were published on Lifebox's work, from mapping population access to essential surgical care in Liberia and exploring the use of a surgical headlight, to evaluating postoperative care after pulse oximetry training.



‘Evaluation of an adaptive, multimodal intervention to reduce postoperative infections following cesarean delivery in Ethiopia: study protocol of the CLEAN-CS cluster-randomized stepped wedge interventional trial’ in *Trials*, August, 2022.  
**Negussie, T. Daba, M. Taye, S. Fikre, T. Asrat, M. Woldeamanuel, H. Temesgen, F. Gebeyehu, N. Starr, N. Fernandez, K. Henrich, N. Bitew, S. Miller, K. Weiser, T.**



‘Perioperative provider safety in the pandemic: Development, implementation and evaluation of an adjunct COVID-19 Surgical Patient Checklist’ in *Anaesthesia and Intensive Care*, November, 2022.  
**Starr, N. Moore, J. Harrell Shreckengost, C. Fernandez, K. Ambulkar, Capo-Chichi, N. Varallo, J. Ademuyiwa, A. Krouch, S. Singh Rana, P. Allen Ingabire, J. Weiser, T. Negussie, T. Evans, F.**



‘Pulse oximeter provision and training of non-physician anesthetists in Zambia: a qualitative study exploring perioperative care after training’ in *BMC Health Services Research*, November, 2022.  
**Peterson, M. Mattingly, A. Merrell, S. Asnake, B. Ahmed, I. Weiser, T.**



‘Bridging the know-do gap in low-income surgical environments: Creating contextually appropriate training videos to promote safer surgery in Ethiopia’ in *Surgery Open Science*, January, 2023.  
**Hawkins, J. Sanchez, U. Tesfaye, A. Gebeyehu, N. Weiser, T. Bitew, S. Negussie, T. Starr, N.**



‘Mapping population access to essential surgical care in Liberia using equipment, personnel, and bellwether capability standards’ in *British Journal of Surgery*, February, 2023.  
**Adde, H. Duinen, A. Andrews, B. Bakker, J. Goyah, K. Salvese Ø, Sheriff, S. Utam, T. Yaskey, C. Weiser, T. Bolkan, H.**



‘Exploring the Use of a Fit-for-Purpose Surgical Headlight in Sub-Saharan Africa: Mixed Methods Study’ in *World Journal of Surgery*, March, 2023.  
**Hussien, M. Capo-Chichi, N. Starr, N. Johansen, E. Negash, S. Utam, T. Negussie, T. Fernandez, K. Weiser, T.**

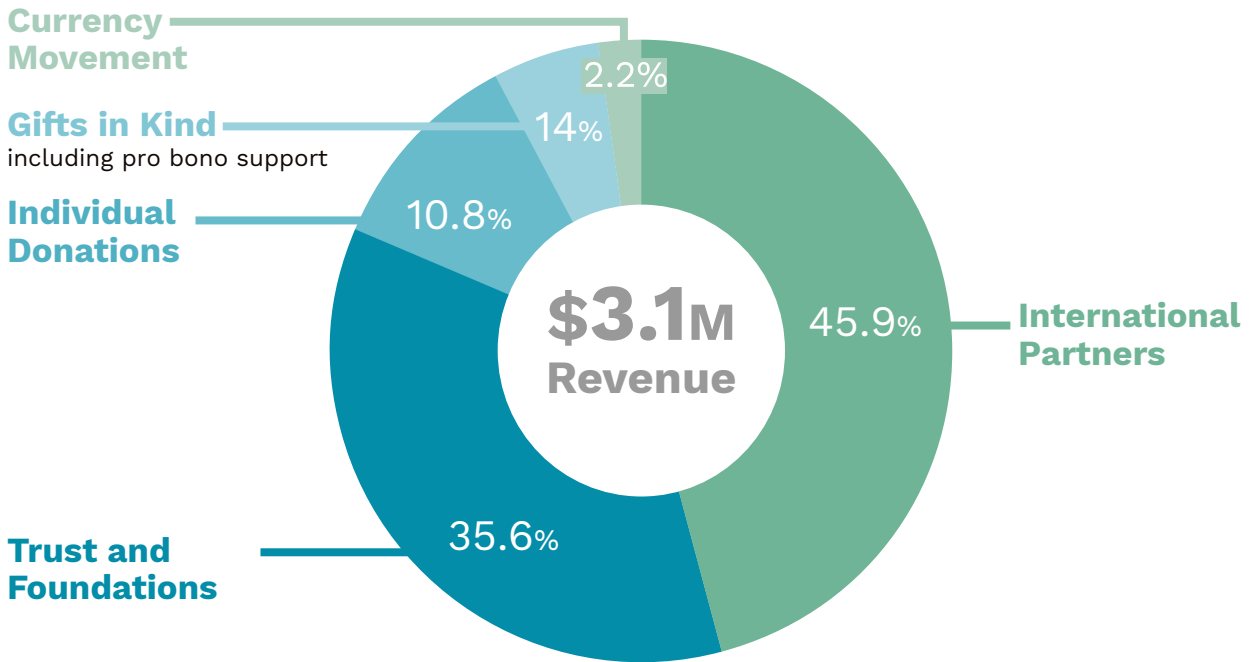
# OUR 2022/2023 FINANCIALS

Each year Lifebox provides a global overview of its audited financial accounts by presenting the combined accounts of Lifebox Foundation UK and Lifebox Foundation USA. The combined accounts provide a full financial picture of our funding sources and how donations are being used. Our individual audited financial reports are publicly available and can be found on our website. Lifebox's fiscal year runs from April 1 to March 31.

<b>OPERATING REVENUE</b>	<b>2022/23</b>	<b>2021/22</b>	<b>CHANGES</b>
International Partners	\$1,417,182	\$1,008,741	\$408,441
Trusts and Foundations	\$1,100,157	\$2,061,396	-\$961,239
Individual Donations	\$334,420	\$530,917	-\$196,497
Gifts in Kind, including pro bono support	\$169,490	\$310,915	-\$141,425
Currency Movement	\$66,034	\$0	\$66,034
<b>TOTAL REVENUE</b>	<b>\$3,087,283</b>	<b>\$3,911,968</b>	<b>-\$824,685</b>
<b>OPERATING EXPENSES</b>	<b>2022/23</b>	<b>2021/22</b>	<b>CHANGES</b>
Program Expenses	\$1,906,253	\$1,870,420	\$35,833
Development	\$196,763	\$284,761	-\$87,998
Awareness-Raising	\$252,315	\$139,672	\$112,643
Operations	\$832,303	\$527,283	\$305,020
<b>TOTAL EXPENSES</b>	<b>\$3,187,634</b>	<b>\$2,822,135</b>	<b>\$365,499</b>
Surplus/ Deficit	-\$100,351	\$1,089,834	-\$1,190,185
<b>COMPOSITION OF NET ASSETS</b>	<b>2022/23</b>	<b>2021/22</b>	<b>CHANGES</b>
Unrestricted Funds	\$1,370,035	\$1,456,917	-\$86,882
Currency Reserve	\$78,545	\$38,016	\$40,529
Restricted Funds	\$865,664	\$988,878	-\$123,214
<b>TOTAL NET ASSETS</b>	<b>\$2,314,244</b>	<b>\$2,483,811</b>	<b>-\$169,567</b>

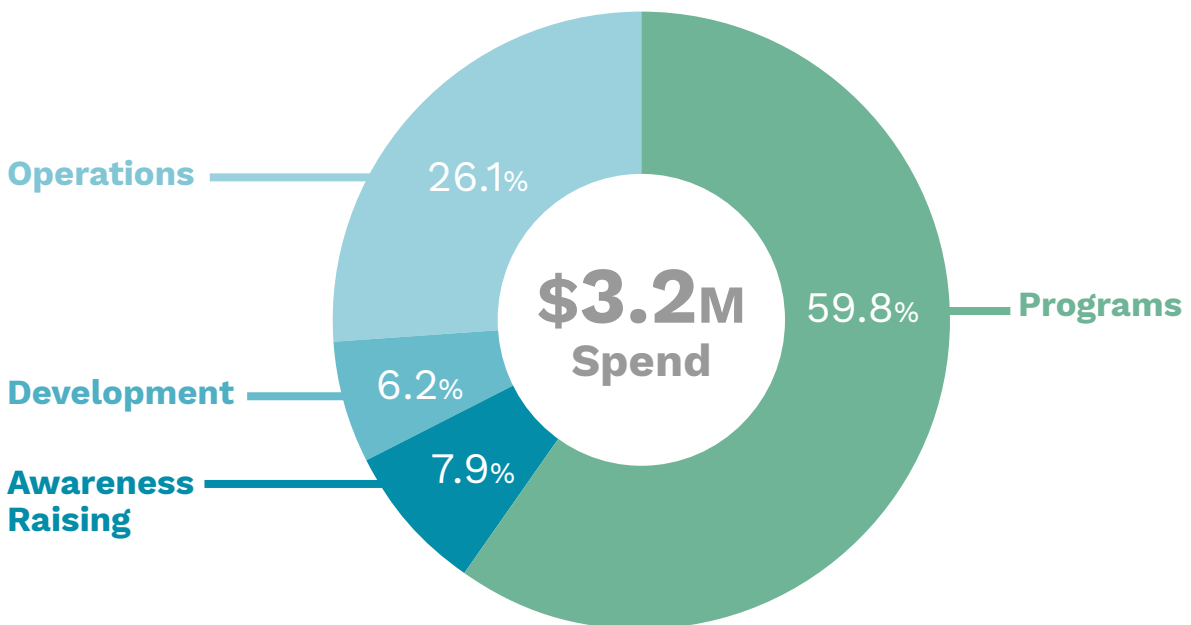
## REVENUE

Analysis of revenue



## SPEND

Analysis of expenditure



Note: These are the consolidated Lifebox annual accounts from audited Lifebox Foundation USA (including Lifebox Ethiopia) and audited Lifebox Foundation UK for the period April 1, 2022 to March 31, 2023.

# GLOBAL GOVERNANCE COUNCIL

The Lifebox Global Governance Council brings together decades of clinical, research, and resource management experience to govern Lifebox's global team and safer surgery vision.



## CHAIR

### **Pauline Philip, DBE**

National Director for Emergency and Elective Care for NHS England



### **Faye Evans, MD**

Senior Associate in Perioperative Anesthesia, Department of Anesthesiology, Critical Care and Pain Medicine, Assistant Professor of Anesthesia, Harvard Medical School



### **Susana del Carmen Abrego Tobar, MD**

Pediatric anesthesiologist, Head of Anesthesia, Benjamin Bloom's Children Hospital, San Salvador



### **Alexander Hannenberg, MD**

Faculty member, Safe Surgery program, Ariadne Labs and Clinical Professor (adjunct), Tufts University School of Medicine



### **William Berry MD, MPA, MPH**

Co-founder, Ariadne Labs, Senior Advisor to the Executive Director and Principal Research Scientist, Harvard TH Chan School of Public Health



### **Alex Haynes, MD, MPH**

Associate Professor, Department of Surgery and Perioperative Care, Inaugural Associate Chair of Investigation and Discovery, Courtesy Associate Professor, Department of Oncology, Dell Medical School, The University of Texas, Austin



### **Professor Miliard Derbew, MD**

Chief Executive Officer and consultant pediatric surgeon, King Faisal Hospital, Rwanda



### **Deborah Lotterman, MA**

Chief Creative Officer, PRECISIONeffect



### **Andreu Maldonado Segler**

Deputy to the Secretary General, Médecins Sans Frontières (MSF)



### **Professor Salome Maswime, MD**

Obstetrician and gynecologist, Professor and Head of the Global Surgery Division, University of Cape Town



**Rob McDougall, MBBS**  
 Pediatric anesthesiologist, Royal Children's Hospital, Melbourne and Clinical Associate Professor, Department of Pediatrics, University of Melbourne



**Professor Nobhojit Roy, MD, MPH**  
 Technical Officer, Operative Care, Clinical Services & Systems Technical Officer, World Health Organization



**Alan Merry, MB, ChB**  
 Professor, Department of Anaesthesiology, University of Auckland



**Susannah Schaefer**  
 Executive Vice Chair, President, and CEO of Smile Train



**Atul Gawande MD, MPH**  
 Co-founder and Immediate Past Chair



**Angela Enright, MB**  
 Emeritus Trustee



**Isabeau Walker, MD**  
 Emeritus Trustee



**Iain Wilson, MD**  
 Emeritus Trustee



**Jason Yeung, MPH**  
 Emeritus Trustee

## OUR FOUNDERS

Lifelix was founded in 2011 by four of the world's leading medical professional and academic organizations.





# 2023 ANNUAL REPORT

For more information contact us at [info@lifebox.org](mailto:info@lifebox.org)

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