



2022

Ten Years Saving Lives Through Safer Surgery

ANNUAL REPORT

TEN YEARS SAVING LIVES THROUGH SAFER SURGERY AND ANESTHESIA

Surgery is an essential part of healthcare, enabling people to live longer and healthier lives. Surgical care can treat one third of the global burden of disease, yet surgical providers around the world face significant challenges in ensuring safe patient care. This was why Lifebox was created in 2011.

Ten years on we can point to 181 million safer surgeries through our tools, training, and partnerships. We have worked across 116 countries, trained 12,000 healthcare providers, and distributed 33,000 pulse oximeters that are essential for safe anesthesia care.

Building on our decade of successful programming and partnerships, Lifebox launched a new strategic plan focused on three critical areas for improving surgical patient safety - anesthesia safety, surgical teamwork, and infection reduction. Each program is driven by evidence of what works and is adapted to the local environment and needs. Lifebox's surgical infection reduction program - Clean Cut® - benefits from follow-up data gathered from 3,000 patients in Ethiopia with results published in JAMA Surgery demonstrating the program's lasting impact.

This past year, we focused on improving the safety of cesarean sections – the most common operation performed globally – by adapting Clean Cut through a randomized control trial as part of a Bill & Melinda Gates Foundation's Grand Challenges Initiative, funded by UBS Optimus Foundation.

This was the second year of the groundbreaking Smile Train-Lifebox Safe Surgery and Anesthesia Initiative, which is elevating the safety of pediatric surgery and anesthesia. Together we distributed 8,800 Lifebox-Smile Train pulse oximeters in 53 countries as part of our coordinated COVID-19 response. We also commenced work developing an affordable capnography device which will

make a tremendous impact on anesthesia safety worldwide.

We want to express our gratitude to Lifebox co-founder - Dr. Atul Gawande - who stepped down as Lifebox Chair this year to take up the role of Assistant Administrator of the Bureau for Global Health with the United States Agency for International Development (USAID). We are enormously grateful for his leadership and vision over the last ten years.

Thank you to our supporters, partners, and donors, who have enabled Lifebox over the last decade to become a global leader in anesthesia and surgical safety. We look forward to sharing the milestones and impact of this work with you as we make surgery and anesthesia safer for every patient, every time.



A handwritten signature in blue ink, reading "Pauline Philip".

Pauline Philip, DBE
Lifebox Chair



A handwritten signature in black ink, reading "Kris Torgeson".

Kris Torgeson
Lifebox Global CEO

COVER PHOTO: ©Yosef Amare Tsehayu/Lifebox, Surgical team, Tikur Anbessa Hospital, Ethiopia, 2022.

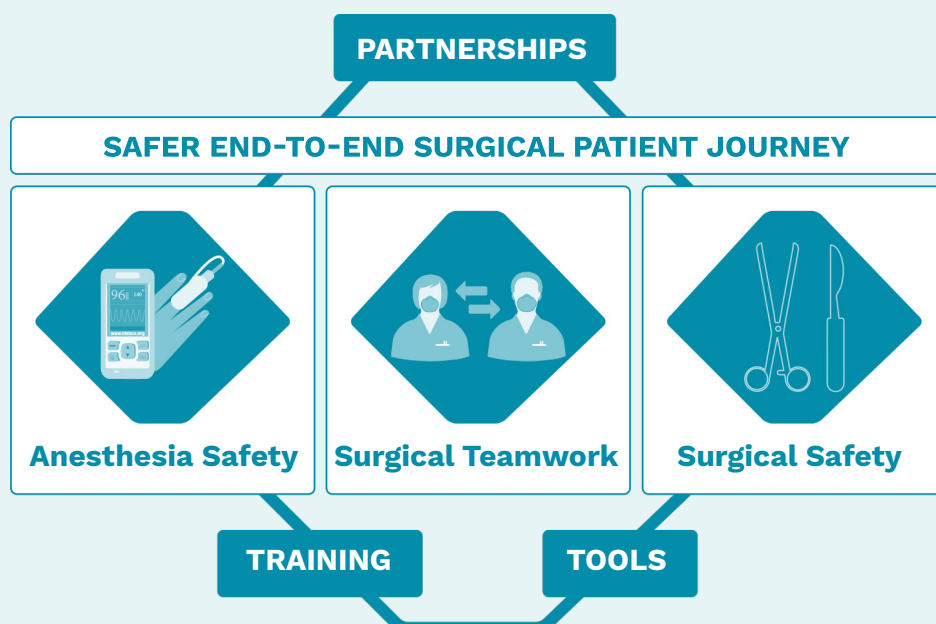
STRONGER TEAMS, SAFER SURGERY (2021-2024 STRATEGIC PLAN)

Our 2021-24 Strategic Plan – Stronger Teams, Safer Surgery – puts multidisciplinary teamwork at the heart of the Lifebox approach by strengthening the professions and processes both within and beyond the operating room. The plan aims to increase the quality and impact of Lifebox programs to target the most critical moments in the end-to-end surgical patient journey.

We aim to achieve measurable improvements in the safety of surgery and anesthesia at 400 facilities in 20 countries over the next three years. Our measures of success, include:

- 30 percent reduction in surgical site infection at partner hospitals through strengthened surgical infection prevention and safety processes
- 10,000 professionals providing safer patient monitoring with pulse oximetry or capnography in operating room and recovery areas
- 400 partner hospitals demonstrating improvements in perioperative teamwork and communication.

We have also set ambitious goals for investing in staff, leadership, and innovation in the regions where we work with 80 percent of the Lifebox team, including the majority of leadership positions, based in the Global South.



TEN YEAR ANNIVERSARY MILESTONES



10
YEARS
lifebox

**181 MILLION
SAFER
SURGERIES**



10
YEARS
lifebox

**33,000 PULSE
OXIMETERS
DISTRIBUTED**



10
YEARS
lifebox

**IMPACTED
100,000 PATIENTS
THROUGH OUR SURGICAL
INFECTION PROGRAM:
CLEAN CUT**



10
YEARS
lifebox

**12,000
HEALTHCARE
PROVIDERS
TRAINED**



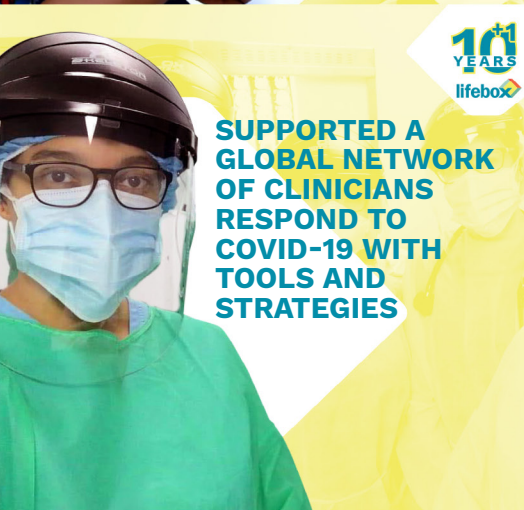
10
YEARS
lifebox

**DEVELOPED AN INNOVATIVE
PULSE OXIMETRY PROBE
DESIGNED FOR CHILDREN
UNDER THE AGE OF 5**



10
YEARS
lifebox

**LAUNCHED THE
SMILE TRAIN - LIFEBOX
SAFE SURGERY AND ANESTHESIA
INITIATIVE**



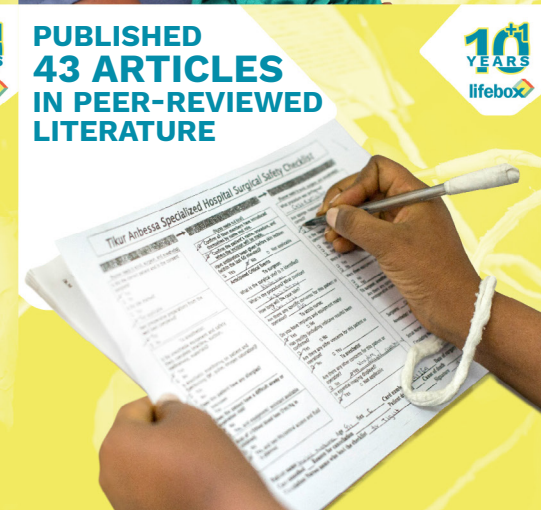
10
YEARS
lifebox

**SUPPORTED A
GLOBAL NETWORK
OF CLINICIANS
RESPOND TO
COVID-19 WITH
TOOLS AND
STRATEGIES**



10
YEARS
lifebox

**WORKING WITH 9 HOSPITALS
IN ETHIOPIA TO IMPROVE
MATERNAL HEALTH**



10
YEARS
lifebox

**PUBLISHED
43 ARTICLES
IN PEER-REVIEWED
LITERATURE**



**BUILT A GLOBAL TEAM OF
50+ MEMBERS ACROSS
17 COUNTRIES**

More than half of the Global Lifebox team
are clinicians

10⁺
YEARS
lifebox

SMILE TRAIN-LIFEBOX SAFE SURGERY AND ANESTHESIA INITIATIVE



This was the second year of the groundbreaking Smile Train-Lifebox Safe Surgery and Anesthesia Initiative: A multiyear program elevating the quality and safety of cleft and pediatric surgery. Through training and technological innovation, the Initiative is addressing gaps in cleft and pediatric surgical and anesthesia care - strengthening the surgical system as a whole.

Dr. Atul Gawande served as Inaugural Global Ambassador, before handing over to Professor Miliard Derbew in December 2021.



“I am absolutely honored to serve as the Global Ambassador of the Smile Train-Lifebox Safe Surgery and Anesthesia Initiative. In this role I will continue to advocate for focus and funding from governments and policymakers for interventions that work deeply on the surgical management of children.”

Professor Miliard Derbew, Global Ambassador, Smile Train-Lifebox Safe Surgery and Anesthesia Initiative

INITIATIVE HIGHLIGHTS:

COORDINATED GLOBAL RESPONSE

We continued supporting healthcare providers with tools and resources for safe surgical, anesthesia, and COVID-19 care:

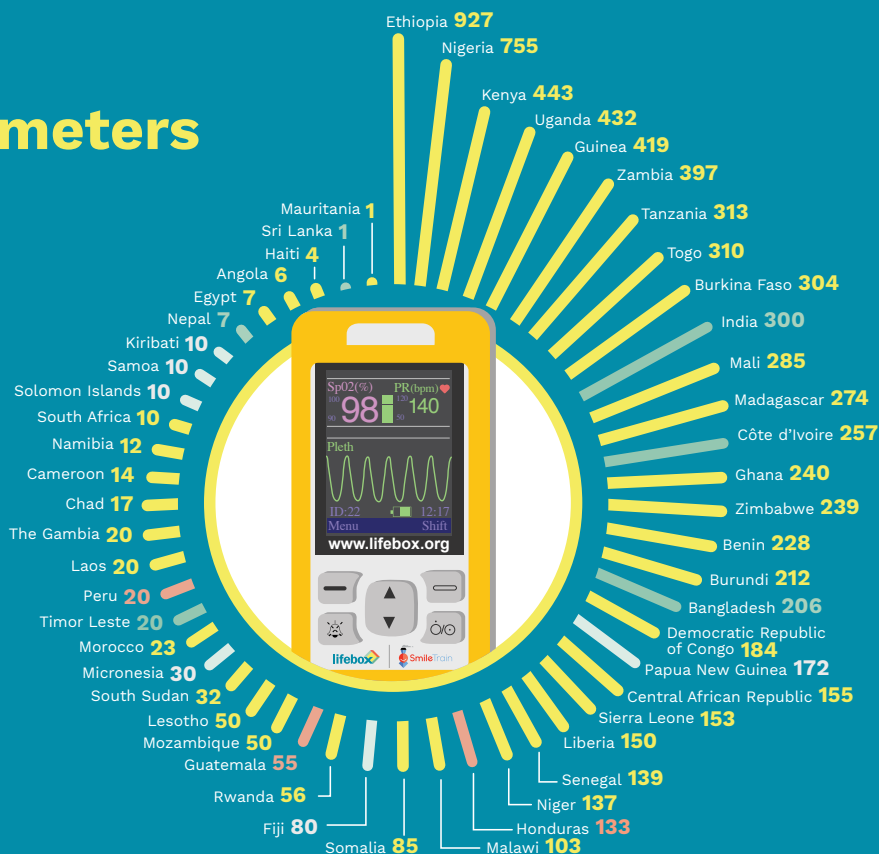
Distributing **8,800 pulse oximeters** across 53 low-resource countries for the detection and management of COVID-19 patients.

Training 130 perioperative providers as trainers through 23 workshops on the **COVID-19 Surgical Patient Checklist** - a communication tool developed by Lifebox, Smile Train, and the World Federation of Societies of Anaesthesiologists (WFSA) - to help keep surgical teams and patients safe from infection.

Publishing **“Perioperative Provider Safety in Low- and Middle-Income Countries During the COVID-19 Pandemic: A Call for Renewed Investments in Resources and Training”** in the Annals of Surgery¹. The results informed distribution plans and were used to advocate for greater investment in essential resources and training for LMIC based perioperative providers.

¹Starr, N. Capo-Chichi, N. Moore, J. Shreckengost, C. et al. ‘Perioperative Provider Safety in Low- and Middle-income Countries During the COVID-19 Pandemic: A Call for Renewed Investments in Resources and Training’ in Annals of Surgery Dec, 2021.

8,800 pulse oximeters distributed across 53 countries for COVID-19 care



THE SMILE TRAIN-LIFEBOX CAPNOGRAPHY PROJECT

Smile Train and Lifebox are developing a robust, affordable capnography device for use in low-resource settings. Despite being listed as an ‘essential’ safety monitoring device by the WHO-WFSA International Standards for a Safe Practice of Anesthesia, there is a lack of capnography availability throughout many LMICs. A study in Malawi found the country had only one capnograph available nationally - shared among 31 operating rooms - a 97 percent gap².

We are working to address the capnography gap with a device designed for the intraoperative care of children. Shortlisted devices are currently being tested in the laboratory and with anesthesia providers in six countries.



CLEAN CUT FOR CLEFT

We began adapting Clean Cut specifically for cleft surgeries. Alongside reducing infection, the program will address the main complications faced by cleft patients undergoing surgery, such as airway compromise or delayed bleeding. Clean Cut for Cleft will launch at two Smile Train partner hospitals in Ethiopia and one in Cote d'Ivoire.

TEAM CLEFT

TEAM Cleft is a new multidisciplinary workshop that 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 and will pilot in Ethiopia, Kenya, and Uganda.

² Jooste, R. Roberts, F. Mndolo, S. et al. Global Capnography Project (GCAP): implementation of capnography in Malawi – an international anaesthesia quality improvement project. *Anaesthesia*, 74: 158-166. 2019

CLEAN CUT IMPACT: REDUCING SURGICAL INFECTION

Surgical site infections (SSIs) are a common and devastating complication of surgery. The Lifebox Clean Cut® program reduces infection by strengthening adherence to six key infection prevention practices.

SUSTAINABLE RESULTS

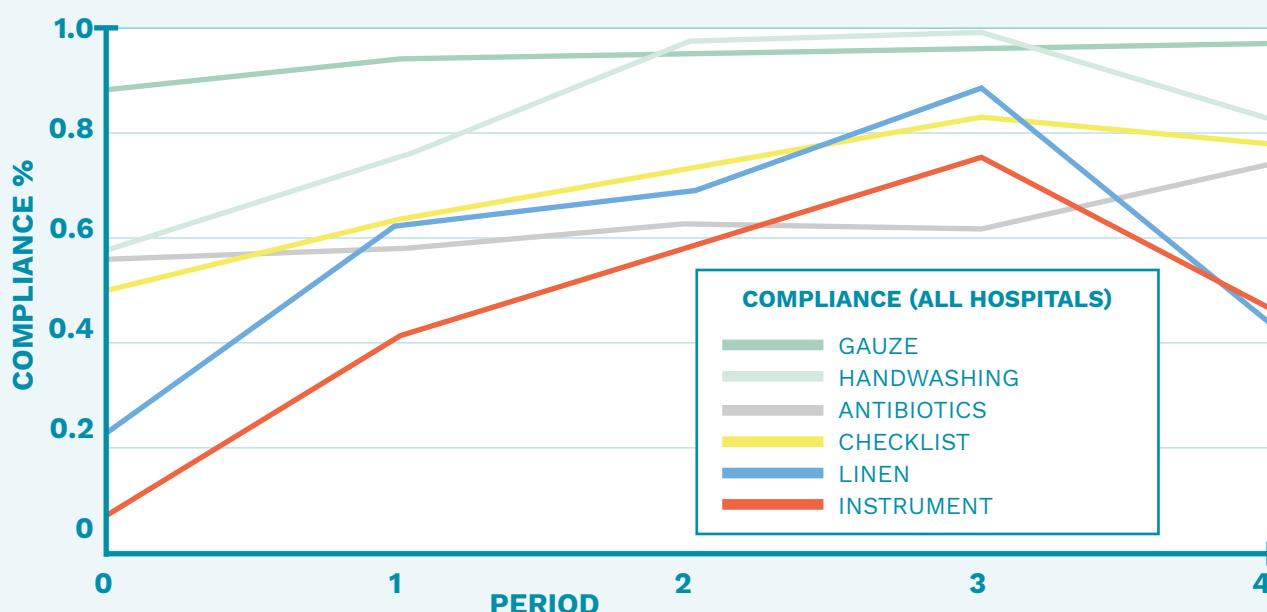
In November 2021, The Journal of the American Medical Association (JAMA) Surgery published “Sustainability of a Surgical Quality Improvement Program at Hospitals in Ethiopia” which detailed the results of a followup audit of more than 3,000 patients at seven hospitals, six to eighteen months after completion of the Clean Cut program³.

The results show that hospitals maintained improvements in compliance with all six program infection prevention standards - with compliance continuing to improve in four standards - demonstrating the lasting behavior changes achieved by Clean Cut.

Lifebox is scaling Clean Cut to multiple sites and contexts with 25 partner hospitals in Ethiopia, India, Liberia, and Madagascar.

Compliance With Perioperative Infection Prevention Standards Through Phases of Clean Cut Implementation and at the Sustainability Audit Time Point

Period 0 indicates before implementation; 1, beginning of the program; 2, middle of the program; 3, end of the program; and 4, sustainability audit.



³ Starr, N. Nofal, M. Gebeyehu, N. et al. ‘Sustainability of a Surgical Quality Improvement Program at Hospitals in Ethiopia’ in Journal of the American Medical Association Surgery, Nov, 2021

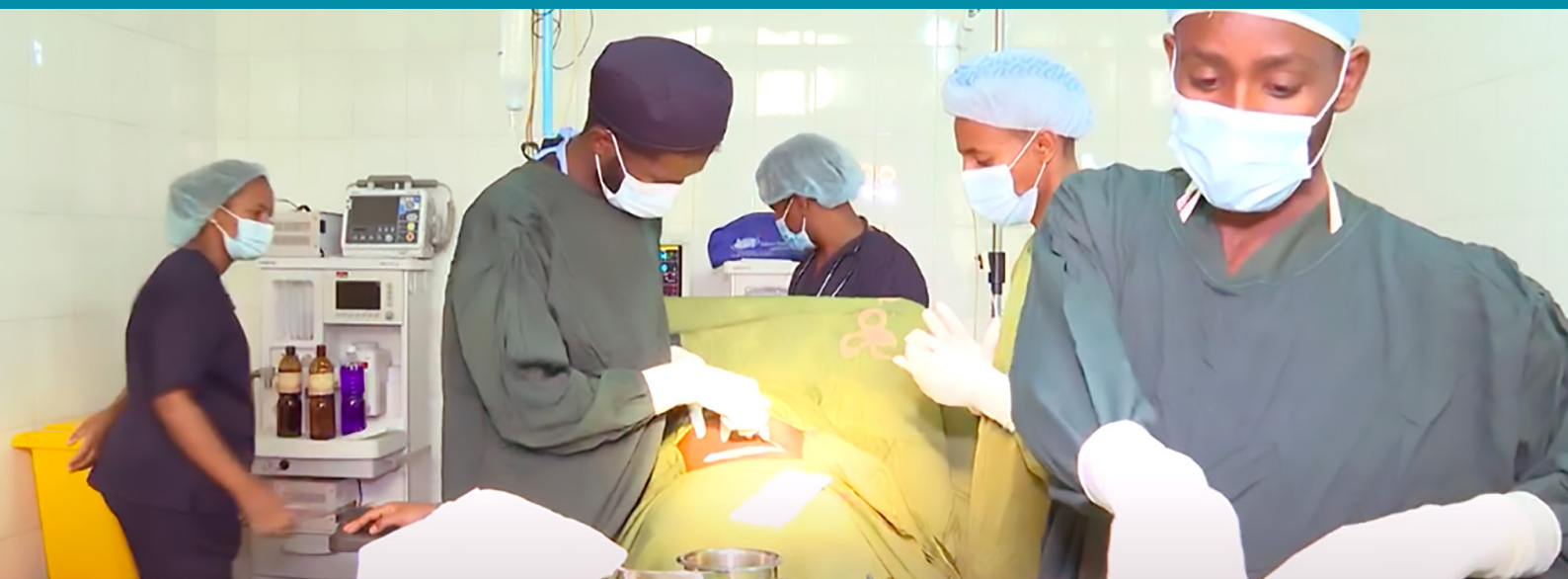


IMPROVING MATERNAL HEALTH

Cesarean section (C-section) is the most commonly performed major operation in the world, yet patients are at risk of infection. Lifebox is implementing a randomized control trial in Ethiopia to improve C-section safety by adapting our Clean Cut program. The study is being carried out at nine maternity hospitals with 4,317 patients participating in the study to date.

“Surgical site infections from C-sections are a leading cause of harm for mothers in Ethiopia. Supporting Lifebox to adapt Clean Cut will enable Lifebox and partners to drive lasting improvements in maternal health across the country and, we hope, beyond.”

Dr. Tihitena Negussie, Program PI and Lifebox Global Clinical Director



In Ethiopia, nine percent of patients undergoing C-sections are estimated to develop an infection. Infections and complications following C-sections are estimated to cause 15 percent of maternal deaths in the country.

This work is part of the Bill and Melinda Gates Foundation’s Grand Challenges Initiative, funded by UBS Optimus Foundation.

PERIOPERATIVE NURSING

NURSING LEADERSHIP

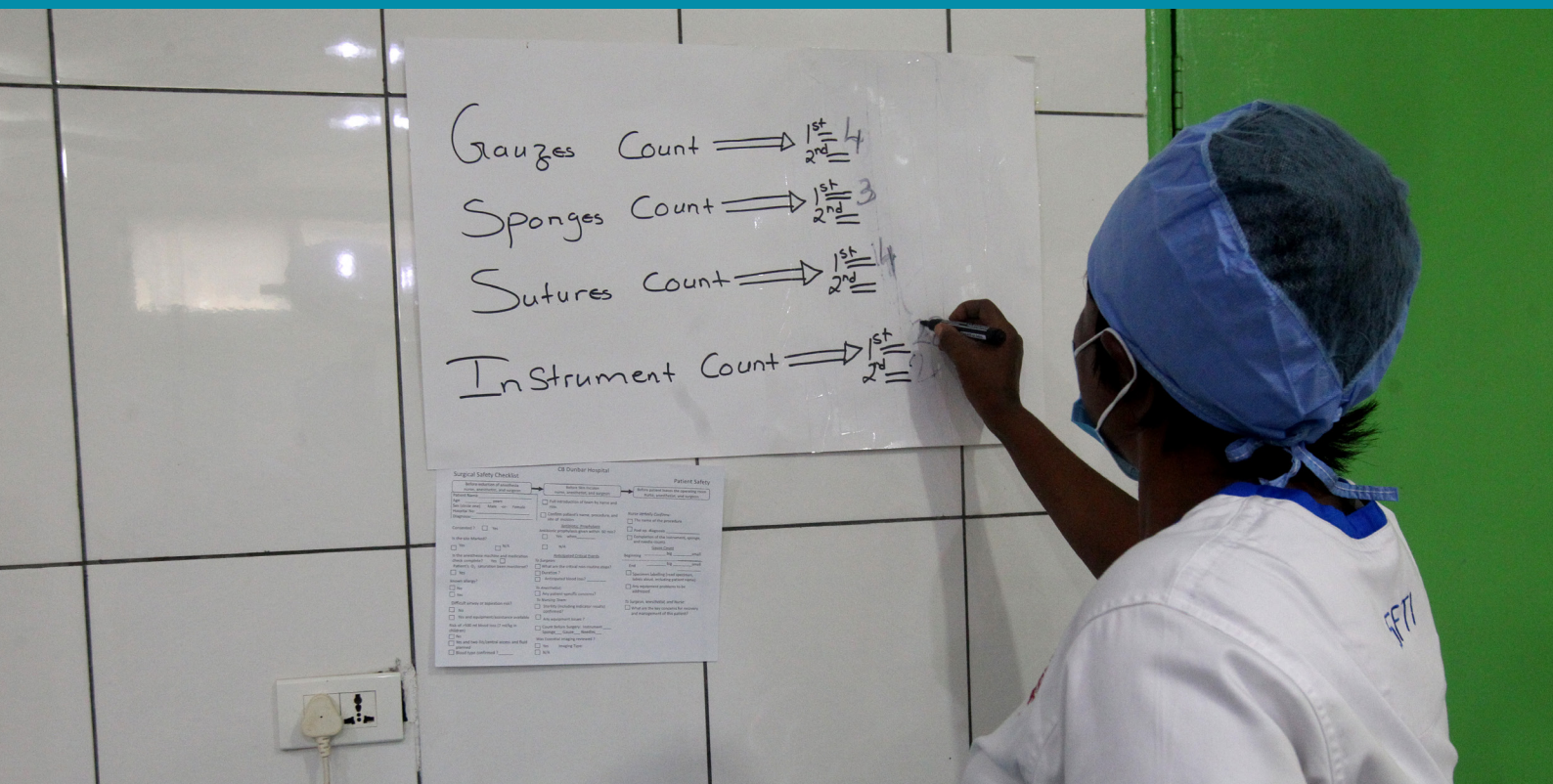
Globally nurses constitute the highest number of health professionals providing care to patients and play a critical role in patient care before, during, and after surgery. In many low-resource settings, perioperative nurses face significant challenges due to hierarchical structures and organizational barriers.

A survey of perioperative nurses conducted by Lifebox in Liberia and Ethiopia found that the top five perceived training needs were: nursing-led research (72 percent); taking on leadership roles (50 percent); communication with colleagues (28 percent); monitoring the needs of critically unwell patients (28 percent); and preventing infection (22 percent).

The Perioperative Nursing Project is a new stream of work focused on building the leadership and management skills of perioperative nurses. The project will pilot in Liberia and Ethiopia.

“I have low confidence in surgical material sets which are needed for different sub-specialty surgeries and procedures which I haven’t come across yet. That happens because I am not well trained with that regard and orientation is not given. When I don’t fulfill materials, surgeons get unhappy and give me comments and feedback.”

Perioperative Nurse, Nursing Survey



RESEARCH - EVIDENCE BASED, ALWAYS.

Lifebox is driven by data to inform and shape our work. This year nine articles were published on Lifebox's work, from program sustainability and perioperative safety, to innovations in decontamination.



'Anaesthesia facility evaluation: a Whatsapp survey of hospitals in Burundi' in *Southern African Journal of Anaesthesia and Analgesia* (SAJAA), April, 2021.

Sund, G. Lipnick, M, Law, T. et al.



'Addressing quality in surgical services in sub-Saharan Africa: hospital context and data standardisation matter' in *The British Medical Journal*, June, 2021.

Mammo, T. Weiser, T.



'Tribute to Dr. Takuo Aoyagi, inventor of pulse oximetry' in *Journal of Anesthesia*, August, 2021.

Miyasaka, K. Shelley, K. Takahashi, S. et al.



'Takuo Aoyagi, Ph.D., American Society of Anesthesiologists Honorary Member' in *Anesthesiology*, October, 2021.

Hanneberg, A.



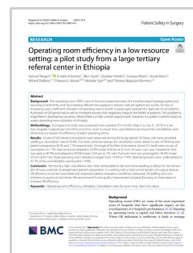
'Sustainability of a Surgical Quality Improvement Program at Hospitals in Ethiopia' in *Journal of the American Medical Association Surgery*, November, 2021

Starr, N. Nofal, M. Gebeyehu, N. et al.



'Perioperative Provider Safety in Low- and Middle-income Countries During the COVID-19 Pandemic: A Call for Renewed Investments in Resources and Training' in *Annals of Surgery*, December, 2021.

Starr, N. Capo-Chichi, N. Moore, J. Shreckengost, C. et al.



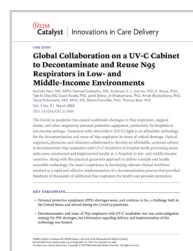
'Operating room efficiency in a low resource setting: a pilot study from a large tertiary referral center in Ethiopia' in *Patient Safety in Surgery*, January, 2022.

Negash, S. Anberber, E. Ayele, B. et al.



'Clean and Confident: Impact of Sterile Instrument Processing Workshops on Knowledge and Confidence in Five Low- and Middle-Income Countries' in *Surgical Infections*, January, 2022.

Shreckengost, C. Starr, N. Mammo, T. et al.



'Global Collaboration on a UV-C Cabinet to Decontaminate and Reuse N95 Respirators in Low- and Middle-Income Environments' in *New England Journal of Medicine Catalyst*, February, 2022.

Starr, N. Gebeyehu, N. Gomes, A. et al.

PUBLICATION SPOTLIGHT:

ANAESTHESIA FACILITY EVALUATION: A WHATSAPP SURVEY OF HOSPITALS IN BURUNDI

The study, published in SAJAA, focused on the availability of five pieces of anesthesia equipment in Burundi that are recommended by the WHO–WFSA International Standards for a Safe Practice of Anesthesia⁴. **The study found that 89 percent of hospitals had a Lifebox pulse oximeter.** While 91 percent of respondents reported the presence of an anesthesia machine, 52 percent reported that their machines were not functional or only partially functional – **highlighting the critical role of pulse oximetry in providing patient monitoring during anesthesia.**

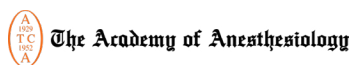
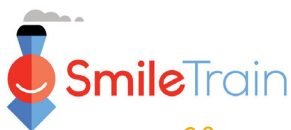


89% of hospitals reporting the use of Lifebox-Smile Train pulse oximeters

“Our study also highlights Lifebox’s impact in Burundi, with respondents from 89% of hospitals reporting the use of Lifebox pulse oximeters. Since September 2017, there have been three Lifebox workshops held in Burundi, and 116 pulse oximeters distributed. These workshops included training on maintenance and proper usage of the Lifebox pulse oximeter and how to recognise and treat hypoxia, as well as implementation of the WHO surgical safety checklist.”

Since 2017 Lifebox has partnered with the national association of anesthesia providers in Burundi, – Agora des Techniciens Supérieurs Anesthésistes Réanimateurs pour la Promotion de la Santé (ATSARPS) – to distribute 423 devices for improved anesthesia safety.

A special thank you to all of our supporters for helping Lifebox make surgeries safer for millions of patients this year.



UBS Optimus Foundation

⁴ Sund, G. Lipnick, M, Law, T. et al. ‘Anaesthesia facility evaluation: a Whatsapp survey of hospitals in Burundi’ in Southern African Journal of Anaesthesia and Analgesia (SAJAA), April, 2021.

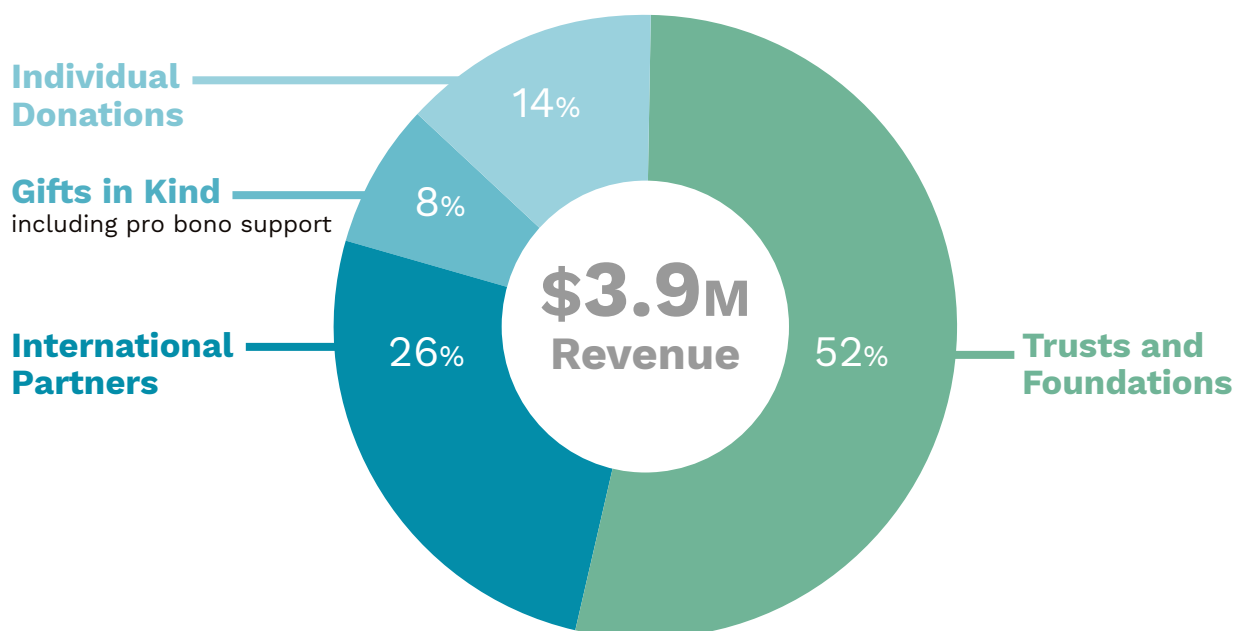
OUR 2021/2022 FINANCIALS

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.

OPERATING REVENUE	2021/22	2020/21	CHANGES
International Partners	\$1,008,741	\$1,050,392	-\$41,651
Trusts and Foundations	\$2,061,396	\$2,057,897	\$3,499
Individual Donations	\$530,917	\$439,940	\$90,977
Gifts in Kind, including pro bono support	\$310,915	\$104,721	\$206,194
Currency Movement	\$0	\$0	\$0
TOTAL REVENUE	\$3,911,968	\$3,652,950	\$259,018
OPERATING EXPENSES	2021/22	2020/21	CHANGES
Program Expenses	\$1,870,420	\$2,563,460	-\$693,040
Development	\$284,761	\$203,464	\$81,297
Awareness Raising	\$139,672	\$52,650	\$87,022
Operations	\$527,283	\$247,928	\$279,355
TOTAL EXPENSES	\$2,822,135	\$3,067,502	-\$245,367
Surplus/ Deficit	\$1,089,834	\$585,448	\$504,385
COMPOSITION OF NET ASSETS	2021/22	2020/21	CHANGES
Unrestricted Funds	\$1,456,917	\$959,661	\$497,256
Currency Reserve	\$38,016	\$57,950	-\$19,934
Restricted Funds	\$988,878	\$398,603	\$590,275
TOTAL NET ASSETS	\$2,483,811	\$1,416,214	\$1,067,597

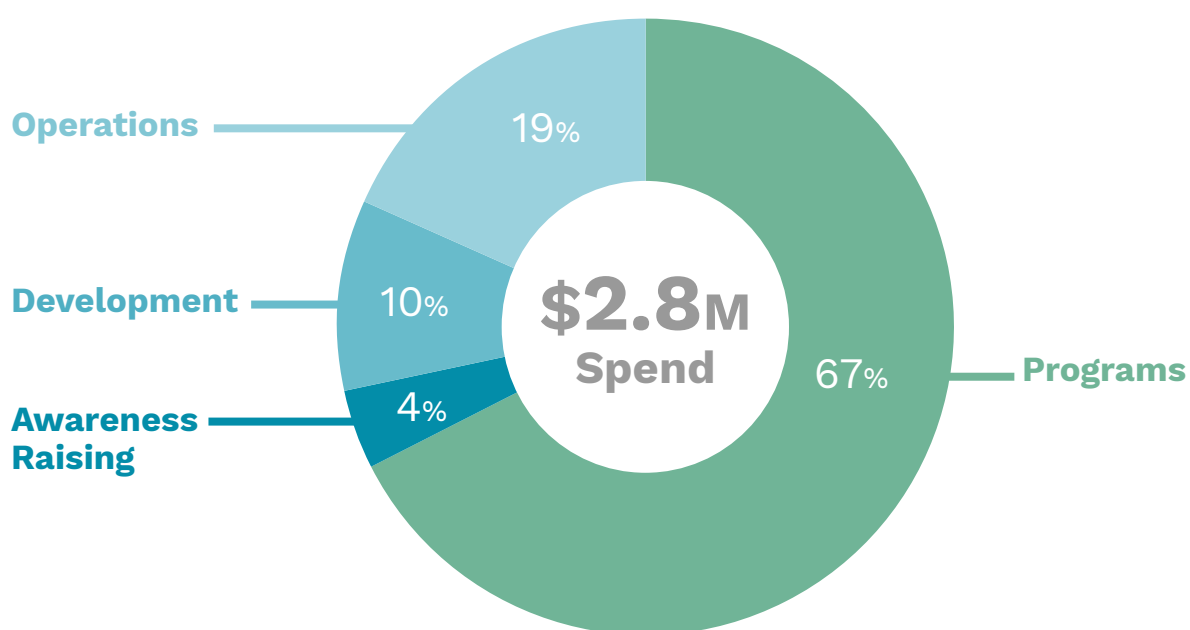
REVENUE

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, 2021 to March 31, 2022.

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. This year we welcomed a new Chair and three new members to the Council.

Lifebox co-founder - Dr. Atul Gawande - stepped down as Chair to take up the role of Assistant Administrator of the Bureau for Global Health with USAID. We are enormously grateful for Dr. Gawande's leadership and vision during our first impactful decade.

We are proud to welcome Pauline Philip as the new Lifebox Chair as well as Drs. Susana Abrego and Rob McDougall - pediatric anesthesiologists in El Salvador and Australia respectively - and Professor Salome Maswime, an obstetrician and gynecologist at the University of Cape Town.

LIFEBOX GLOBAL GOVERNANCE COUNCIL



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 Hannenbergh, 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

**Professor Salome Maswime, MD**

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

**Alan Merry, MB, ChB**

Professor, Department of Anaesthesiology, University of Auckland

**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

**Jason Yeung, MPH**

Managing Director and Portfolio Manager, Morgan Stanley Growth Team Mutual Funds

**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

We also want to thank Drs. Angela Enright and Isabeau Walker, two of our founding Council members who joined Dr. Iain Wilson as Emeritus Trustees. We are grateful for their commitment to Lifebox and the countless lives impacted by their work to improve anesthesia care globally.

OUR FOUNDERS

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



**Association
of Anaesthetists**



Brigham and Women's Hospital
Founding Member, Mass General Brigham



HARVARD T.H. CHAN
SCHOOL OF PUBLIC HEALTH



WFSA
WORLD FEDERATION OF SOCIETIES OF
ANAESTHESIOLOGISTS



2022 ANNUAL REPORT

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