

Oxygen Delivery Toolkit

Resources to plan and scale
medical oxygen

Global Financing Facility Medical Oxygen Investment Guide

Assisting decision-makers and advocates
in leveraging the Global Financing Facility
Investment Case for increased investment in
and access to medical oxygen

For use by:



Decision-makers



Advocates

March 2021

This resource is part of the **Oxygen Delivery Toolkit: Resources to plan and scale medical oxygen**. The materials provided within the toolkit can be used together or separately, as needed. The complete Oxygen Delivery Toolkit includes the following resources:

- *Oxygen is Essential: A Policy and Advocacy Primer*
- *Health Facility Standards Guide*
- *Baseline Assessment Manual*
- *Consumption Tracking Tool*
- *Procurement Guide*
- *Quantification and Costing Tools*
- *Reference Pricing Guide*
- *Electricity Planning Guide*
- *Asset Management Guide*
- *Global Financing Facility Medical Oxygen Investment Guide*

The toolkit is available at www.path.org/oxygen-delivery-toolkit.

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Abbreviations

CSO	civil society organization
DALY	disability-adjusted life year
Gavi	Gavi, the Vaccine Alliance
GFF	Global Financing Facility for Women, Children and Adolescents
Global Fund	The Global Fund to Fight AIDS, Tuberculosis and Malaria
HFS	health facility financing
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
MCP	multi-stakeholder country platform
NGO	nongovernmental organization
RMNCAH+N	reproductive, maternal, newborn, child, and adolescent health and nutrition
UN	United Nations

About this resource

The Global Financing Facility for Women, Children and Adolescents (GFF) is a multi-stakeholder global partnership housed at the World Bank that is committed to ensuring all women, children, and adolescents can survive and thrive. The primary mechanism of the GFF is the investment case, an innovative approach to financing that supports country efforts to significantly increase investment in the health of their own people by aligning health priorities with health financing. The GFF investment case presents an opportunity for eligible low- and middle-income countries to improve access to medical oxygen, defined here as oxygen therapy administered with the support of pulse oximetry.

Oxygen therapy is essential to treat a broad range of diseases that affect multiple patient populations. However, government officials involved in the GFF process are often unaware of wide gaps in oxygen access or of its capacity to improve health outcomes, particularly for vulnerable populations such as pregnant women, newborns, and

children.¹ As a result, many countries may be engaged with the GFF, but the GFF investment case is underrecognized and underused as a tool to support medical oxygen access.

This guide describes how the GFF investment case process can be leveraged to increase access to medical oxygen and is intended for use by civil society and government decision-makers. Civil society groups are key participants in the investment case process with the ability to raise awareness and advocate for health priorities. Government decision-makers should be in the driver's seat of writing investment cases, and should be encouraging recipients of civil society advocacy and technical expertise. Presented in this guide are practical approaches and actions that civil society and government can use throughout the GFF process to include medical oxygen both proactively during GFF investment case development, as well as later, during implementation of an investment case.

Included in this guide

- Background information on challenges to medical oxygen access.
- High-level overview of the GFF process with embedded references to additional resources.
- Advocacy content for civil society to use to engage decision-makers in the importance of medical oxygen.
- Pragmatic recommendations for civil society and government decision-makers to participate in the GFF process, including in national health financing and costing of investment cases.
- Two case studies from Tanzania and Uganda, showing how medical oxygen scale-up activities can be included in an investment case.

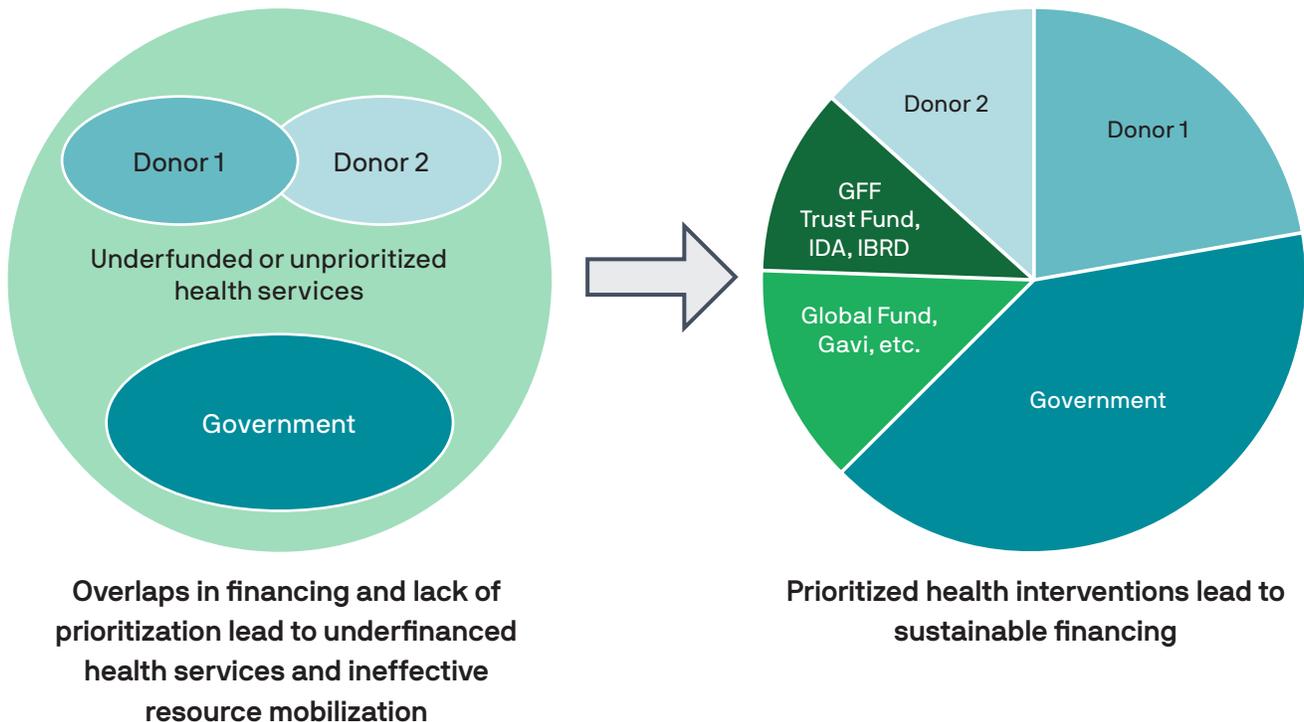
1. Introduction

The Global Financing Facility

The Global Financing Facility for Women, Children and Adolescents (GFF) is a mechanism that supports low- and middle-income countries to close financing gaps in reproductive, maternal, newborn, child, and adolescent health and nutrition (RMNCAH+N) by using resources more effectively and improving the efficiency of health spending over time.² National financing plans created under the GFF process align RMNCAH+N priorities with donations and money from funding sources such as government, the private sector, the International Development Association, and the International Bank for Reconstruction and Development. The overall goal of the GFF is to encourage governments to leverage domestic funding efficiently and avoid gaps and overlaps in project financing (Figure 1).³

The GFF allocates catalytic funding from the GFF Trust Fund to eligible countries based on approval of their investment cases. An investment case sets forth a plan to finance health priorities, which are established through the case development process, and determined by civil society and government decision-makers in the ministries of health and finance. Overall, an investment case describes the changes a country wants to see with regard to reproductive, maternal, newborn, child, and adolescent health and the investments required to achieve them.⁴ While investment cases follow a framework set by the GFF Secretariat,^a countries have wide latitude in how they address RMNCAH+N concerns. The priorities of an investment case and decisions about where to direct funding are determined by the government and its partners, including

Figure 1. The Global Financing Facility encourages effective health financing.



Abbreviations: Gavi, Gavi, the Vaccine Alliance; GFF, Global Financing Facility for Women, Children and Adolescents; Global Fund, The Global Fund to Fight AIDS, Tuberculosis and Malaria; IBRD, International Bank for Reconstruction and Development; IDA, International Development Association.

^a The GFF Secretariat manages the GFF Trust Fund, the GFF Trust Fund Committee, and the Investors Group—all seated within the World Bank headquarters in Washington, DC—as well as supports investment case implementation, donor investment in the GFF, and resource mobilization.

civil society, the private sector, representatives of subnational levels of government, and key constituents of the GFF and the World Bank. Ideally, all these constituents are involved in the GFF process and together make up an inclusive country platform that is instrumental in enforcing accountability (Table 1). The country platform often builds on existing coordination structures and should be engaged in investment case and health financing strategy (HFS) development, resource mobilization, implementation, monitoring, and evaluation.

As of 2020, the GFF works in partnership with 36 countries (Table 2), and an additional 31 are eligible for GFF support.⁵ Of countries with existing investment cases, only two countries, Tanzania and Uganda, mention or include oxygen interventions, despite their importance to maternal,

newborn, and child health. These cases are discussed in further detail in the “Case implementation” section.⁶

Countries supported by the GFF may have investment cases at different stages. The process and considerations for adding new interventions to an existing investment case—during implementation—will be different from those for a country newly eligible for GFF financing and just developing an investment case. There are several phases of a typical GFF investment case timeline (Table 3) and important considerations for each step of the process (figure in annex). This guide will highlight opportunities for engagement and advocacy for medical oxygen during investment case development as well as during investment case implementation.

Table 1. Global Financing Facility structure and major participants.

Country level	Global level
Country platform: Includes government, representatives from subnational government, civil society, the private sector, partners such as nongovernmental and other organizations, United Nations agencies and other technical assistance partners, key financiers and donors, and the World Bank.	GFF Secretariat focal point: Supports country coordination by taking questions for the GFF Secretariat and coordinating grants and technical assistance.
Government focal point: Typically, a ministry of health staff member who leads the country platform.	GFF Secretariat: Oversees the use of funds from the GFF Trust Fund and supports country implementation.
GFF liaison officer: Supports the country platform and the government focal person by facilitating stakeholder coordination.	GFF Trust Fund Committee: Donors to the GFF Trust Fund.
	Investors Group: Oversees high-level GFF activities.

Abbreviations: GFF, Global Financing Facility for Women, Children and Adolescents; NGO, nongovernmental organization; UN, United Nations.

Table 2. Global Financing Facility–supported countries (as of December 2020).

Afghanistan	Ethiopia	Malawi	Senegal
Bangladesh	Ghana	Mali	Sierra Leone
Burkina Faso	Guatemala	Mauritania	Somalia
Cambodia	Guinea	Mozambique	Tajikistan
Cameroon	Haiti	Myanmar	Tanzania*
Central African Republic	Indonesia	Niger	Uganda*
Chad	Kenya	Nigeria	Vietnam
Côte D'Ivoire	Liberia	Pakistan	Zambia
Democratic Republic of the Congo	Madagascar	Rwanda	Zimbabwe

*Countries with investment cases that mention either oxygen or pulse oximetry directly.

⁶A systematic evaluation of investment case content was conducted by the Every Breath Counts Coalition to determine if cases prioritized child health after the neonatal period. References to oxygen and pulse oximetry were counted as part of this review due to their importance in averting mortality as the result of pneumonia and other illnesses that require oxygen therapy.

Table 3. Global Financing Facility investment case timeline.

Country selection	Country platform generation	Investment case development	Financing strategy	Investment case implementation and monitoring
<ul style="list-style-type: none"> The GFF engages eligible low- and middle-income countries 	<ul style="list-style-type: none"> Organization of stakeholders and civil society groups to build a country platform and GFF investment case 	<ul style="list-style-type: none"> Situational analysis Prioritization of interventions Costing 	<ul style="list-style-type: none"> Resource mobilization Costed strategy is mapped to resources Resource gaps are identified 	<ul style="list-style-type: none"> Money is disbursed to the ministry of finance and pooled with other health finances Implementation Monitoring and adaptation

Abbreviation: GFF, Global Financing Facility for Women, Children and Adolescents.

Source: The Global Financing Facility. Guidance Note: Investment Cases [working version], February 9, 2016. https://www.globalfinancingfacility.org/sites/gff_new/files/Investment%20Case%20Guidance%20Note_EN.pdf.

Access to medical oxygen is a priority investment

Many low- and middle-income countries are underresourced in terms of medical oxygen: oxygen therapy with monitoring by pulse oximetry.⁶ Additionally, many decision-makers working on GFF investment cases are not aware of the lack of access to medical oxygen in these countries, do not recognize its capacity to improve RMNCAH+N services and outcomes, or do not understand the impact the GFF could have on increasing access, as evidenced by the lack of inclusion of oxygen in GFF investment cases.⁷ Understanding and communicating this value is critical for improving the health of these vulnerable populations.

Medical oxygen is essential for reducing morbidity and mortality from illnesses and conditions including pneumonia, birth asphyxia, and obstetric emergencies (e.g., hemorrhage, eclampsia, and pulmonary embolism), which are leading causes of preventable deaths.⁸ In 2017, pneumonia killed approximately 800,000 children, representing 15 percent of all deaths of children under 5 in 2017.⁹ It has been estimated that in countries with high burdens of child pneumonia, access to oxygen and pulse oximetry could reduce mortality up to 35 percent.¹⁰ Oxygen therapy is administered safely with the assistance of pulse oximetry, which is used to monitor oxygen saturation in the blood and alert health care workers to hypoxemia—a lack of oxygen in the blood and a symptom of many of the aforementioned conditions. In many low- and middle-income countries, pulse oximetry and medical devices and supplies to provide oxygen therapy have been observed to be in extremely short supply, and often are accompanied by inadequate care practices. One study of 12 secondary-level hospitals in Nigeria found that only one hospital used pulse oximetry, and only 14.4 percent of total admitted children and 19.4 percent of hypoxemic children received oxygen therapy.¹¹ Increasing access to

oxygen-related medical devices can enormously reduce mortality; a study that introduced bubble CPAP (continuous positive airway pressure) devices into a referral hospital in Uganda saw a 44 percent mortality reduction among the study population of neonates with very low birthweight.¹²

Medical oxygen is underresourced

The following points describe the significant need for reliable access to medical oxygen, using examples of how women and children are impacted both globally and in Kenya and Malawi. The need is articulated for these two countries because they are currently supported by the GFF; however, oxygen interventions are not explicitly included in their investment cases.

Global: A disproportionate 99 percent of maternal deaths occur in low- and middle-income countries. Less than half of hospitals in these areas can supply reliable oxygen, and only half can provide functional pulse oximeters for diagnosis of hypoxemia.¹

Kenya: Lack of reliably available oxygen equipment and consumables is a major challenge to providing care and contributes to poor maternal care capacity in many rural facilities.¹³

Malawi: Data from hospital wards in Malawi estimate very high rates of hypoxemic patients do not receive oxygen therapy.^{14,15}

The COVID-19 pandemic has caused a tremendous surge in oxygen demand, as well as increased global recognition of the criticality of oxygen supply and delivery systems.¹⁶ Many countries who are already struggling to provide oxygen, have invested in increased production capacity such as oxygen concentrators and oxygen production plants. Despite this progress, the need for oxygen remains extremely high and

investments in production, distribution, supply sourcing, routine data collection, maintenance of equipment, training, and many other areas must be sustained.¹⁷ The versatility of oxygen to treat a wide spectrum of diseases that can cause hypoxemia and even death makes oxygen a high-impact and cost-effective intervention in reducing maternal, newborn, and child mortality.¹⁷⁻¹⁹

Intended user of this guide

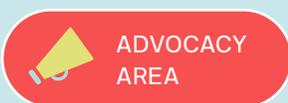
Civil society is the intended primary user of this guide because they contribute significantly to investment case development and implementation. The guide could also be a helpful resource for government officials and other decision-makers looking to better understand the role of civil society in the investment case development process, facilitate their representation, as well as advocate for inclusion of medical oxygen in case development and implementation.

GFF defines civil society as “formal and informal, non-governmental and not-for-profit, organizations that publicly represent the interests, ideas, and values of citizens and their members.”²⁰ This definition extends to local and international nongovernmental organizations, community- and faith-based organizations and service providers, charities, academic and research institutions, and populations that would benefit from RMNCAH+N interventions, including youth and adolescents.

Civil society organizations offer a diverse array of perspectives, insight, expertise, and capability to aid in

the development of sustainable strategies and health financing for RMNCAH+N. They are key to advocating for populations affected by health and financial policy, improving accountability of the government, developing investment cases and HFS, and implementing investment case objectives. Despite their strengths, the influence of civil society may not always be considered in decision-making in the GFF process, and it is important to consider strategies to strengthen their engagement. Civil society can participate in the GFF process at multiple levels; however, this guide focuses on civil society engagement through the country platform and opportunities to advocate for issue-specific investment case priorities such as access to medical oxygen.

Throughout this guide, helpful advocacy resources for use in investment case development are highlighted via “Advocacy Area” signposts, including content on specific elements of the GFF process, opportunities for civil society and government participation, and support for medical oxygen.



Reference material to strengthen Global Financing Facility engagement

- [*Civil Society Guide to the GFF.*](#)²¹ This guide is particularly useful for understanding the role and benefit of including civil society in the GFF process as well as for ways to navigate the challenges of involvement.
- [*Civil Society Engagement in the Global Financing Facility: A Briefing Document for Country CSO Focal Points.*](#)²² This resource outlines important points of contact relevant to civil society.
- [*Guidance Note: Inclusive Multi-Stakeholder Country Platforms in Support of Every Woman Every Child.*](#)²³ This resource outlines the roles and broad benefits of a multi-stakeholder platform.
- [*A Global Financing Facility in Support of Every Woman Every Child.*](#)³
- [*Guidance Note: Investment Cases.*](#)⁴

2. Opportunities for civil society to engage in investment cases

Case development

To ensure that interventions such as medical oxygen are included in investment cases, civil society should begin advocacy early in the development process. This will provide an opportunity to involve a broader swath of civil society

and offer robust plans for including and financing oxygen supplies and equipment. Table 4 highlights the skills and capabilities that civil society can bring to investment case development.

Table 4. Civil society engagement areas during development of an investment case.

Generate evidence for decision-making
<ul style="list-style-type: none">Academic institutions, research organizations, and training centers can collect and present data to decision-makers. Evidence-based advocacy is critical to encouraging decision-makers to prioritize a given issue, since they are often faced with many competing priorities.
Guide policy recommendations
<ul style="list-style-type: none">Civil society can identify and advocate for population needs and describe areas in which existing health and financial policies or their implementation is ineffective.Health care workers are often the stakeholders involved in implementing new health policies. If they are included in policy formulation, they will have a greater understanding of it, as well as more incentive to implement and provide feedback on it.
Promote transparency, accountability, and effective information flow
<ul style="list-style-type: none">When civil society organizations participate in development of an investment case, they are invested in the outcomes, will be available to support implementation, and can hold the government accountable for results.Civil society can also encourage the government to provide information openly, allowing for independent review by their organizations.
Coordinate across local, subnational, and national levels
<ul style="list-style-type: none">Many investment case interventions will require implementation support at both national and subnational levels. Civil society's ability to reach these constituencies and coordinate with them can be leveraged for investment case development and implementation.
Mobilize resources
<ul style="list-style-type: none">Civil society can identify and advocate for domestic resources from governments and other sources and secure additional financing for investment case priorities. Resource mobilization is a key advocacy space for civil society.Familiarity with national health financing and budgeting processes will help civil society engage in these activities.
Provide technical expertise
<ul style="list-style-type: none">Civil society can leverage technical expertise to identify root causes of health inequity—such as in clinical practice—and suggest informed solutions.

Sources:

Stenberg K, Elovainio R, Chisholm D, et al. *Responding to the Challenges of Resource Mobilization - Mechanisms for Raising Additional Domestic Resources for Health*. World Health Report 2010. Background Paper, 13. Geneva: World Health Organization; 2010. <https://www.who.int/healthsystems/topics/financing/healthreport/13Innovativedomfinancing.pdf?ua=1>.

Gupta I, Joe W, Rudra S. *Demand Side Financing in Health: How Far Can It Address the Issue of Low Utilization in Developing Countries?* World Health Report 2010. Background Paper, 27. Geneva: World Health Organization; 2010. https://www.who.int/healthsystems/topics/financing/healthreport/DSF_No27IEG.pdf?ua=1.

Civil society can add value to investment case development in many ways—especially by generating evidence to support medical oxygen scale-up, coordinating stakeholders nationally and subnationally, and advocating for groups that would benefit from oxygen health system strengthening, such as mothers, children, and adolescents. Civil society engagement in the GFF process is most effective when organized within a country platform or technical working group and governed by terms of reference.⁹ Civil society can use the country platform to capture the attention of decision-makers—government officials and technical leads—who often elevate civil society’s voice.

Prioritizing medical oxygen interventions

This section offers a strategy for prioritizing medical oxygen interventions in investment cases by demonstrating their ability to broadly strengthen health systems.

Proposal and prioritization of medical oxygen interventions will depend on how robust current strategies are for RMNCAH+N. In countries with inclusive and existing RMNCAH+N strategies, investment cases may be concise. In the absence of developed strategies, more detailed investment cases may be required. In either case, proposed interventions will be better received if they are backed by strong evidence and data.

Providing evidence for an investment case

A situational analysis in which verified data are gathered can help in identifying existing barriers to health, and inefficiencies and bottlenecks that result in a lack of access to oxygen and pulse oximetry. Identifying these root causes will lead to prioritizing interventions more thoughtfully, setting objectives, and defining intended results. Unfortunately, location-specific data on oxygen and pulse oximetry are hard to collect, making traditional advocacy tactics more difficult. One approach is to collaborate with technical partners such as PATH and the Clinton Health Access Initiative, which have collected oxygen-related data and can offer technical guidance and recommendations around data collection and strategies for medical oxygen scale-up.

Prioritization of medical oxygen in investment cases can be supported by showing how oxygen interventions broadly contribute to health system strengthening. Typically, interventions that emphasize health system improvements over disease-specific attributes can more equitably distribute resources across the population. Oxygen therapy with monitoring by pulse oximetry can be used to treat hypoxemia regardless of the underlying cause, making it a nondisease-specific treatment and especially well suited for health system strengthening. The following section lists typical challenges to oxygen access and describes how oxygen interventions can improve equity and efficiency in a health system. Advocates can consider health system strengthening capabilities while prioritizing medical oxygen interventions during investment case development.

Oxygen investments improve equity of health service provision

- Equipment is often inequitably distributed at service delivery points; therefore, provision of oxygen therapy to vulnerable groups, including women in labor or post-birth, newborns, and children under 5, is not reliable.
- Access to oxygen and pulse oximetry can be negatively impacted by the oxygen service delivery model; that is, whether it is centralized or decentralized. Often, incentives for industry (manufacturers and distributors) to service remote locations are poor, which results in a lack of access. Furthermore, oxygen production capacity is insufficient to meet oxygen need, especially in decentralized regions.

Interventions can be evaluated for equity based on their coverage of vulnerable populations, such as women, babies, children, and people living in rural areas. Oxygen’s ability to improve health outcomes for a broad swath of the population contributes to overall improved population health, which lies at the heart of investment cases.

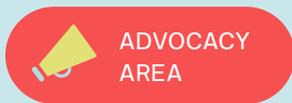
Oxygen investments improve efficiency of health service provision

- Access to oxygen and pulse oximetry is decreased by market fragmentation (large numbers of manufacturers and distributors of oxygen) or poor procurement methods.
- Low availability of maintenance technicians to service respiratory care equipment results in premature failure of devices.
- Poor tracking of oxygen devices (functionality and availability) and consumables inventory contributes to stockouts and unreliable treatment, and inefficiency in supply chains for spare parts and consumables can increase prices.

⁹ Terms of reference help to define the operations of a multi-stakeholder country platform (MCP). It has been shown that many countries lack an organized MCP that can effectively engage with the GFF process. Creating a platform that facilitates ongoing civil society inclusion is critical in down-streaming investment case inclusion of civil society interests. For more information on civil society and MCP challenges, see: <https://www.csogffhub.org/resources/assessment-of-the-effectiveness-of-mcps-used-to-implement-the-gff/>.

Interventions that identify sources of inefficiency—supported by data—and propose strategic plans to address them, contribute to health system strengthening. Such interventions could include implementation of standard

operating procedures for supply chain management and medical device maintenance scheduling. Such systems can be integrated across medical devices, improving efficiency of operations in the health system broadly.



Messaging to support oxygen interventions

Medical oxygen interventions have other capabilities beyond health system strengthening that advocates can leverage to support oxygen inclusion in investment cases (Table 5). These points can be supplemented by country-specific data and information collected through a situational analysis to make a strong argument for medical oxygen.

Table 5. Messaging for medical oxygen.

Capability of medical oxygen interventions	Supporting evidence	Messaging for advocates
High impact	Pneumonia is responsible for more than 800,000 deaths worldwide annually and for 15 percent of deaths of children younger than 5 years. ¹¹ Increasing supportive oxygen therapy could improve health system capacity to treat pneumonia.	Advocates can point out the potential of oxygen therapy to reduce mortality from major causes of preventable death when working to include safe oxygen in investment cases.
Cost-effective	Improved oxygen delivery systems for treatment of childhood pneumonia in Papua New Guinea were costed at US\$50 per disability-adjusted life year (DALY)* averted. ⁹ A pneumococcal conjugate vaccine for pneumonia cost US\$100 per DALY averted, twice as much. Handheld pulse oximeters are cost-effective, with low total cost of ownership due to low maintenance, energy use, and training requirements.	Advocates can explain how the versatility of oxygen—its use in treating patients across disease areas—has a greater impact on the population for less money and is therefore cost-effective in investment cases. Because cost-effectiveness analysis depends on data, advocates can also leverage this information for strengthened data collection systems.
Results focused	Metrics to track maternal and childhood mortality rates before and after oxygen scale-up; service coverage of the population; and resource mapping of oxygen devices and delivery systems.	Tangible measurement and evaluation capabilities can strengthen advocates' arguments for including medical oxygen in investment cases.

* A disability-adjusted life year (DALY) is a measurement of disease burden across a population, where increased DALYs represent decreased potential for people to achieve a long disease- and disability-free life. It is calculated by summing the total years of life lost due to premature mortality and years lost to disability. For more information, see the World Health Organization's explanation of the metric: https://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/.

Financing and resource mobilization

Financing is a government-led process the GFF accesses to provide a framework for effectively and sustainably mobilizing resources for RMNCAH+N. Some countries may have a national HFS to link to the country's investment case. The HFS encompasses more than RMNCAH+N; often has a longer term than the investment case; and defines the main functions of the HFS, such as the services that will be provided, resource mobilization, and procurement and allocation of supplies. Because resource mobilization is a key advocacy area for civil society and investment case development should be closely aligned with the HFS, it is necessary for civil society to understand and be involved in both processes. This section discusses primary areas for civil society engagement in financing and resource mobilization.

In the financing stage of GFF cases, interventions are placed under broad objectives that dictate how budgets are created. Because there are many ways oxygen interventions can strengthen health service provision in maternal, newborn, and child health program areas, oxygen interventions may be placed under multiple objectives. For example, Bangladesh's investment case lists "achieve effective and equitable coverage of evidence based high impact maternal, neonatal, child and adolescent health (MNC&AH) care interventions"²⁴ as an objective. Although oxygen does not receive an explicit mention, it could easily have been included here due to its ability to treat major causes of maternal, newborn, and child mortality, such as pneumonia and birth complications. Thoughtful placement of oxygen under investment case objectives will determine if and how many resources can be mobilized to support oxygen. It is worth calling out the use of "evidence based" in Bangladesh's investment case objective; strengthening health information systems will always support inclusion of interventions that stand to make positive impacts on health. If data can be routinely collected to support oxygen, those data will be available for oxygen advocacy in future cases when resource allocation is being decided.

Establishing a health financing working group that ties to the country platform and facilitates coordination between HFS and investment cases can allow civil society to engage high-level decision-makers such as technical leads in the ministry of finance. The HFS should also include a plan for engaging the private sector, which can mobilize resources and expand financing potential. Examples of private-sector participation are given in the box "Private-sector solutions in Nigeria."

Private-sector solutions in Nigeria

The Nigeria Service Delivery Innovation Challenge was a strategy used to incentivize participation by the private sector. Driven by a multi-stakeholder partnership, the challenge was for private-sector companies to present key solutions for strengthening RMNCAH+N outcomes through methods such as supply chain and logistics improvements and better training and knowledge sharing among health care workers. For more detail, see chapters four and five of Nigeria's 2017-2030 GFF investment case.²⁵

Policy can be leveraged to accrue financing support from donors, and civil society can inform policy formation through the GFF process. For example, health facility standards and norms often specify the minimum essential equipment required at different levels of the health system or facility types. Health care workers and hospital procurement officers can use these standards to make purchasing and placement decisions for medical devices. Additionally, comparing existing hospital equipment to a suggested baseline list can help facilities advocate for financial support from donors.

Recommendations for costing

Global Financing Facility investment cases require cost estimation in order to prioritize interventions, support planning, and estimate resource needs.²⁶ Costing is a detailed exercise that draws from existing data and informed assumptions for things including but not limited to equipment costs and quantity, population projections, service coverage levels, and average costs for labor. A complete costing of an intervention will also include associated costs such as trainings and monitoring and evaluation. The effort and time needed to collect and analyze these data make costing difficult for many countries.

Due to the complexity of costing, tools such as the World Health Organization's OneHealth software have been created to help decision-makers cost interventions. The box below illustrates Cambodia's approach to costing, an example of where this tool was used. In general, generating data and creating channels of communication with government decision-makers will help civil society advocate for medical oxygen during costing of GFF interventions.

Approaches to costing interventions

The paper "Estimating health plan costs with the OneHealth Tool, Cambodia"²⁷ provides an in-depth look at how Cambodia used the OneHealth Tool to estimate the five-year cost of implementation of health programs under the national strategic health plan. Described in detail are inputs used for the tool and key considerations for estimating available and needed resources. The paper also describes Cambodia's "bottom-up approach" to developing the health plan, which explains how strategic objectives guided collaborative costing and planning among the ministries of health and finance and other partners.



Cost categories for oxygen interventions

Listed below are broad cost categories for oxygen interventions. Advocates for including medical oxygen in investment cases can refer to these categories for discussion and involvement in financing interventions:

- Training programs, guidelines, advocacy tools, and support resources for pulse oximetry and oxygen therapy
- Procurement of new equipment such as pulse oximeters, oxygen concentrators, and ventilators
- Transport and delivery of newly procured devices or routinely managed inventory such as oxygen cylinders
- Human resources to administer oxygen therapy
- Maintenance and servicing of equipment
- Maintenance and improvement of infrastructure such as pressure swing adsorption plants, oxygen piping systems, and electricity to support oxygen equipment
- Management of inventory such as consumables, accessories, oxygen cylinders, and spare parts for devices
- Maintenance and improvement of information systems to track indicators related to oxygen therapy

Resource mapping

After costing interventions, resource mapping is a key next step to creating a complete financing plan. Advocates identifying areas from which resources, financial or otherwise, can be supplied should assess the following:

- Resources available for an intervention, including GFF grant money provided through the International Development Association and the International Bank for Reconstruction and Development, and financing available from bilateral donors, philanthropies, and the private sector.
- Resources available from predicted growth of the economy, government financing capacity, and the effect of budgets that prioritize health.
- Resources available from budget reorganization and prioritization of interventions.
- Availability of tools to track, map, and analyze resources. This becomes especially important for implementation as well as monitoring and evaluation.

Case implementation

Implementation of GFF investment cases extends over many years, and often there is flexibility in the types of activities that may support an intervention.²⁸ Therefore, even if an investment case does not explicitly mention oxygen therapy and pulse oximetry in prioritized interventions, there may be opportunity to weave them into implementation of related interventions. This section first describes key areas in which civil society can suggest inclusion of medical oxygen. These areas are identified because they offer flexibility to include medical oxygen during investment case implementation. Also included in this section are recommendations for results-based monitoring, interventions for medical oxygen, and two case studies from Tanzania and Uganda.

Key areas for medical oxygen inclusion

Strengthening health information systems

Investment case implementation is results driven and requires ongoing data collection and use of health information systems to track intervention progress. Strengthening these systems is often an intervention itself, or a subactivity, that can attract attention to oxygen therapy and pulse oximetry. Tangible ways to leverage health information systems as part of strengthening interventions to increase access to medical oxygen include the following:

- Health information systems can be used to track core indicators such as maternal and childhood mortality rates. Patients from these populations can be treated with oxygen therapy and monitored for hypoxemia (with pulse oximetry). Data on these indicators could help advocates to define oxygen needs and promote its capacity to save lives if access were scaled up.
- Resource mapping of oxygen equipment and health facility treatment capacity could reveal the best places to refer patients needing oxygen therapy. In other words, knowing where oxygen is available will save lives.
- Establishing or improving an equipment or inventory management system used to track availability of oxygen equipment, delivery interfaces, and consumables can help stakeholders to advocate for oxygen when there are gaps or shortages. A system can be scaled up to have various modalities, such as the ability to track demand or shortages, to manage orders, or to schedule maintenance of devices. These data can also inform procurement of appropriate equipment and consumables.
- Strengthening operations and logistics management information systems can help in managing supply chains.

Civil society partners, such as nongovernmental organizations, can provide technical assistance during

implementation, as well as assistance with coordination between government ministries and other groups. For example, VillageReach has worked with ministries of health to implement improved logistics management information systems.²⁹ Partnerships such as these increase transparency and effectiveness of information flow, as well as sharing of best practices.

Improving service provision

Procurement of medical devices and commodities and other improvements to service provision often are not specified in detail in an investment case, but they can be included during implementation activities and can make an impact on RMNCAH+N service delivery.

- Medical oxygen is versatile in its ability to increase treatment capacity across health areas, and thus to provide high investment value. Prioritizing procurement of oxygen equipment and commodities will improve service delivery and increase capacity to provide referral services. Mobilizing expertise and financial resources from the private sector may also be helpful in addressing supply-side and logistical challenges.
- Procuring supportive technologies such as electrical surge protectors and voltage stabilizers can minimize equipment damage from electricity outages and voltage surges and spikes. Avoiding these events will improve the lifespan of medical devices. Civil society and the private sector can also leverage their expertise by recommending technology based on suitability for certain settings.
- Providing health facility staff with training on equipment management or contracting for maintenance of medical equipment can improve availability of devices. Oxygen devices such as ventilators, concentrators, and pressure swing adsorption plants are examples of devices that require regular maintenance.

Implementing policy

Civil society expertise and insight can be vital for implementing sustainable and realistic policies.

- Some interventions might be implemented through changes to policy or national standards and norms. For example, updating the standard equipment list for each facility level will help to identify where there are gaps in access to pulse oximeters and oxygen delivery devices.
- Strengthening coordination between leadership at national and subnational levels, as well as instituting technical working groups or task forces dedicated to advocacy for safe oxygen administration, can support policy implementation.

Recommendations for results-based monitoring

A results-based monitoring and evaluation system is a critical component of an investment case; it makes clear links between priority interventions and intended results, creates actionable items, and defines measures by which to track implementation progress. The GFF recommends using a set of core indicators to monitor and evaluate health impact and financing. Core indicators for oxygen could include the following:

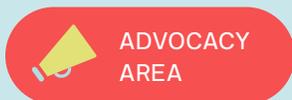
- Maternal mortality
- Neonate and newborn mortality
- Under-5 mortality
- Percentage of children and newborns with pneumonia who received oxygen therapy
- Percentage of women with emergency obstetric complications who received oxygen therapy
- Government spending on health
- Percentage of facilities reporting inventory stockouts of oxygen consumables and accessories

- Percentage of facilities certified under national standards and norms policy

For these indicators, consider how to collect baseline data, sources of data for routine collection, and the frequency of monitoring. A thoughtful investment case will describe clear methods of results monitoring and use of health information systems. Sometimes effective systems are not available and establishing a new method for an intervention may be required.

Recommendations for oxygen interventions

To help civil society and decision-makers think about what a tangible oxygen intervention might look like, this section summarizes the previous recommendations for building investment case content for the proactive inclusion of oxygen. It provides examples of medical oxygen interventions, and describes their value, potential cost categories, and methods for results monitoring. Advocates can pull from this information to support medical oxygen inclusion in investment cases.



Interventions for medical oxygen

Intervention 1: Improve training on oxygen delivery devices

Providing materials for training and tools to track who has been trained on medical devices will help in promoting safe oxygen delivery and good operating practices and will improve device lifespan.

Cost categories:

- Development of tools, training programs, guidelines, and support resources

Results-based monitoring:

- Number of trained staff
- Training procedure and resources available

Intervention 2: Improve awareness of the importance of oxygen therapy

Advocating for oxygen and changing national standards and norms regarding standard equipment for facilities, use, and regulations for manufacturers can expand medical oxygen access.

Cost categories:

- Development of tools, training programs, guidelines, and support resources
- Data collection and monitoring

Results-based monitoring:

- Stakeholder engagement across the public and private sectors
- Mobilization of domestic resources
- Tracking of funds allocated to oxygen
- Number of suppliers of oxygen equipment and accessories
- Number of oxygen production sources
- Updated standards and norms for oxygen policy

Intervention 3: Improve tracking of oxygen consumption

Tools developed for gathering data on oxygen consumption can help in determining the most cost-effective delivery methods and identifying facilities or areas with insufficient access or poor resupply.

Cost categories:

- Labor to collect and track data
- Development of tools, including databases

Results-based monitoring:

- Oxygen output for generators and concentrators
- Refill rates for oxygen cylinders
- Health statistics on patients receiving or not receiving oxygen therapy

Intervention 4: Implement health management information systems to track availability of oxygen access, delivery, and equipment

Lack of data on oxygen use is a huge barrier to access. Data can assist in gap analysis for oxygen access and resource mapping to identify areas for targeted interventions.

Cost categories:

- Labor to collect and track data
- Equipment for data collection and analysis

Results-based monitoring:

- Coverage of facilities across the country
- Numbers of functional medical oxygen devices and/or pulse oximeters
- Civil registration systems
- District health information software

Intervention 5: Improve supply chain management and inventory optimization for oxygen technology, consumables, and spare parts

Improving supply chain management and inventory optimization allows for reliable stocking of consumables that facilitate oxygen delivery to patients, and ensures availability of spare parts when medical devices need maintenance and repair.

Cost categories:

- Procurement of equipment
- Maintenance and improvement of essential infrastructure
- Transportation and delivery
- Inventory maintenance

Results-based monitoring:

- Tracking of human resources for health across the public and private sectors
- Performance-based contracting
- Refill rates and shipment fulfillment
- Coverage to show areas that pose logistical challenges
- Electricity availability and power quality

Intervention 6: Implement asset management systems to maintain oxygen delivery devices

Asset management systems can be used in the collection and tracking of data on oxygen delivery systems and pulse oximeters. These data can inform procurement, installation, training, use, maintenance, and disposal of assets.

Cost categories:

- Human resources
- Maintenance costs
- Development of tools and systems for asset tracking and maintenance

Results-based monitoring:

- Functional oxygen devices across the country
- Price information for oxygen devices
- Total cost of ownership for devices
- Maintenance data
- Supplier performance in providing spare and replacement parts

Intervention 7: Coordinate procurement of oxygen delivery devices

Coordinated purchasing in a decentralized health system can allow for better product selection and reduce prices by decreasing product variance in the market.

Cost categories:

- Data collection and monitoring
- Development of tools and systems

Results-based monitoring:

- Price tracking
 - Availability of devices, accessories, and consumables
 - Number of device variants within a market
 - Number of suppliers
-

CASE STUDY: Medical oxygen in Tanzania's investment case

The National Road Map Strategic Plan to Improve Reproductive, Maternal, Newborn, Child and Adolescent Health in Tanzania (2016 - 2020), *One Plan II* was built on the original 2008-2015 "One Plan" and on progress that had been made toward the Sustainable Development Goals related to RMNCAH+N.³⁰ The following section shows how Tanzania included medical oxygen interventions in this GFF investment case. It also notes how investment case interventions that do not explicitly mention oxygen can be leveraged during implementation to support oxygen inclusion.

Table 6 lists the strategic objectives in Tanzania's investment case, which support including oxygen supplies and pulse oximetry.

Table 6. Tanzania investment case direct links to oxygen.

Investment case strategic objective	Direct link to oxygen scale-up
Procure and supply essential medicines, equipment, and laboratory reagents for maternal health.	Oxygen is listed as an essential medicine by the World Health Organization ³¹ and therefore should fall under this first strategic objective, as should procurement of oxygen delivery equipment.
Maintain life-saving commodities stock for maternal health at least 80 percent of the time.	Many oxygen-related consumables such as masks, nasal cannula, and intubation accessories are required for administering oxygen therapy and need to be maintained through good stock-keeping practices.
Procure newborn resuscitation equipment so that 90 percent of newborns who do not spontaneously breathe at birth will have access to resuscitation.	The strategic objectives explicitly list resuscitation and oxygen concentrators as essential equipment, showing a direct plan to scale up oxygen access.
At least 90 percent of health facilities conducting deliveries have essential equipment (explicitly including oxygen concentrators and resuscitation).	

In addition to strategic objectives that allow oxygen supplies and equipment to be included in an investment case, other objectives are tangentially related to medical oxygen but still could be leveraged through the implementation process (Table 7).

Table 7. Tanzania investment case tangential links to oxygen.

Investment case strategic objective	Tangential link to oxygen scale-up
Increase the number of health care worker trainings and reviews of health facility capacity to provide integrated management of childhood illness.	During implementation, trainings could be mandated for health care workers who provide oxygen therapy in facilities. Scaling up availability of pulse oximetry in health facilities directly increases capacity to safely administer oxygen for treatment of childhood illnesses. For example, use of pulse oximetry could help to identify hypoxemia in children with pneumonia and lead to improved outcomes for the key indicator of reducing child mortality.
Increase the government budget for RMNCAH+N to 15 percent by 2020.	Increasing RMNCAH+N financing could be a major rallying point for advocates; oxygen interventions are high impact and cost-effective, conferring an outsized benefit on health from fewer financial resources.
Create an annual operational plan for implementation.	An annual operational plan could be a good entry point for implementing oxygen and pulse oximetry activities over the lifespan of the investment case.

Abbreviation: RMNCAH+N, reproductive, maternal, newborn, child, and adolescent health and nutrition.

Multi-stakeholder participation in Tanzania allowed for alignment under these strategic objectives and development of an investment case that addressed important issues in access to medical oxygen. With participation from stakeholders such as civil society, objectives in investment cases are more likely to be evidence based, high impact, accepted, and promoted by those involved in implementation.

CASE STUDY: Medical oxygen in Uganda’s investment case

Uganda’s Investment Case for Reproductive, Maternal, Newborn, Child and Adolescent Health (2016) is the only other GFF investment case that mentions oxygen and does so only once. The case states that “Oxygen cylinders or functioning central oxygen supply are available at 57% of the Regional Referral Hospitals (RRHs), 41% of the government hospitals, and 13% of HC IVs [level IV health centers]”, according to the most recent available data at the time of the development of this report.³² The narrative surrounding this statistic comments on the need for improved emergency services and services for emergency obstetric and neonatal complications. Oxygen is not mentioned again, despite being an integral therapy in both areas.

The proposed interventions in the conclusion of the investment case again miss a huge opportunity to include oxygen. The table below highlights proposed interventions and their details as a few places where further mention of oxygen could have added a level of specificity that could have helped achieve the desired outcomes.

Table 8. Uganda investment case interventions for oxygen inclusion

Intervention	Intervention details
Expanded package at level III health centers	<ol style="list-style-type: none">1. Integrated Management of Neonatal and Childhood Illnesses (IMNCI)2. Basic Emergency Obstetric and Newborn Care (bEmONC)
Comprehensive package at level IV centers and general hospitals	<ol style="list-style-type: none">1. Comprehensive Emergency Obstetric and Newborn Care (cEmONC)2. Inpatient management of severe newborn and child illnesses

*The table includes only relevant intervention areas where oxygen therapy interventions could have been specified.

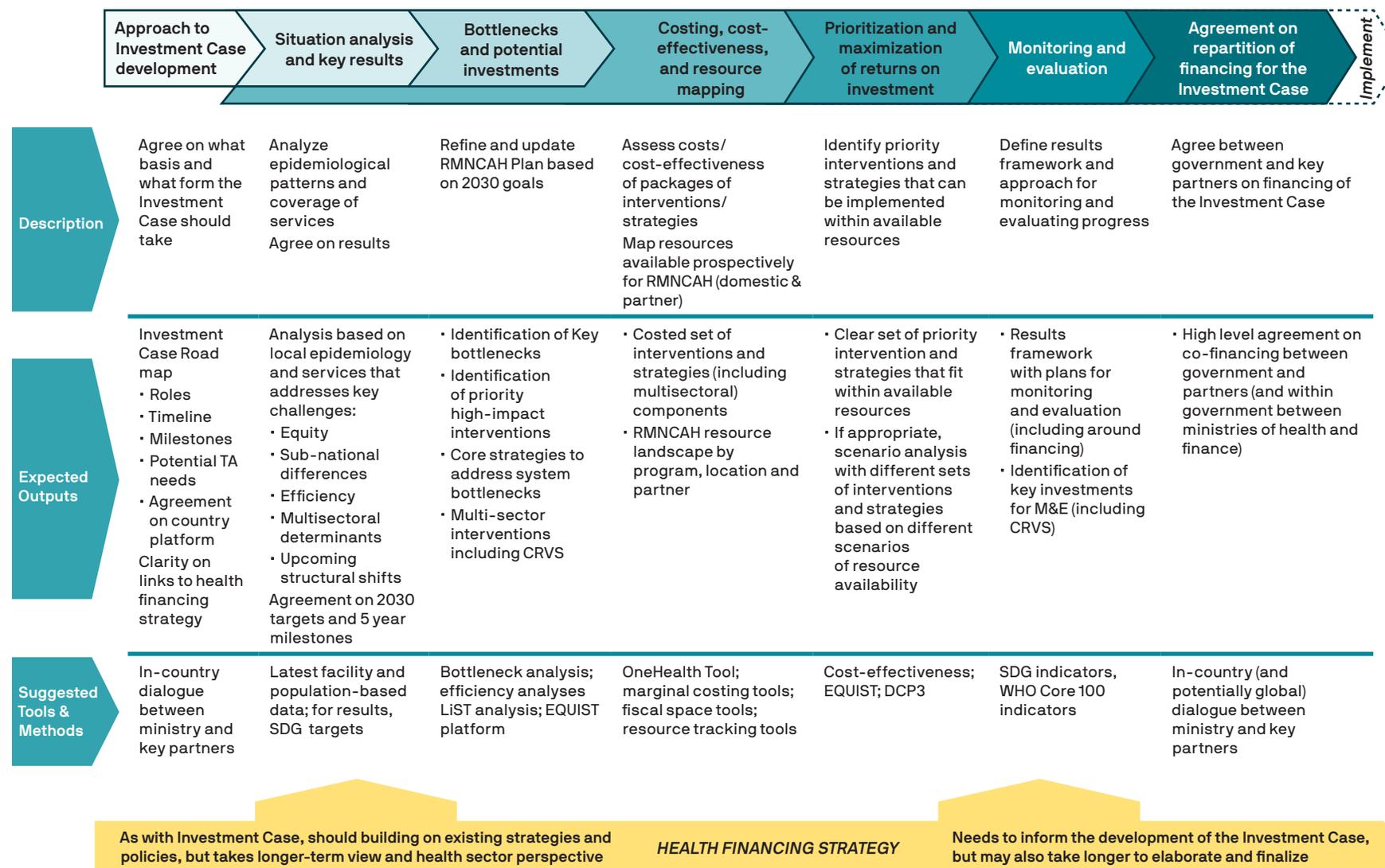
Integrated management of childhood illness should include ability to diagnose hypoxemia with pulse oximetry, as well as supply oxygen to children. Furthermore, oxygen is an essential medicine in many emergency obstetric and newborn care situations.

3. Conclusion

Improving access to medical oxygen is fundamental for improving reproductive, maternal, newborn, child, and adolescent health and nutrition in low- and middle-income countries. However, countries remain underresourced in terms of oxygen supplies and equipment, in part because stakeholders are not aware of the value of medical oxygen and its potential to improve health outcomes. For eligible countries, incorporating medical oxygen into GFF investment cases is a key opportunity to sustainably expand access. Civil society plays a key role in the GFF investment case development process to increase access to medical

oxygen—from generating evidence for decision-making and providing technical expertise, to mobilizing resources and engaging in health financing. Their influence can help align decision-makers with the needs of civil society, bolster high-level awareness of the value of investment in priority interventions, and strengthen implementation. This guide can help civil society, as well as decision-makers, better understand and advocate for inclusion of medical oxygen in GFF investment cases, both proactively in case development, as well as during implementation to leverage an existing investment case for medical oxygen scale-up.

Annex. Overview of the process and outputs toward a high-quality investment case



Abbreviations: CRVS, Civil Registration and Vital Statistics; DCP3, Disease Control Priorities Project; EQUIST, Equitable Impact Sensitive Tool; LiST, Lives Saved Tool; M&E, monitoring and evaluation; RMNCAH, reproductive, maternal, newborn, child, and adolescent health; SDG, Sustainable Development Goals; TA, technical assistance; WHO, World Health Organization.

Source: Global Financing Facility. *Guidance Note: Investment Cases* [working version]. February 9, 2016. https://www.globalfinancingfacility.org/sites/gff_new/files/Investment%20Case%20Guidance%20Note_EN.pdf.

References

1. Banke-Thomas A, Wright K, Sonoiki O, et al. Assessing emergency obstetric care provision in low- and middle-income countries: a systematic review of the application of global guidelines. *Global Health Action*. 2016;9:31180. doi:10.3402/gha.v9.31880.
2. Global Financing Facility website. About us page. <https://www.globalfinancingfacility.org/introduction>. Accessed December 21, 2020.
3. Global Financing Facility. *A Global Financing Facility in Support of Every Woman Every Child* [concept note]. September 25, 2014. https://www.globalfinancingfacility.org/sites/gff_new/files/documents/GlobalFinancingFacility_ConceptNote.pdf.
4. Global Financing Facility. *Guidance Note: Investment Cases* [working version]. February 9, 2016. https://www.globalfinancingfacility.org/sites/gff_new/files/Investment%20Case%20Guidance%20Note_EN.pdf.
5. Global Financing Facility. All 67 GFF eligible countries [table]. https://www.globalfinancingfacility.org/sites/gff_new/files/documents/GFF-eligible-countries.pdf.
6. Catto AG, Zgaga L, Theodoratou E, et al. An evaluation of oxygen systems for treatment of childhood pneumonia. *BMC Public Health*. 2011;11(Suppl 3):S28. <https://doi.org/10.1186/1471-2458-11-S3-S28>.
7. Global Financing Facility website. Resource Library page. <https://www.globalfinancingfacility.org/resource-library>. Accessed March 25, 2021.
8. PATH. *Oxygen is Essential: A Policy and Advocacy Primer*. Seattle: PATH; 2017. <https://www.path.org/resources/oxygen-is-essential-a-policy-and-advocacy-primer/>.
9. World Health Organization website. Pneumonia page. https://www.who.int/health-topics/pneumonia#tab=tab_1. Accessed March 25, 2021.
10. Duke T, Graham SM, Cherian MN, et al. Oxygen is an essential medicine: a call for international action. *International Journal of Tuberculosis and Lung Disease*. 2010;14(11):1362–1368. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2975100/>.
11. Bakare AA, Graham H, Ayede AI, et al. Providing oxygen to children and newborns: a multi-faceted technical and clinical assessment of oxygen access and oxygen use in secondary-level hospitals in southwest Nigeria. *International Health*. 2020;12(1):60–68. <https://doi.org/10.1093/inthealth/ihz009>.
12. Okello F, Egiru E, Ikiror J, et al. Reducing preterm mortality in eastern Uganda: the impact of introducing low-cost bubble CPAP on neonates <1500 g. *BMC Pediatrics*. 2019;19:311. <https://doi.org/10.1186/s12887-019-1698-x>.
13. Otiangala D, Agai NO, Olayo B, et al. Oxygen insecurity and mortality in resource-constrained healthcare facilities in rural Kenya. *Pediatric Pulmonology*. 2020;55(4):1043–1049. <https://doi.org/10.1002/ppul.24679>.
14. McCollum ED, Bjornstad E, Preidis GA, Hosseinipour MC, Lusefi N. Multicenter study of hypoxemia prevalence and quality of oxygen treatment for hospitalized Malawian children. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 2013;107(5):285–292. <https://doi.org/10.1093/trstmh/trt017>.
15. Baker T, Schell CO, Petersen DB, et al. Essential care of critical illness must not be forgotten in the COVID-19 pandemic. *The Lancet*. 2020;395(10232):1253–1254. [https://doi.org/10.1016/S0140-6736\(20\)30793-5](https://doi.org/10.1016/S0140-6736(20)30793-5).
16. PATH website. COVID-19 oxygen needs tracker page. <https://www.path.org/programs/market-dynamics/covid-19-oxygen-needs-tracker/>.
17. Duke T, Wandt F, Jonathan M, et al. Improved oxygen systems for childhood pneumonia: a multihospital effectiveness study in Papua New Guinea. *Lancet*. 2008;372(9646):1328–1333. doi:10.1016/S0140-6736(08)61164-2.
18. Burn SL, Chilton PJ, Gawande AA. Peri-operative pulse oximetry in low-income countries: a cost-effectiveness analysis. *Bulletin of the World Health Organization*. 2014;92:858–867. <https://www.who.int/bulletin/volumes/92/12/14-137315/en/>.
19. Groudine SB, Jasvinder S. Oxygen is cost effective. *Anesthesia & Analgesia*. 1995;81(4):891. https://journals.lww.com/anesthesia-analgesia/Fulltext/1995/10000/Oxygen_Is_Cost_Effective.57.aspx.
20. Global Financing Facility. *Civil Society Engagement Strategy*. Fifth Investors Group Meeting, April 24, 2017. https://www.globalfinancingfacility.org/sites/gff_new/files/documents/GFF-IG5-5%20CS%20Engagement%20Strategy.pdf.
21. Dennis S. *Civil Society Guide to the GFF*. Washington, DC: PAI; 2016. <https://pai.org/wp-content/uploads/2016/10/CS-GFF-Guide-2.pdf>.
22. Global Civil Society Coordinating Group for the Global Financing Facility. *Civil Society Engagement in the Global Financing Facility: A Briefing Document for Country CSO Focal Points*. <https://www.csogffhub.org/resources/civil-society-engagement-in-the-gff-a-briefing-document-for-country-cso-focal-points/>.
23. Global Financing Facility. *Guidance Note: Inclusive Multi-Stakeholder Country Platforms in Support of Every Woman Every Child*. June 26, 2018. https://www.globalfinancingfacility.org/sites/gff_new/files/documents/GFF%20Country%20Platform%20guidance%20note.pdf.

24. Government of the People's Republic of Bangladesh, Ministry of Health and Family Welfare (MOHFW). *Health, Nutrition and Population Strategic Investment Plan (HNPSIP) 2016 – 21: "Better Health for a Prosperous Society."* Dhaka: MOHFW; 2016. https://www.globalfinancingfacility.org/sites/gff_new/files/documents/Bangladesh-Investment-Case.pdf.
25. Federal Republic of Nigeria, Ministry of Health. *Federal Republic of Nigeria: Investment Case for Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition 2017-2030*. April 13, 2018. <https://www.globalfinancingfacility.org/federal-republic-nigeria-investment-case-reproductive-maternal-newborn-child-and-adolescent-health>.
26. Dutta A. The GFF investment case in priority countries: Why, what, how and beyond [PowerPoint presentation]. Washington, DC: Health Policy Plus (Palladium); November 29, 2016. https://www.equist.info/files/general_files/GLB_29558glb-30240gff-rmncah-investment-case.pdf.
27. Barker Cantelmo C, Takeuchi M, Stenberg K, et al. Estimating health plan costs with the OneHealth Tool, Cambodia. *Bulletin of the World Health Organization*. 2018;96:462–470. <http://dx.doi.org/10.2471/BLT.17.203737>.
28. Global Financing Facility. *GFF Country Implementation Guidelines*. Washington, DC: International Bank for Reconstruction and Development/Global Financing Facility; 2019. https://www.globalfinancingfacility.org/sites/gff_new/files/documents/GFF-Country-Implementation-Guidelines-En.pdf.
29. VillageReach website. OpenLMIS: Open source software for managing health supply chains page. <https://www.villagereach.org/impact/openlmis/>. Accessed November 12, 2020.
30. United Republic of Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC). *The National Road Map Strategic Plan to Improve Reproductive, Maternal, Newborn, Child and Adolescent Health in Tanzania (2016 - 2020), One Plan II*. Dar es Salaam: MOHCDGEC; 2016. <https://www.globalfinancingfacility.org/national-road-map-strategic-plan-improve-reproductive-maternal-newborn-child-adolescent-health>.
31. World Health Organization (WHO). *WHO Model Lists of Essential Medicines: 21st List*. Geneva: WHO; 2019:1–2. <https://www.who.int/medicines/publications/essentialmedicines/en/>.
32. The Republic of Uganda, Ministry of Health. *Investment Case: Reproductive, Maternal, Newborn, Child and Adolescent Health Sharpened Plan for Uganda 2016/17-2019/20*. April 2016, pg. 17. <https://www.globalfinancingfacility.org/investment-case-reproductive-maternal-newborn-child-and-adolescent-health-sharpened-plan-uganda>. Accessed March 2, 2021.

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oxygen@path.org