MINISTRY OF HEALTH
REPUBLIC OF GHANA
FREEDOM AND JUSTICE

NATIONAL MEDICAL OXYGEN POLICY







JANUARY 2023

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FOREWORD

Medical oxygen is an essential medicine used to manage a wide range of diseases where hypoxemia (insufficient oxygen in the blood), arises as a complication. The only treatment for hypoxemia is medical oxygen therapy. Medical oxygen therapy, also known as supplemental oxygen therapy, is the use of inhaled oxygen as an essential medicine in medical treatment. The purpose of supplying additional oxygen is to eliminate hypoxemia that may lead to tissue hypoxia and death. Oxygen supplementary treatment works by increasing oxygen content in the blood in patients with low levels of blood, in an attempt to oxygenate the vital organs in the body and avoid tissue hypoxia and death.

In Ghana, hypoxemia-related morbidity and mortality is a common event, which was exacerbated by the outbreak of the COVID-19 pandemic. In 2020, institutional deaths associated with respiratory diseases contributed to 15.5% of deaths across all ages. For children under five years, 16.5% died due to respiratory diseases. It is reported that there are about 5,000 pneumonia-related deaths annually in new-born and children younger than 5 years in Ghana (the third highest cause of death in this age group). Studies have shown that improved supply and utilization of oxygen in the healthcare setting has the potential to reduce mortality from childhood pneumonia by 35%. In summary, the ability to quickly detect and treat hypoxemia is critical to patient care.

COVID-19 pandemic brought to light the inadequacies in the production, supply, distribution, and use of medical oxygen globally, regionally, and in Ghana specifically. It has accelerated global demand for medical oxygen by 3-7 folds and made the delivery of oxygen supplies more urgent than ever.

It is against this background that, the Ministry of Health, its Agencies, Development Partners and Key Stakeholders (including the Private Sector) have come together to develop the National Medical Oxygen Policy, to establish the framework and lay the foundation for a national strategy for scaling-up production, availability, access, and use of medical oxygen across the country.

As the Minister responsible for Health, I have a strong belief that if this policy is implemented effectively by all sector players, Ghana will reduce drastically hypoxemia related deaths especially pneumonia to the barest level.

Kwaku Agyeman-Manu (MP)
Minister for Health

ACKNOWLEDGEMENT

The National Medical Oxygen Policy has seen the light of day because of collaborative efforts of the Ministry of Health and its Agencies, Development Partners, and other Key Stakeholders ***(refer to APPENDIX II: Table 12D)***.

The Ministry of Health would like to appreciate the Minister for Health, Honourable Kwaku Agyeman-Manu; the Deputy Ministers for Health, Honourable Tina Mensah and Honourable Mahama Asei Seini, and the Chief Director, Kwabena Boadu Oku-Afari, and all Heads of Agencies for their strategic leadership.

Our deepest gratitude also goes to the Director, Policy Planning Monitoring and Evaluation Directorate (PPMED); Director, Infrastructure Directorate; Director, Technical Coordination; Head, Biomedical Engineering Unit as well as the Technical Working Group (TWG) members ***(refer to APPENDIX II: Table 11C)*** who who provided the technical guidance in the development of this policy and the Technical Working Group and all stakeholders whose effort have resulted in the development of this policy document.

We also wish to acknowledge the efforts of various institutions such as UNICEF and Clinton Health Access Initiative (CHAI) for their financial and technical assistance to the process.

ACRONYMS

AfCFTA	African Continental Free Trade Area
AGI	Association of Ghana Industries
ASU	Air Separation Unit
AU	African Union
BEU	Biomedical Engineering Unit
CHAG	Christian Health Association of Ghana
CHAI	Clinton Health Access Initiative
CHPS	Community-Based Health Planning and Services
CMA	Common Management Arrangement
CPESDP	Coordinated Programme of Economic and Social Development Policies
DP	Development Partners
EPA	Environmental Protection Agency
FBO	Faith Based Organization
FDA	Food and Drug Authority
GHS	Ghana Health Service
GMP	Good Manufacturing Practices
GoG	Government of Ghana
GPP	Good Production Practices
GSA	Ghana Standards Authority
HCW	Healthcare Worker
HeFRA	Health Facilities Regulatory Agency
HMIS	Health Management Information System
ICU	Intensive Care Unit
ID	Infrastructure Directorate
IHR	International Health Regulations
LMIS	Logistics Management Information System
LOX	Liquid Oxygen
LPM	Litres Per Minute
MDAs	Ministries, Departments and Agencies
MELR	Ministry of Employment and Labour Relations
MoE	Ministry of Energy
MoF	Ministry of Finance
MoH	Ministry of Health
MoI	Ministry of Information
MoTI	Ministry of Trade and Industry
NCCE	National Commission for Civic Education
NGO	Non-Governmental Organization
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme

ACRONYMS

NHP	National Health Policy
NICU	Neonatal Intensive Care Unit
Nm^3/hr	Normal Cubic Meter/Hour
NSAP	National Strategic Action Plan
O_2	Oxygen (Molecule)
PHC	Primary HealthCare
PPM	Planned Preventive Maintenance
PPMED	Policy Planning, Monitoring and Evaluation Directorate
PSA	Pressure Swing Adsorption
QoL	Quality of Life
SDG	Sustainable Development Goals
SOP	Standard Operating Procedure
UHC	Universal Health Coverage
UN	United Nations
UNICEF	United Nation International Children's Emergency Fund
WFP	World Food Programme
WHO	World Health Organization

GLOSSARY

Agency of MoH	Authorities/ institutions established by law that work directly or indirectly under MoH e.g., GHS, FDA, HeFRA, GSA, etc.
Asphyxia	The condition arising when the body is deprived of oxygen leading to suffocation, unconsciousness, and even death
Collaborators of MoH	International organizations that supports the activities of MoH e.g. UNICEF, CHAI, WHO, GHS, GSA, FDA etc.
Hypoxemia	Insufficient or low level of oxygen in the blood
Medical oxygen	Oxygen gas without contaminants which is classified as essential medicine used to treat or prevent hypoxia.
Medical oxygen systems	Systems set up for the Production/ manufacturing, procurement, installation, distribution/supply, transportation, and the required expertise to ensure the availability of quality medical oxygen for health care delivery
Oxygen flow rate	The flow rate of oxygen required to achieve specific saturation
Oxygen source	Cylinders, concentrators, plants
Private sector	Consist of private bodies including the private health sector
Pulse oximeter	A device for measuring oxygen saturation level in the body
Quality of life	Individuals' standard of health and comfort

1.0 CHAPTER 1 - INTRODUCTION

1.1 BACKGROUND

Medical oxygen is an essential medicine used to manage a wide range of diseases where hypoxemia (insufficient oxygen in the blood), arises as a complication. The only treatment for hypoxemia is medical oxygen therapy. Medical oxygen therapy, also known as supplemental oxygen therapy, is the use of inhaled oxygen as an essential medicine in medical treatment. The purpose of supplying additional oxygen is to eliminate hypoxemia that may lead to tissue hypoxia and death. Oxygen supplementary treatment works by increasing oxygen content in the blood in patients with low levels of blood, in an attempt to oxygenate the vital organs in the body and avoid tissue hypoxia.

Medical oxygen is crucial and essential for the treatment of patients with diseases that affect lung function, shortness of breath, or difficulty in breathing which hampers the supply of oxygen to various parts of the body. This includes pneumonia, birth asphyxia, sepsis, malaria, asthma, heart disease and lung diseases, amongst others. Pneumonia is a major cause of hypoxaemia leading to death among all age groups. Pneumonia resulted in 1.4 million deaths globally among all age groups in 2010 (7% of the world's yearly total) and 3.0 million deaths in 2016 (the 4th leading cause of death in the world[1][2]. In 2015, pneumonia was responsible for the deaths of 473,000 African children under the age of five years old.[5] In Sub-Saharan Africa, there are an estimated four million cases and 200,000 deaths in adult populations per year.[3] .

It is estimated that 20–40% of these deaths could be prevented with the availability of oxygen therapy[4]. Oxygen is used across all levels of the healthcare system; it is essential in safe surgery, anaesthesia, obstetric, and emergency care, within several units of the health system including Neonatal (New-Born) Intensive Care Units (NICU), Paediatric Units, General wards, Emergency transport (Ambulance), Delivery Units, and Intensive Care Units (ICUs).

The COVID-19 pandemic brought to bear, the inadequacies in the production, supply, distribution and use of medical oxygen globally, regionally, and in Ghana specifically. It has accelerated global demand for medical oxygen by 3-7 folds and made the delivery of oxygen supplies more urgent than ever.[5]

Ghana still faces a high burden of deaths due to lack of access to oxygen. Despite numerous World Health Organization (WHO) guidelines, emphasising the importance of oxygen across the continuum of care, availability and supply of medical oxygen to patients has been inadequate, especially to those who need it most.

Specific barriers to availability and supply of oxygen resources in Ghana include limited production capacity, inefficient logistics management (especially transportation), limited oxygen cylinders and high production cost. Additionally, an erratic payment system, inadequate human resources capacity (for use, maintenance, and management), inadequate technical training, poor quality and unreliable power supply, high electricity tariffs, erratic supply chain systems and logistics, few medical oxygen-producing plants, and poor maintenance including spare parts availability compound the issues.

Additionally, the availability of medical oxygen in public and private health facilities as well as pre-hospital care services, highly depends on a facility's geographic location and their proximity to oxygen generation sources. In urban centres and high -population regions, medical oxygen is more readily available whereas in remote areas, supply chain and logistical challenges along with infrastructural limitations (e.g., electricity availability and road network) limit access to medical oxygen. There is therefore the need to address the availability of oxygen delivery and monitoring devices as vital health commodities and as part of the measures to scale up medical oxygen access and use in the country.

To mitigate these aforementioned challenges, there have been multiple initiatives by the Ministry of Health, its Agencies and Partners, the Private Sector, and other health care providers (including the private and Quasi-Governmental providers) to improve medical oxygen availability in the country. These initiatives have included the installation of onsite Oxygen Pressure Swing Adsorption (PSA) plants, procurement, and distribution of medical oxygen and therapy commodities to health facilities and ambulances.

1 https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death, ^ Jump up to:a b "The top 10 causes of death". www.who.int. Retrieved 2018-12-07.

2 Ruuskanen O, Lahti E, Jennings LC, Murdoch DR (April 2011). "Viral pneumonia". Lancet. 377 (9773): 1264–75. doi:10.1016/S0140-6736(10)61459-6. PMC 7138033. PMID 21435708.

3 Child health". WHO | Regional Office for Africa. Retrieved 2020-11-12

4 The life-saving power of medical oxygen | by World Health Organization | World Health Organization, https://medium.com/who/the-life-saving-power-of-medical-oxygen-9f8385c4c613. Date accessed: 25th May 2021

5 Based of off various WHO clinical guidelines

Additionally, the government and its development partners have led the procurement of portable oxygen concentrators and cylinders across all levels of healthcare, especially referral hospitals at the height of the COVID-19 pandemic. Oxygen concentrators and cylinders remain the most common modalities of oxygen provision to patients in Ghana.

Despite these efforts, most health facilities and ambulances in the country have limited availability of a continuous source of medical oxygen. It is therefore appropriate that the Ministry of Health ensures that medical oxygen production and access is adequately funded, always available and captured in health plans and budgets.

This National Medical Oxygen Policy, therefore, seeks to establish the framework and lay the foundation for a national strategy for scaling-up production, availability, access and use of medical oxygen across the country. It also lays the foundation for operational policies and technical guidelines for all stakeholders within the health sector for both public and private alike.

1.2 SITUATIONAL ANALYSIS

In Ghana, hypoxemia-related morbidity and mortality is a common event, which was exacerbated by the outbreak of the COVID-19 pandemic. In 2020, institutional deaths associated with respiratory diseases contributed to 15.5% of deaths across all ages. For children under five years, 16.5% died due to respiratory diseases. It is reported that there are about 5,000 pneumonia-related deaths annually in new-born and children under 5 in Ghana (the third highest cause of death in this age group)[6]. Studies have shown that improved supply and utilization of oxygen in the healthcare setting has the potential to reduce mortality from childhood pneumonia by 35%[7]. In summary, the ability to quickly detect and treat hypoxemia is critical to patient care.

After the declaration of the novel COVID-19 as a pandemic by the President of the Republic of Ghana in March 2020, Ghana experienced three waves of COVID-19 infections within 18 months: from May to August 2020, and again from January to March 2021, then July to September 2021. The second and third waves were characterized by an increase in severe and critical cases of COVID-19 infections. This led to increase in demand for medical oxygen therapy.

6 Mercy Abbey, Seth Kwaku Afagbedzi, Jane Afriyie-Mensah, David Antwi-Agyei, Kirchuffs Atengble, Ebenezer Badoe, James Batchelor, Eric S Donkor, Reuben Esena, Bamenla Q Goka, Michael G Head, Appiah-Korang Labi, Edmund Nartey, Isabella Sagoe-Moses, Edem M A Tette, Pneumonia in Ghana—a need to raise the profile, International Health, Volume 10, Issue 1, January 2018, Pages 4–7, https://doi.org/10.1093/inthealth/ihx062

7 Duke T et al. Improved oxygen systems for childhood pneumonia: a multihospital effectiveness study in Papua New Guinea. Lancet 2008; 372(9646):1328-1333.

The second and third waves resulted in an increase in the case fatality rate from 0.6% in December 2020 to 2.4% in September 2021 ***(Figure 1)***.
During these periods, the demand for medical oxygen was very high with reported shortages in all healthcare facilities. Patient admissions into healthcare facilities for COVID-19 treatment were largely influenced by availability of medical oxygen.

In line with the country's Strategic Response Plan for COVID-19, which aimed to: contain the virus; slow down and manage community spread; provide medical and psychosocial care for COVID-19 cases; and minimize the impact on social and economic life, it was imperative for Ghana to adequately prepare for a surge. The country's experience during the second and third waves illustrated the growing demand for therapeutics, including medical oxygen.

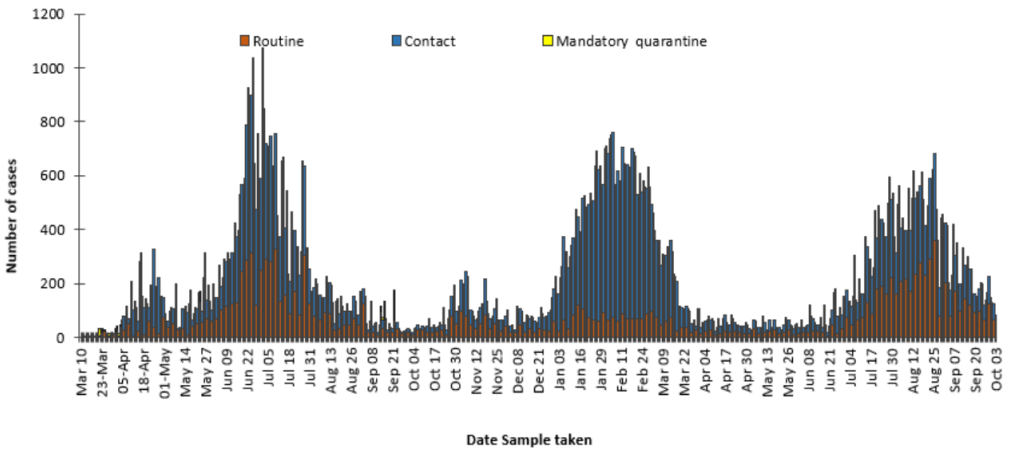

Figure 1- COVID-19 related deaths in Ghana; March 2020-September 2021

Limited access to and use of effective diagnostic tools and medical oxygen for diagnosis, treatment and management of hypoxemia, as well as the absence of supportive clinical governance and equipment maintenance systems, were prevalent in Ghana. Diagnostic tools such as pulse oximeters, which support the diagnosis of hypoxemia, and monitors the patients' response to oxygen therapy, were also not readily available.

1.2.1 OXYGEN DELIVERY METHODS

Oxygen delivery methods – sources and storage modalities - include oxygen cylinders, concentrators and oxygen plants ***(Table 1)***. In Ghana, there are four main oxygen supply methods: onsite oxygen production plants, liquid oxygen tanks, pressurised oxygen cylinders and portable oxygen concentrators. Health facilities across the country use a combination of these medical oxygen supply options to ensure both access and cost-effectiveness.

Table 1 - Medical Oxygen Production and Storage Equipment

	Cylinders	Concentrators	Oxygen Plant	Liquid Oxygen Tank
Images				
Description	High-pressure gas supplied via portable canisters delivered to facilities	Self-contained, electrically powered, bedside medical device designed to deliver concentrated oxygen via PSA technology	Oxygen is provided via larger PSA Plant and is delivered to facilities via direct piping onsite or via cylinders	Bulk liquid oxygen is generated offsite, stored in a large tank, and supplied to a facility either through a facility's pipeline system or high-pressure gas cylinders (after conversion and filling)

Table 1 (cont.) - Medical Oxygen Production and Storage Equipment

	Cylinders	Concentrators	Oxygen Plant	Liquid Oxygen Tank
Images				
Optimal use case	Facilities without steady electricity but reachable via a cylinder transport mechanism	Facilities with steady electricity or without easy access to cylinder transport	Higher-level facilities with substantial demand and with steady electricity	Higher-level facilities where power is unreliable and/or space is not available for a PSA plant.
Advantages	• No associated running cost • No need for electricity • Delivery flow up to 25 LPM	• Lower running cost, but the limited output • Can serve several patients (if flow requirements are low)	• Cost-effective for larger facilities • High-pressure oxygen can be installed in remote locations • Potential for income generation	• Cost-effective for larger facilities • High-pressure oxygen • Nominal electricity needed (for controls and alarms only)
Drawbacks	• High costs associated with transport • Can be hard to move within a facility • Cylinder presents associated risks (weight and pressure)	• Requires steady power • Service and spare parts needed	• The high capital investment needed • Continuous electricity needed • Service and spare parts needed • The tank has associated risk	• Requires contract for regular refilling • Maintenance requirements for piping • The tank has associated risk

1.2.2 STRUCTURE OF THE HEALTH SYSTEM AND CRITICAL ISSUES

The Ministry of Health (MoH), like other Ministries, Departments, and Agencies (MDAs) takes its mandate from the Civil Service Act, 1993 (PNDCL 327) for policy formulation, monitoring, and evaluation, resource mobilization and allocation, financing, health training, health research and regulation of the health sector. This mandate is performed through the public agencies under the MoH, other public agencies under other ministries and private not-for-profit and private-for-profit organisations.

Service delivery public agencies and organisations under the MoH include Ghana Health Service, National Blood Service, National Ambulance Service, Saint John's Ambulance Brigade, Ghana Red Cross Society, Komfo Anokye Teaching Hospital, Korle-Bu Teaching Hospital, Cape Coast Teaching Hospital, Tamale Teaching Hospital and Ho Teaching Hospital. Other public agencies which are not under the MoH include the Quasi-Governmental Health Institutions. Not-for-profit private sector service providers include the Christian Health Association of Ghana (CHAG) and the Ahmadiyya Muslim Mission Health Services, and the Society of Private Self-Financing Facilities which are for profit.

The Food and Drugs Authority, Health Facility Regulatory Agency, Mental Health Authority, Traditional and Alternative Medicine Practice Council, Medical and Dental Council, Allied Health Professions Council, Nursing and Midwifery Council, Psychology Council, Pharmacy Council, Ambulance Council, Mortuaries and Funeral Facilities Agency, are some regulatory agencies involved in regulating aspects of the health sector. The National Health Insurance Authority was established to attain universal health insurance coverage for all people living in Ghana and to provide financial access to healthcare services to persons covered by the National Health Insurance Scheme.

The health system operates at the national, regional, district, sub-district, and community levels. The apex facility along the continuum of care is at the tertiary level, represented by Teaching Hospitals, while the regional hospitals are the secondary level facilities with the district hospital serving as the primary level of care. The primary level of the healthcare system includes: 1) Community-Based Health Planning and Services (CHPS) serving as the close-to-client and first point-of-call facility: 2) the sub-districts with the Health Centres as the point-of-care at the sub-district level; and finally 3) the district hospital or Polyclinic as the apex point of care at the district level.

As of December 2020, Ghana had 8,887 health facilities, which by ownership are categorised as follows: 7,216 public health facilities (of which 79 are Quasi-Governmental facilities), 280 private not-for-profit, and 1,331 Private Self-Financing for profit. These 8,887 health facilities are further categorised by levels of care: 4 Special Hospitals (1 Quaternary and 3 mental Hospital), 5 Tertiary (Teaching) hospitals, 7 Secondary Referral/Regional Hospitals, 478 Primary Referral hospitals (Public and Private), 992 Polyclinics and Health Centres, 5,998 CHPS Compounds, 1,403 Maternity Homes and Clinics.

Generally, the health of the population has improved over the years. Life expectancy has improved from 57 years in 1990 to 64 years in 2017. In the same vein, the Maternal Mortality Ratio dropped to 310 per 100,000 live births in 2017 from 315 per 100,000 in 2007; the Under-5 mortality rate which in 2005 was 72 per 1000 live births, has reduced to 56 per 1000 live births in 2017. These outcome indicators show positive returns on health investments made over the years. However, the impact of COVID-19 on these health indices is yet to be ascertained.

1.2.2.1 SYSTEMIC CHALLENGES

Systemic challenges remain, including

1. Inadequate and inequitable distribution of human resources;
2. Inadequate health infrastructure;
3. Inadequate sustainable financing;
4. Lack of comprehensive general data governance and reporting system;
5. Cross-programmatic inefficiencies;
6. Low compliance to regulations and standards; and
7. Obsolete medical equipment and weak framework for medical oxygen.

These challenges affect the ability of the health system to provide responsive and quality care to the population who need it.

1.2.3 PRODUCTION AND SUPPLY LANDSCAPE

As of August 2021, twenty-seven (27) known commercial oxygen producers have set up Oxygen Production Plants in Ghana ***(refer to table 2)***, out of which seventeen (17) installed Cryogenic technology plants to produce oxygen at 99.5% whiles nine (9) had PSA technology plants installed to produce oxygen at 95% (or 93 ±3%). Information gathered indicated that twelve (12) of the oxygen producers have stopped production due to several reasons of which high electricity tariff was the major reason. Ten (10) of the remaining fifteen (15) producers in operation were using Cryogenic technology.

Among the fifteen (15) active oxygen producers in operation, three (3) were steel production companies whose core mandate was to produce oxygen for refining steel. However, due to the spike in the oxygen demand during the COVID-19 pandemic, the steel production companies dedicated some of their oxygen plants to supply health institutions with medical oxygen. These steel production companies supplied oxygen to the health facilities for either at no cost or at a subsidized rate. The rest of the commercial oxygen producers supplied oxygen to health facilities at a commercial rate.

Air Liquide has been the leading and the longest-serving oxygen production company in Ghana. It was the only liquid oxygen producing company in Ghana and the sub-region. Unfortunately, the company relocated its in-country Cryogenic Liquid Oxygen Production Plant to Nigeria in 2017 due to high electricity tariffs and unstable power supply in Ghana. Currently, the company imports liquid oxygen from Cote D'Ivoire, which is stored in a Vacuum Insulated Evaporator (VIE) tank in its factory and refills cylinders for distribution in Ghana. Air Liquide's experience brings to the fore some of the challenges with commercial oxygen production in Ghana.

The challenges of the commercial oxygen production include:

- High electricity tariffs and unstable power supply for commercial production of medical oxygen;
- High water tariffs for commercial production of medical oxygen;
- High tax regime on the sale of medical oxygen, production equipment and spare parts;
- Limited in-country maintenance capacity for medical oxygen systems and equipment;
- Delayed, unreliable and unpredictable payment system especially from the public health facilities;
- High cost of transportation for medical oxygen cylinders and tanks;
- Non-standardized and unapproved tariffs for cost recovery for medical oxygen administered to patients;
- Inconsistent supply of medical oxygen by vendors;
- High debt burden from purchases of medical oxygen;
- Lack of or insufficient oxygen piping network systems coupled with leakages;
- Increase in demand due to COVID-19 pandemic;
- High cost of medical oxygen; and
- Inadequate quantity of medical oxygen cylinders for refilling.

Table 2 - Oxygen Production Companies in Ghana and their Production Capacities as of August 2021

ID	Company	Location	Production Method	Capacity (Nm^3/hr) (Medical Oxygen)	Remarks
1	RikAir	Accra	PSA	15	Active
2	Indo-Ghana Industries Ltd	Accra	ASU	100	Active
3	PanAir	Accra	ASU	100	Active
4	Atmo Gas	Accra	PSA	25	Active
5	Takoradi Gas Ltd	Takoradi	ASU	300	Active
6	Oxygen Dynamics	Kumasi	PSA	30	Active
7	Apex Global Ltd	Kumasi	ASU	120	Active
8	Oxygen Dynamics	Kumasi	PSA	30	Active

ID	Company	Location	Production Method	Capacity (Nm^3/hr) (Medical Oxygen)	Remarks
9	Airmate Co. Ltd	Kumasi	ASU	120	Active
10	Christy Air	Accra	ASU	100	Active
11	Tamale Air (Along Kintampo road)	Tamale	ASU	100	Active
12	Air Liquide	Tema	LOX Imports	875	Active (Importing)
13	Tema Steel	Tema	ASU	350	Active (Steel)
14	Ferro Fabrik	Tema	ASU	600	Active (Steel)
15	B5 Plus	Tema	ASU	600	Active (Steel)
16	RikAir	Kpone	ASU	50	Not in service
17	Kumoxygen	Accra	PSA	30	Not in service
18	Baako's Oxygen Ltd	Accra	PSA	40	Not in service
19	Tamale (Along Sarlugu road)	Tamale	PSA	22	Not in service
20	OxyAir Ltd	Accra	PSA	100	Not in service
21	Western Castings	Accra	ASU	200	Not in service
22	Joku Maks	Kumasi	PSA	100	Not in service
23	Western Castings	Kumasi	ASU	200	Not in service
24	Wahome Steel	Tema	ASU	160	Not in service
25	Western Castings	Tema	ASU	200	Not in service
26	Park Air	Tema	ASU		Not in service
27	Western Castings	Takoradi	ASU	200	Not in service

In addition to the commercial oxygen production in the country, twenty-seven (27) hospitals (both public and private) had installed Pressure Swing Adsorption (PSA) Plants for in-hospital medical oxygen production ***(refer to Table 3 below)*** and deliver the oxygen directly to the clinical areas through the central oxygen piping system within the respective hospitals, as of August 2021. The number of hospitals with the oxygen producing plants is increasing. As at the year 2000, there were only three (3) hospitals(KBTH, KATH and CCTH) that had onsite oxygen producing plants. These plants have different capacities and are at varying levels of functionality. The hospitals that do not have the onsite oxygen producing plant depend solely on the supply of oxygen in cylinders from the commercial market.

Table 3 (con.t) - Health Facilities with onsite Medical Oxygen Production Plants in Ghana

HOSPITALS WITH OXYGEN PRODUCTION PLANTS					
ID	**Region**	**Facility**	**Level**	**Capacity (Nm^3/hr)**	**Remarks**
1	Accra	Korle Bu Teaching Hospital	Tertiary	134.8	Active
2	Accra	Ga East Municipal Hospital	Primary	27.6	Active
3	Accra	Shai Osudoku Hospital, Dodowa	Primary	12	Active
4	Accra	Trust Mother & Child Hospital in Osu	Primary	8	Active
5	Accra	Bank of Ghana Hospital at Cantonment	Primary	8	Active
6	Accra	International Maritime Hospital, Tema	Primary	15	Active

Table 3 (cont.) - Health Facilities with onsite Medical Oxygen Production Plants in Ghana

HOSPITALS WITH OXYGEN PRODUCTION PLANTS					
ID	**Region**	**Facility**	**Level**	**Capacity (Nm3/hr)**	**Remarks**
7	Accra	37 Military Hospital, Accra	Primary	52	Active
8	Accra	Greater Accra Regional Hospital	Secondary	90	Active
9	Accra	University of Ghana Medical Centre, Legon	Tertiary	25	Active
10	Accra	UN Field Hospital (WHO-WFP)	Primary	90	Active
11	Ashanti	Komfo Anokye Teaching Hospital	Tertiary	120 (2x60)	Active
12	Ashanti	Tepa Hospital	Primary	15.6	Active
13	Ashanti	Bekwai Hospital	Primary	13.4	Active
14	Ahafo	Nsawkaw Hospital	Primary	15.6	Active
15	Central	Cape Coast Teaching Hospital	Tertiary	20	Active
16	Central	Twifo Praso Hospital	Primary	15.6	Active
17	Eastern	Koforidua Regional Hospital	Secondary	20	Active
18	Eastern	Somanya Hospital	Primary	9.4	Active

Table 3 (cont.) - Health Facilities with onsite Medical Oxygen Production Plants in Ghana

HOSPITALS WITH OXYGEN PRODUCTION PLANTS					
ID	**Region**	**Facility**	**Level**	**Capacity (Nm^3/hr)**	**Remarks**
19	Northern	Tamale Teaching Hospital	Tertiary	20	Active
20	Northern	Tolon Hospital	Primary	9.4	Active
21	North East	Nalerigu Baptist Hospital	Primary	30	Active
22	Western	Tarkwa Municipal Hospital	Primary	10	Active
23	Upper West	Upper West Regional Hospital	Secondary	36	Active
24	Savannah	Buipe Hospital	Primary	13.4	Active
25	Savannah	Sawla Hospital	Primary	9.4	Active
26	Savannah	Damango Catholic Hospital	Primary		Inactive
27	Volta	Weta Hospital	Primary	9.4	Active
TOTAL Capacity =				**829.6 m^3/hr**	

As demonstrated in the ***Table 3 above and the Figure 2*** below, a disproportionate number of these facilities, sixteen (16) constituting 61.5% are located in the southern zone compared to four (4) constituting 15.4% in the middle zone and six (6) constituting 23.1% in the northern zone. The installed capacities of the onsite oxygen production plants range from about 8m3/hr to around 140m3/hr. Comprehensive data on oxygen plants, oxygen equipment inventories and maintenance records were limited. Information on oxygen resources should be established or improved for coordination of the supply and distribution of life-saving oxygen for patients.

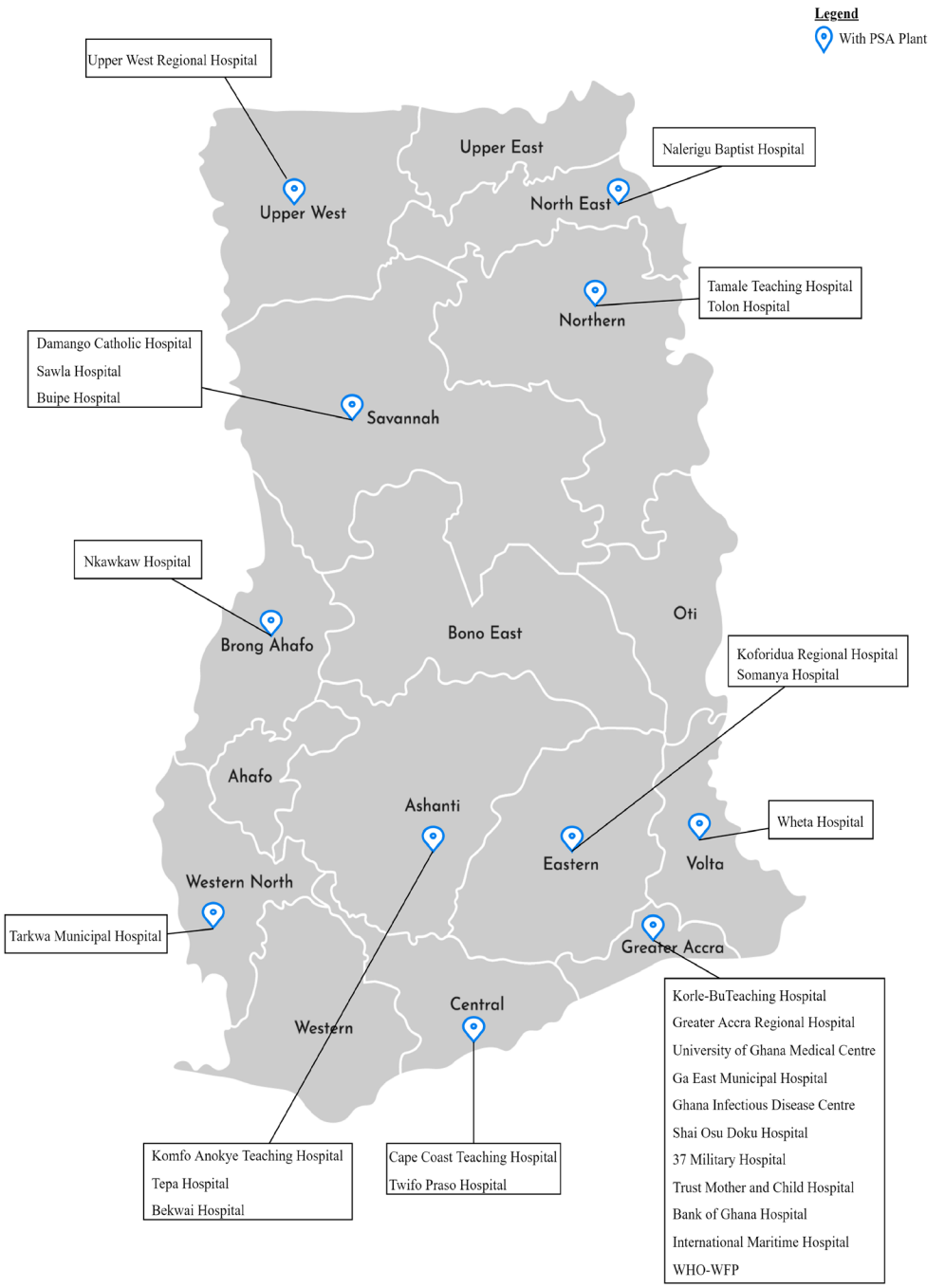

Figure 2 - Distribution of Hospital-based PSA oxygen producing plants

Other hospitals, polyclinics, health centres, clinics, CHPS Compounds, maternity homes and ambulances rely on cylinders or portable oxygen concentrators for their oxygen needs. They procure their oxygen from the commercial oxygen production plants and transport them to their respective health facilities. With the oxygen production companies primarily located in the major cities in the southern

and middle belts, namely, Accra-Tema, Sekondi-Takoradi and Kumasi areas, health facilities in the other parts of the country sourcing oxygen from these areas must travel long distances to purchase their oxygen, thus resulting in higher transportation costs. The estimated transportation cost ranges from GH₵ 300.00 (equivalent to US$51.28 at the rate of US$1 = GH₵5.85 as of 31st August 2021) to GH₵ 900.00 (equivalent to US$153.85) per trip depending on location.

Several health facilities are confronted with challenges in oxygen access and sufficiency. These challenges include:

- High cost of oxygen producing plants;
- Lack of or inadequate oxygen cylinders;
- High oxygen cylinder transportation cost;
- Lack of funds to guarantee timely payment;
- Non-existent tariff regime for cost recovery for oxygen administered to patients;
- Inconsistent supply/delivery of oxygen by vendors;
- High debt burden from purchases of oxygen;
- Insufficient capacity to maintain oxygen systems;
- Lack of or insufficient oxygen piping network systems coupled with leakages; and
- Increase in demand due to COVID-19 pandemic.

All these challenges contribute to frequent stock out and shortages in oxygen supply in many health facilities across the country.

1.2.4 PROCUREMENT LANDSCAPE

The responsibility for procuring medical oxygen and related equipment lies primarily with the individual health facilities. Decentralised procurement to this effect makes it difficult to coordinate the use, negotiate and standardize the prices for medical oxygen and efficiently provide training to end-users and maintenance professionals. For example, hospitals can procure medical oxygen and related equipment independently using their budgets. There is a need for a national guideline with technical specifications to guide procurement practices across the country.

There are three types of oxygen production companies in Ghana:

1. Commercial oxygen producers;
2. Steel manufacturers and;
3. Other industrial manufacturers (e.g. mining companies).

As of August 2021, steel companies sold their oxygen around GH₵5.00 (equivalent to US$0.85) per cubic meter of oxygen whilst the commercial oxygen producers sold their oxygen between GH₵10.00(equivalent to US$1.71) to GH₵20.00(equivalent to US$3.42) per cubic meter, depending on the technology they use in producing the oxygen. The wide variation in the prices between the steel companies and the commercial oxygen producers is due to the special subsidized electricity tariffs and tax incentives offered to the steel companies, to which the commercial oxygen producers are not entitled. For example, whilst the steel companies pay around 50p/kWh of electricity, the commercial medical oxygen producers pay close to GH₵20.00/kWh of electricity. Thus, the pricing of medical oxygen in Ghana is highly influenced by the electricity tariff.

In addition to the local production of oxygen, some companies import oxygen for use in Ghana. According to the World Bank, the top exporting countries of medical oxygen into Ghana in 2019 included Cote D'Ivoire, the European Union, and China[8]. The table below illustrates details of exporters of medical oxygen to Ghana.

Table 4 - Top Exporters of Medical Oxygen to Ghana

Reporter	Trade Flow	Product Code	Product Description	Year	Partner	Trade Value 1000USD
Cote d'Ivoire	Export	280440	Medical oxygen	2019	Ghana	279.42
European Union	Export	280440	Medical oxygen	2019	Ghana	10.33
China	Export	280440	Medical oxygen	2019	Ghana	6.39
South Africa	Export	280440	Medical oxygen	2019	Ghana	5.88

8 https://wits.worldbank.org/trade/comtrade/en/country/All/year/2019/tradeflow/Exports/partner/GHA/nomen/h5/product/280440, Accessed 15th September 2021

Table 4 - Top Exporters of Medical Oxygen to Ghana

Reporter	Trade Flow	Product Code	Product Description	Year	Partner	Trade Value 1000USD
United Kingdom	Export	280440	Medical oxygen	2019	Ghana	3.96
United States	Export	280440	Medical oxygen	2019	Ghana	3.53
Spain	Export	280440	Medical oxygen	2019	Ghana	2.38
Belgium	Export	280440	Medical oxygen	2019	Ghana	3.75

Major challenges with procurement of oxygen include high cost of oxygen, inadequate or lack of oxygen cylinders for refilling and delayed and unpredictable payment. This has increased the debt burden of the health facilities.

1.2.5 FINANCING LANDSCAPE

Medical oxygen is captured as essential Medicine on the Ministry of Health's Seventh Edition, 2017 Essential Medicines List[9] but the National Health Insurance Authority does not currently reimburse it as a medicine separately, but rather as bundled charge.

Government, as part of the capital investment program, finances the initial set up of the medical oxygen as part of the medical gas systems in some health facilities. It provides assistance for the installation of onsite medical oxygen production plants, installation of the central piping network for distribution of oxygen, provision of oxygen concentrators, oxygen cylinders and related equipment or accessories. On the other hand, facilities are responsible for the maintenance and refilling of the oxygen cylinders using their facility's Internal Generated Fund (IGF).

9 *Ministry of Health, Ghana National Drugs Programme, Essential Medicines List Seventh Edition, 2017*

Higher-level facilities including the secondary and tertiary levels are able to finance oxygen supply and undertake oxygen plant and oxygen concentrator maintenance (both planned and corrective) to some extent. On the other hand, majority of the Primary Health Care facilities (from District Hospitals down to CHPS Compounds) which depend heavily on the NHIS reimbursement for their IGF are challenged with funding for oxygen supply. Since the NHIS does not currently reimburse oxygen as a medicine separately, but rather as bundle charges, the facilities are not able to realistically recover the cost of medical oxygen consumed by the patients. This results in insufficient funding for medical oxygen.

Also delays in the NHIS reimbursement causes health facilities to be consistently in payment arrears. For example, facilities that rely on oxygen supply in cylinders often face oxygen stock-outs as some suppliers will not refill oxygen cylinders if an account has an outstanding balance. With undue delays, some facilities are denied supply of medical oxygen, which results in stock-outs of oxygen.

Similarly, the National Ambulance Service also faces challenges in procuring oxygen from vendors to manage patients during transport. Oxygen for ambulance services delivery is financed by the GoG annual budget allocation, however, the amounts budgeted for are not released on time and are inadequate to support the procurement of oxygen and they are always in arrears.

1.2.6 REGULATORY LANDSCAPE

Essential medicines, including medical oxygen, are regulated under sections 111 to 132 of Part Seven of the Public Health Act, 2012 (Act 851). Medical oxygen is listed on the Essential Medicines List, 2017 . However, enforcement of regulation on medical oxygen systems production and standards are limited.

Although medical oxygen is packaged in pressure vessels (cylinders) and could be regulated under the Factories, Offices, and Shops (Boiler and Pressure Vessels) Safety Act, 1970 (Act 663), the Act does not take into consideration medical oxygen cylinders. To regulate medical oxygen cylinders or pressure vessels for medical oxygen, the Act needs to be reviewed.

1.2.7 AVAILABILITY AND UTILIZATION LANDSCAPE

Reference to the section on oxygen production landscape, oxygen is available on the commercial market but at a higher cost. Health facilities purchase the oxygen in cylinders and transport them to their facility. The high cost of oxygen result in inadequate supply of oxygen in these health facilities.

Unfortunately, medical oxygen is an important resource for the survival of patients especially COVID-19 patients and patients in respiratory distress. Before the COVID-19 pandemic, oxygen stock-out in health facilities existed but was not a major issue. With the COVID-19 pandemic, oxygen demand has increased by 3-7 folds. This has worsened the already existing situation and health facilities are challenged with frequent oxygen shortages. Table 5 below, shows the severity of COVID-19 conditions and amount of oxygen demand for effective treatment. The table illustrates that for 75 patients with severe illness (individuals who have SpO2 <94% on room air at sea level, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO2/FiO2) <300 mm Hg, a respiratory rate >30 breaths/min, or lung infiltrates >50%) and 25 patients with critical COVID-19 illness presentation (individuals who have respiratory failure, septic shock, and/or multiple organ dysfunction), in a hypothetical 100 bed COVID-19 treatment facility, approximately 90m^3/hr of oxygen supply would be required. The potential scale and need of oxygen supply has affected the supply of oxygen in many health facilities escalating the already fragile situation.

Hypothetical 100 Bed Covid-19 Treatment Facility				
Disease Severity	**Avg. O_2 flow rate**		**Size of Solutions of scale***	
	per patient	**Total**	**PSA Plant**	**Bulk liquid**
Severe 75 Patients	10L/min	75 * 10 * 60 = 45 m^3/hr	= 45 m^3/hr	= 1.25 m^3/day
Critical 25 Patients	30L/min	25 * 30 * 60 = 45 m^3/hr	= 45 m^3/hr	= 1.25 m^3/day
			= 90 m^3/hr	= 2.5 m^3/day
1m^3 of gaseous oxygen is approximately 0.8L of liquid oxygen				

Table 5 - W.H.O. Oxygen demand estimates for COVID 19 Case Management

Table 6 below shows a sample of the monthly consumption of oxygen in 7.5m^3 cylinders in selected hospitals in Ghana. These hospitals depend solely on oxygen in cylinders with the exception of Ho Teaching Hospital and Cape Coast Teaching Hospital which had Liquid Oxygen and PSA Plant respectively.

Table 6 - Sample of Hospitals that Depended on Oxygen in Cylinder for Oxygen Supply and their Average Monthly Consumption as in February 2021

Hospital	Region	Average Monthly Consumption (No. of 7.5m^3 Cylinders)	Equivalent volume in m^3
Agogo Presbyterian Hospital	Ashanti	100 cylinders	750
Berekum Catholic Hospital	Bono	300 cylinders	2,250
Techiman Holy Family Hospital	Bono East	330 cylinders	2,475
Nkoranza Catholic Hospital	Bono East	140 cylinders	1,050
Police Hospital	Accra	160 cylinders	1,200
Effia Nkwanta Regional Hospital	Western	720 cylinders	5,400
Cape Coast Teaching Hospital	Central	400 cylinders	3,000
Ho Teaching Hospital	Volta	2400 cylinders	18,000

Though there is no scientific data to fully quantify the utilization of medical oxygen in health facilities in Ghana, the recent UNICEF-supported Oxygen Quantification Assessment, which covered 59 health facilities in eight regions, has provided some evidence on the medical oxygen demand in various types of health facilities.

The ***Table 7*** below provides an estimated volume of oxygen required in different types of public health facilities in Ghana.

Table 7 - Estimated Oxygen Need

Facility type	Number of facilities	The average number of beds	[9]Estimated oxygen demand by the level of care (in Nm^3/h at current bed occupancy rate)
Quaternary	1	600	600
Tertiary Hospitals	5	850	135
Secondary	7	200	90
Primary	157	80	15
Polyclinic	48	30	7
Health Centres	933	8	0.6
CHPS	5526	1	0.3
Clinic	218	5	0.6

Supply of medical oxygen in CHPS Compounds, Clinics and Health Centres do not require piping to deliver medical oxygen within the health facility to patients. On the other hand, hospital and polyclinics require a central oxygen piping network to efficiently deliver medical oxygen to patients.

Unfortunately, most hospitals do not have the appropriate medical oxygen piping systems. This compels such hospitals to resort to the delivery of medical oxygen in cylinders directly to the patient, a practice which is characterised with serious safety consequences. The UNICEF/GHS Quantification Assessment further confirmed the extent of dependence on oxygen cylinder utilisation at patients' bedside.

Provision of piping system in the hospitals is essential in eliminating the unsafe practice of using high-pressure oxygen cylinders at the patients' bedside.

Fortunately, newly constructed hospitals are equipped with medical oxygen piping systems, a practice that must be sustained and replicated in all hospitals.

The UNICEF quantification exercise also revealed gaps in the competencies in the maintenance personnel's capabilities to maintain oxygen systems to ensure safety and continuous availability of oxygen. Other observations included the absence of fault reporting, calibration, preventive and corrective maintenance. All these have contributed to the inefficiencies in the management of oxygen resources and could result in wastage of medical oxygen resources.

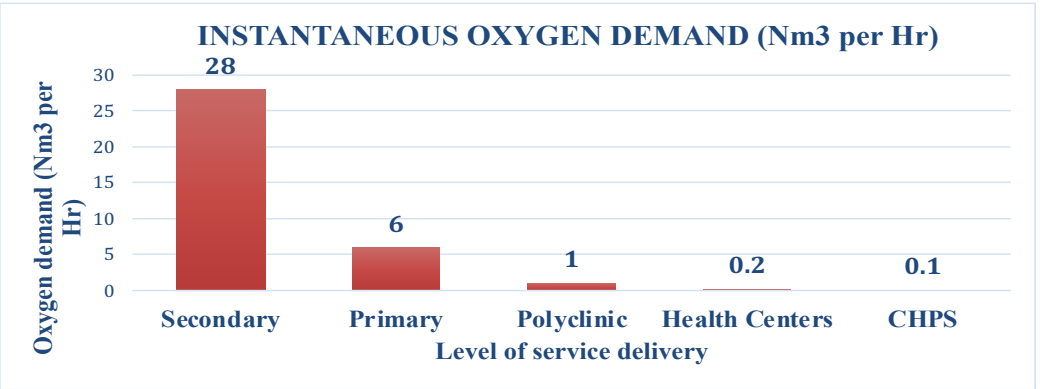

Figure 3 - Hypoxemic bed-based instantaneous oxygen demand by facility type

1.3 SCOPE OF POLICY

The National Medical Oxygen Policy seeks to establish the framework for improving medical oxygen production, distribution, access, transport, handling, storage and use. Specifically, the policy will help establish an enabling environment, led by the Ministry of Health, for the planning, production, implementation, monitoring, and evaluation of effective and efficient medical oxygen production and delivery systems at all levels of the health sector, both public and private.

This policy is intended for use by:

1. Manufacturers of medical oxygen in both the private and public sectors;
2. Manufacturers and suppliers or distributors of medical oxygen equipment and accessories in both the private and public sectors;
3. Professionals involved in the production, transportation, use and maintenance of medical oxygen and their systems;
4. All health facilities, ambulances, clinicians and health practitioners involved in the administration of medical oxygen;
5. Financiers, investors and all stakeholders involved in resource mobilization within medical oxygen supply chain;

6. Suppliers and traders of medical oxygen;
7. Regulatory bodies;
8. End users and the public who require oxygen at home, offices, health facilities and ambulances; and
9. Health strengthening and implementing partners.

It must, therefore, be noted that this Policy is not intended for the production, distribution and use of industrial oxygen, including the aviation use of oxygen, but only limited to medical oxygen for clinical use.

1.4 POLICY DEVELOPMENT PROCESS

This Policy was developed under the stewardship of the Honourable Minister for Health, Kwaku Agyeman-Manu (MP), and an Inter-Agency Steering Committee under the leadership of the Chief Director of the Ministry of Health, Mr. Kwabena Boadu Oku-Afari. A Technical Working Group was constituted by the Minister to draft the policy document. The draft policy document was then subjected to thorough stakeholder consultation, review and validation. The validated draft policy was submitted to Cabinet and has subsequently been approved and adopted for implementation. The drafting of the document was started in August 2020 and was finally approved by Cabinet in October 2022

2.0 CHAPTER TWO - THE POLICY CONTEXT AND FRAMEWORK

2.1 GLOBAL AND REGIONAL CONTEXT

The policy recognizes several global, regional, and sub-regional compacts and policy frameworks. The following, among others, are mentioned here: the United Nations Sustainable Development Goals (SDGs) on the theme, "Transforming our World: the 2030 Agenda for Sustainable Development". The International Health Regulations (IHR 2005), the Astana Declaration on Primary Health Care (PHC), the African Union (AU) Vision 2063: "The Africa We Want", the African Health Strategy (2016-2030), and Global Strategy on Human Resources for Health: Workforce 2030. Medical oxygen is on the WHO Essential Medicine List 21st Edition 2019. It is also aligned to the WHO-UNICEF Technical Specifications and Guidance for Oxygen Therapy Devices, 2019.

2.2 NATIONAL CONTEXT

This policy is based on Chapter Six of the 1992 Constitution of the Republic of Ghana; Directive Principles of State Policy, which among others requires the state to ensure the realization of the right to good health care. The overall National Policy Framework developed by the National Development Planning Commission called the Coordinated Program of Economic and Social Development Policies (2017-2024) has inspired the development of this document.

Medical oxygen is listed on the Essential Medicines List, 2017[10] as an essential medicine and thus regulated by the FDA through Part Seven of the Public Health Act, 2012 (Act 851) for production, distribution, and sale of medicines. It also takes inspiration from the National Medicines Policy 3rd edition 2017[11] which states that "the FDA shall ensure that medicines and health technologies are consistently being manufactured to meet required quality standards by the provisions of the Public Health Act, 2012 (Act 851)". The policy is further aligned to the National Human Resource Policy and Strategies for Health, 2020.

10 Ministry of Health, Ghana National Drugs Programme, Essential Medicines List Seventh Edition, 2017, Page 1
11 National Medicines Policy 3rd edition 2017, page 29

2.3 VISION

A healthy population for national development.

2.4 MISSION

Work toward the achievement of healthy lives for all people living in Ghana through and enabling Policy framework that recognises, empowers, and bring together in a coordinated manner, all stakeholders.

2.5 GOAL

To promote, restore and maintain good health for all people living in Ghana by reducing hypoxia-related morbidity and mortality by ensuring availability, accessibility, reliability, and utilization of acceptable quality of medical oxygen in Ghana.

2.6 OBJECTIVES

The overall objective of this Policy is to provide a strategic framework for the practice and regulation of the production, procurement, distribution and use of medical oxygen in a bid to reduce mortality and morbidity from hypoxemia in Ghana.

2.6.1 SPECIFIC OBJECTIVES:

1. To create an enabling environment for the production, distribution and rational use of medical oxygen in health facilities in Ghana;
2. To establish a regulatory system for the production, procurement, installation, distribution and rational use of medical oxygen in Ghana;
3. To strengthen supply chain management of medical oxygen systems in Ghana;
4. To strengthen the capacity of all relevant staff on management, maintenance and use of medical oxygen;
5. To strengthen collaboration and partnership across the entire medical oxygen value chain; and
6. Establish a robust monitoring and evaluation system for medical oxygen.

2.7 GUIDING PRINCIPLES AND CORE VALUES

The Policy upholds the following as its main principles:

Multi-Sectoral Collaboration
This policy recognises that public policies and resulting actions of different section impact health and population well-being. This policy shall ensure that all sector policies and actions support the achievement and maintenance of a healthy population.

Strategic Partnerships
The policy recognises partnerships with non-state actors (CSOs, industry, development, partners, FBOs, etc.) in all its forms towards delivering appropriate health and wellness interventions for the population.

Equity
This policy recognises that the disease burden and its impact on segments of the population are influenced by the national demographics, geographical distribution, and socio-economic status of the population. Interventions and resources required to meet these needs of the population where they are will necessarily be different. These needs shall be addressed in an equitable and not an equal manner.

Professionalism
Professionalism means to conduct yourself with responsibility, integrity, accountability, and excellence. This means one needs to communicate effectively and appropriately and always find a way to be productive.

Regulations, Ethical standards, and Client Rights
Regulations are the imposition of rules by the government and are backed by the use of penalties that are meant to change the economic behaviour of individuals.
Ethical standards are principles that promote values such as trust, good behaviour, and fairness that govern the conduct of a person.
Client Rights are the legal assurance of being treated like a person, being to make informed choices of the services provided, and confidentiality.

Fairness and Transparency
Transparency is linked to fairness. Being transparent is about being clear, open, and honest with people from the start. Fairness is impartial and just treatment without favouritism. Being fair is when everyone is treated equally, and none is left out.

3.0 CHAPTER THREE - OBJECTIVES AND STRATEGIC INTERVENTIONS

3.1 OBJECTIVE 1: CREATE AN ENABLING ENVIRONMENT

To create an enabling environment for the production, procurement, installation, distribution and rational use of medical oxygen in health facilities in Ghana.

The interventions are:

1. Establish a functional coordination mechanism for the medical oxygen system at national, regional, district and sub-district levels;
2. Develop a reporting mechanism for medical oxygen systems;
3. Develop a comprehensive resource mobilization tool for the management of medical oxygen systems;
4. Formulate appropriate administrative instrument(s) to guide compliance and adherence to standards;
5. Develop guidelines for transportation, storage, handling and safe use of medical oxygen;
6. Develop and monitor a performance instrument for medical oxygen systems;
7. Advocate for waivers for the importation of medical oxygen equipment for producers;
8. Advocate for special rates for electricity tariffs for producers;
9. Develop a mechanism for the timely payment of oxygen suppliers;
10. Establish a mechanism for universal access to quality medical oxygen; and
11. Facilitate the implementation of oxygen production systems countrywide.

3.2 OBJECTIVE 2: ESTABLISH REGULATORY SYSTEM

To establish a regulatory system for the production, procurement, installation, distribution, and rational use of medical oxygen in Ghana.

The interventions are:

1. Develop guidelines for the production, procurement, installation, distribution, and rational use of medical oxygen in Ghana and its related devices;
2. Resource the appropriate regulatory bodies to carry out their mandate effectively and efficiently;
3. Establish and implement quality assurance systems for administering medical oxygen;

4. Develop safety protocols on medical oxygen systems;
5. Develop standards on medical oxygen systems to include security issues; and
6. Enforce the regulations and guidelines developed.

3.3 OBJECTIVE 3: STRENTHEN SUPPLY CHAIN MANAGEMENT

To strengthen supply chain management of medical oxygen systems in Ghana.

The interventions are:

1. Ensure compliance to the procurement processes on medical oxygen using the national procurement guidelines;
2. Develop guidelines and specifications for the acquisition of medical oxygen systems;
3. Incorporate Oxygen management specifics into the existing human resource for medical oxygen management;
4. Develop training guidelines on medical oxygen supply chain processes;
5. Develop Standard Operating Procedures (SOPs), protocols and guidelines for the management, maintenance and use of medical oxygen;
6. Monitor compliance to procurement processes for medical oxygen;
7. Mainstream medical oxygen issues into the health sector medium-term and medicine procurement plans;
8. Review minimum requirements for health infrastructure to include medical oxygen systems, across the different levels of care; and
9. Develop guidelines on the distribution, transportation and handling of oxygen cylinders.

3.4 OBJECTIVE 4: STRENGTHEN HUMAN RESOURCE CAPACITY

To strengthen the capacity of all relevant staff on management, maintenance, and use of medical oxygen.

The interventions are:

1. Develop training packages for all relevant staff on the acquisition, rational use, service, repair, maintenance and management of medical oxygen systems, and related equipment and their documentation, including their electronic management system;
2. Train relevant staff on electronic management system for the acquisition, maintenance and management (including spare parts, maintenance and consumables) of medical oxygen resources;
3. Review of the existing pre-service training curriculum to include medical oxygen system;
4. Develop management systems for the maintenance of medical oxygen systems and train relevant staff; and
5. Train technical staff for the service, repair, maintenance and management of medical oxygen and related equipment.

3.5 OBJECTIVE 5: STRENGTHEN COLLABORATION AND PARTNERSHIP

To strengthen collaboration and partnership across the entire medical oxygen value chain.

The interventions are:

1. Develop sustainable financing arrangements for medical oxygen;
2. Develop a mechanism for Private Sector engagement to ensure sustained improvement in medical oxygen generation and usage;
3. Establish mechanisms for engaging Development Partner on medical oxygen systems;
4. Develop strategic social partnerships at all levels of healthcare delivery to sustain medical oxygen systems; and
5. Advocate for the inclusion of medical oxygen reimbursements by the National Health Insurance Scheme.

3.6 OBJECTIVE 6: ENFORCE EFFECTIVE MONITORING AND EVALUATION

Establish a robust monitoring and evaluation system for medical oxygen.

The interventions are:

1. Integrate data on medical oxygen use, systems' management and maintenance into existing logistics and health management information systems;
2. Update and make available data gathering tools to integrate medical oxygen use at all levels of healthcare delivery;
3. Train relevant monitoring and evaluation officers to collect and input oxygen-related indicators into existing logistics and health management information systems;
4. Improve medical oxygen data visibility for use in decision-making; and
5. Research on the environmental impact of commercial oxygen production.

4.0 CHAPTER FOUR- IMPLEMENTATION FRAMEWORK

4.1 INSTITUTIONAL ARRANGEMENTS FOR IMPLEMENTATION

The implementation of this Policy shall be a collective action by all stakeholders led by the MoH through the Common Management Arrangement (CMA) of the health sector. The Ministry shall continue to play its role in leading the development of policies/strategies, planning, regulating, coordinating, monitoring and evaluating the sector and all its activities. The Minister for Health shall provide the overall political direction in the execution and implementation of the Policy by all relevant agencies and partners. The MoH shall work with and through frontline MoH Agencies, MDAs and other stakeholders whose mandate covers respective areas of the Policy using existing systems and structures including:

1. The Inter-Agency Leadership Committee (IALC);
2. The Health Sector Working Group (HSWG) meetings;
3. Inter-Agency Committees and Standing Committees;
4. Business Meetings;
5. Annual Health Summit;
6. Decentralized Level Dialogue; and
7. Annual Policy Dialogue.

The Minister for Health shall designate directorates to coordinate and manage the implementation of the Policy. The MoH recognizes that the implementation of this Policy and strategies will require financial support. The Ministry shall, therefore, provide the requisite budgetary allocation towards its successful implementation.

4.1.1 ROLES AND RESPONSIBILITIES MATRIX

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
1	To create an enabling environment for the production, procurement, installation, distribution, and rational use of medical oxygen in health facilities in Ghana	Establish a functional coordination mechanism for the medical oxygen system at national, regional, district and sub-district levels.	MoH, GHS	Agencies of MoH, DPs, Private Sector, GSA, FDA, HeFRA
		Develop a reporting mechanism for medical oxygen systems.	MoH	Private Sector, Agencies of MoH, Private health sector, GAQHI, CHAG, AMHS
		Develop a comprehensive resource mobilisation tool for the management of medical oxygen systems.	MoH	Agencies of MoH, DPs, Private Sector, Private health sector, GAQHI, CHAG, AMHS
		Formulate appropriate administrative instrument(s) to guide compliance and adherence to standards.	MoH	FDA, HeFRA, GSA
		Develop guidelines for transportation and storage of medical oxygen.	MoH, GHS	Agencies of MoH, Private Sector, Private health sector, GAQHI, CHAG, AMHS

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
1	To create an enabling environment for the production, procurement, installation, distribution, and rational use of medical oxygen in health facilities in Ghana	Develop and monitor a performance instru-ment for medical oxygen systems.	MoH	Agencies of MoH, Private Sector, Private health sector, GAQHI, CHAG, AMHS
		Advocate for waivers for the importation of medical oxygen equipment, spare parts as well as sales of medical oxygen in Ghana.	MoH	Agencies of MoH, DPs, Private Sector, MoF, GRA
		Advocate for special electricity tariffs for commercial oxygen production in Ghana.	MoH	MoF, MoE, DPs, Private sector, and Agencies of MoH
		Develop a mechanism for the timely payment of Oxygen suppliers.	MoH	MoF, GHS, Private Health sector, NHIA

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
2	To establish a regulatory system for the production, procurement, installation, distribution, and rational use of medical oxygen in Ghana.	Develop guidelines on the production, supply, storage, and use of medical oxygen and its related devices.	MoH, FDA	Agencies of MoH, Private Sector Private health sector, GAQHI, CHAG, AMHS, GSA
		Resource the appropriate regulatory bodies to carry out their mandate effectively and efficiently.	MoH, MoT	FDA, EPA, GSA, HeFRA, DPs
		Establish and implement quality assurance systems for administering medical oxygen.	MoH,	FDA Private health sector, GAQHI, CHAG, AMHS
		Develop safety protocols on medical oxygen systems.	MoH	Agencies of MoH, DPs, and Private Sector, GSA Private health sector, GAQHI, CHAG, AMHS
		Develop standards on medical oxygen systems to include security issues.	MoH	Agencies of MoH, DPs, and Pri-vate Sector, GSA

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
3	To strengthen supply chain management of medical oxygen systems in Ghana.	Ensure compliance to the procurement processes on medical oxygen to the national procurement guidelines.	MoH	Agencies of MoH,
		Develop guidelines and specifications for the acquisition of medical oxygen systems.	MoH	Agencies of MoH Private health sector, GAQHI, CHAG, AMHS
		Incorporate oxygen management specifics into the existing human resource for medical oxygen management.	MoH	Agencies of MoH Private health sector, GAQHI, CHAG, AMHS
		Develop training guidelines on medical oxy-gen supply chain processes.	MoH	Agencies of MoH Private health sector, GAQHI, CHAG, AMHS
		Develop Standard Operating Procedures (SOPs), protocols, and guidelines for management, maintenance, and use of medical oxygen.	MoH	Agencies of MoH Private health sector, GAQHI, CHAG, AMHS

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
3	To strengthen supply chain management of medical oxygen systems in Ghana.	Monitor compliance to procurement processes for medical oxygen.	MoH	Agencies of MoH, Private health sector, GAQHI, CHAG, AMHS
		Mainstream medical oxygen issues into the health sector medium-term and medicine procurement plans.	MoH	Agencies of MoH, MoF
		Review minimum requirements for health infrastructure to include medical oxygen systems, across the different levels of care.	MoH	Agencies of MoH, HeFRA
4	To strengthen the capacity of all relevant staff on management, maintenance, and use of medical oxygen.	Develop training packages for all relevant staff on the acquisition, rational use, service, repair, maintenance and management of medical oxygen systems, and related equipment and their documentation, including their electronic management system.	MoH,	Agencies of MoH, Private health sector, GAQHI, CHAG, AMHS

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
4	To strengthen the capaci-ty of all relevant staff on management, maintenance, and use of medical oxygen.	Train relevant staff on electronic management system for the acquisition, maintenance and management (including spare parts, maintenance and consumables) of medical oxygen resources.	MoH	Agencies of MoH, GAQHI, CHAG, Private Health Sector, AMHS
		Review of the existing pre-service training curriculum to include medical oxygen system.	MoH	Agencies of MoH, HTIs
		Develop management systems for the maintenance of medical oxygen systems and train relevant staff.	MoH	Agencies of MoH, Private Sector,
		Train technical staff for the service, repair, maintenance and management of medical oxygen and related equipment.	MoH	Agencies of MoH, GAQHI, CHAG, Private Health Sector, AMHS

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
5	To strengthen collaboration and partnership across the entire medical oxygen value chain.	Develop sustainable financing arrangements for medical oxygen.	MoH, MoF	Agencies of MoH, DPs, MoTI, GIPC, MoFARI, AGI
		Develop a mechanism for Private sector engagement to ensure sustained improvement in medical oxygen generation and usage.	MoH	Agencies of MoH, DPs, Private sector, AGI, MOTI, GIPC, MoF
		Establish mechanisms for Development Partner engagement on medical oxygen systems	MoH	Agencies of MoH, DPs, Private sector, MoF, GIPC, MoFARI
		Develop strategic social partnerships at all levels of healthcare delivery to sustain medical oxygen systems.	MoH	Agencies of MoH, Private Sector, MoTI, GIPC, MoFARI
		Advocate for the inclusion of medical oxygen reimbursements into the National Health Insurance Scheme.	MoH, MoF	Agencies of MoH, NHIA, DPs, Private sector

Table 8 - Roles and Responsibilities Matrix

ID	Objectives	Strategic Interventions	Responsibility	
			Lead MDA / Organization	Collaborators
6	Establish a robust monitoring and evaluation system for medical oxygen.	Integrate data on medical oxygen use, systems' management and maintenance into existing logistics and health management information systems.	MoH	Agencies of MoH, Private health sector
		Update and make available data gathering tools (e.g., patient records, observation charts, etc.) to integrate medical oxygen use at all levels of healthcare delivery.	MoH	Agencies of MoH, Private health sector
		Train relevant monitoring and evaluation of-ficers to collect and input oxygen-related indicators into existing logistics and health management information systems.	MoH	Agencies of MoH, Private health sector
		Improve data visibility for use in decision-making and assess and evaluate the efficacy of the system.	MoH	Agencies of MoH, Private health sector

4.2 CREATE AN ENABLING ENVIRONMENT FOR THE PRODUCTION, PROCUREMENT, INSTALLATION, DISTRIBUTION AND RATIONAL USE OF MEDICAL OXYGEN IN GHANA

A robust mechanism involving all stakeholders within the oxygen value chain shall be established for the sustainable supply of medical oxygen. Stakeholders including the private sector investors shall be engaged to create opportunities for the development of liquid and gaseous oxygen production plants in all regions as well as major oxygen-consuming health institutions across the country. The type of oxygen resources for health facilities shall be based on geographic location; level of service provided; economic factors; and existing infrastructure. All hospitals and polyclinics shall install oxygen-piping infrastructure for delivery of oxygen to patients.

4.3 COMPLIANCE WITH STANDARDS AND REGULATORY REQUIREMENTS

The regulatory bodies shall ensure compliance to established standards for:

1. Production;
2. Distribution of medical oxygen, medical oxygen devices and accessories;
3. Use of medical oxygen; and
4. Safe management of medical oxygen.

4.4 CLINICAL GUIDELINES ON THE USE OF MEDICAL OXYGEN

Develop, review and adapt clinical guidelines and Standard Operating Procedures (SOPs) for the use of medical oxygen. The clinical guidelines and the SOPs will provide details on the safe and rational use of medical oxygen at all levels.

4.5 CAPACITY BUILDING

MoH in collaboration with relevant authorities shall develop the human resource capacity needed for the production, procurement, installation, distribution, use, maintenance and regulation of medical oxygen systems.

4.6 INFRASTRUCTURE, MANAGEMENT AND MAINTENANCE

The MoH in collaboration with relevant authorities shall ensure that all medical oxygen systems are well maintained. Maintenance shall include both planned preventive maintenance (PPM) and corrective maintenance, safety checks, monitoring medical oxygen purity, calibrations of equipment, and the continued, reliable supply of appropriate spare parts to avoid downtime. All maintenance records shall be kept appropriately.

The Infrastructure Directorate of MoH, together with relevant institutions, shall be responsible for planning, designing, supervising and monitoring building facilities that take into consideration the oxygen supply system, including piping.

4.7 RESOURCE MOBILISATION AND FINANCING

Mobilizing the requisite resources including financial, capital, and human resources is key to the successful implementation of this Policy. The MoH in collaboration with relevant stakeholders shall mobilize the needed resources for the implementation of this Policy in a bid to achieve the objectives.

Financing options will include, but not limited to:

- GoG Budgetary Support;
- Internally Generated Funds;
- Development Partners;
- Social Strategic Partnership;
- Corporate Bodies;
- Civil Society/ Non-Governmental Organisations;
- Public-Private Partnerships; and
- National Health Insurance Scheme.

4.9 STRATEGIC ACTION PLAN AND PROGRAMME OF WORK

The National Strategic Action Plan (NSAP) for this Policy shall be for a five-year cycle and shall outline the cost of implementation of all strategies and activities.

5.0 CHAPTER FIVE - COMMUNICATION STRATEGY

The Ministry recognizes that communication is an integral component of the dissemination of policies and strategies. This Policy shall therefore be disseminated towards the achievement of the goals and objectives through a sustained action aimed at ensuring that all key stakeholders and partners understand the tenets of the document as well as have a buy-in.

The communication plan will be activated within the existing structures of MoH as outlined in the Common Management Arrangement (CMA). The following existing systems and structures shall therefore be leveraged for the dissemination of the Policy:

- The Inter-Agency Leadership Committee (IALC);
- The Health Sector Working Group (HSWG) meetings;
- Inter-Agency Committees and Standing Committees;
- Business Meetings;
- Annual Health Summit;
- Decentralized Level Dialogue; and
- Annual Policy Dialogue.

The Ministry of Information (MoI), the National Commission for Civic Education (NCCE) and the Information Services Department will also play a part in disseminating the Policy.

5.1 AUDIENCE

The audience shall be:

- MoH and its Agencies;
- Ministries, Departments, and Agencies;
- Civil Society and Non-State Actors;
- Development Partners;
- Parliamentary Select Committees on Finance and Health;
- The coalition of NGOs/CSOs in Health; and
- The Media.

5.2 OBJECTIVE

The objectives of the communication strategy are to:

- Seek ownership and buy-in from all stakeholders for smooth implementation of the Policy;
- Inform and assure the public of the government's commitment to achieving Universal Health Coverage (UHC);
- Sensitize stakeholders on their roles and responsibilities; and
- Sensitize stakeholders on the institutional and implementation arrangement of this Policy.

6.0 CHAPTER SIX – MONITORING, EVALUATION AND REVIEW

6.1 MONITORING AND EVALUATION

It is essential to monitor and evaluate the interventions and inputs outlined in this Policy to track progress, identify and address issues, and measure challenges and successes. The Monitoring and Evaluation (M & E) of this Policy shall be done using the existing sector-wide M&E framework. The performance indicator framework lays out a set of indicators to track key outputs and outcomes on an annual basis, half-yearly and quarterly basis. (Appendix I)

At the national level, a coordination steering committee will be set up by the MoH to review progress on the targets set in the strategic document annually. The coordinating mechanism will involve the review of data from the community level to the national level to review progress against targets. While the MoH will have ultimate responsibility for ensuring the implementation of this policy, each implementing institution shall clearly have defined roles in line with their mandates as indicated in the implementation framework.

6.2 POLICY REVIEW

This Policy and its strategic action plan shall be reviewed every five (5) years.

Indicator	Indicator level (e.g., output, outcome)	Definition	Target	Source
Patient outcomes				
Oxygen coverage	Outcome	% of patients with SpO_2<90% that received oxygen	100%	HMIS
Pulse oximetry coverage	Outcome	% of patients with a blood oxygen saturation measurement (SpO_2)	100%	HMIS
Objective 1: To create an enabling environment for the production, procurement, installation, distribution, and rational use of medical oxygen in health facilities in Ghana.				
Coordinating mechanisms for medical oxygen systems established	Output	Oxygen Desk at MOH staffed and functional	By end of 2023	Administrative report
Medical oxygen monitoring indicators are integrated into the national health reporting system (e.g. HMIS, LMIS)	Output	HMIS and LMIS updated to include Medical Oxygen indicators	By end of 2023	HMIS

Indicator	Indicator level (e.g., output, outcome)	Definition	Target	Source
Objective 1: To create an enabling environment for the production, procurement, installation, distribution, and rational use of medical oxygen in health facilities in Ghana.				
Resources mobilized for the functioning of the oxygen system	Output	% of annual forecasted oxygen need that is budgeted for (through domestic or external sources)	100%	Administrative report
Standard Operating Procedures (SOPs) for oxygen system use and maintenance established.	Output	% of facilities with technical guidelines and SOPs	100%	Assessment Report Monitoring Report
Tax waiver applied to Medical oxygen	Output	Enactment of policy to introduce tax waiver for medical oxygen production and sales	By end of 2023	Administrative report

Indicator	Indicator level (e.g., output, outcome)	Definition	Target	Source
Objective 2: To establish a regulatory system for the production, procurement, installation, distribution, and rational use of medical oxygen in Ghana.				
Oxygen quality standards met	Outcome	% of facilities whose primary oxygen source is sufficiently concentrated (>82%)	100%	Assessment report
Objective 3: To strengthen supply chain management of medical oxygen systems in Ghana.				
Oxygen availability	Outcome	% of facilities without oxygen stock outs during the reporting period	100%	Monitoring Report
Oxygen systems maintained	Output	% of oxygen equipment receiving scheduled preventative maintenance	100%	Monitoring Report
Up-to-date robust digital inventory systems for oxygen-related equipment developed	Output	% of facilities with all the necessary oxygen equipment	100%	LMIS, Stock Reports, Administrative Reports

Indicator	Indicator level (e.g., output, outcome)	Definition	Target	Source
Objective 4: To strengthen the capacity of all relevant staff on management, maintenance, and use of medical Oxygen.				
Healthcare workers trained on the use of medical oxygen	Output	% of healthcare workers who have completed medical oxygen training	100%	Administrative report Training report
Maintenance professionals trained on medical oxygen system maintenance	Output	% of maintenance professionals who have completed medical oxygen system maintenance training	100%	Administrative report Training report
Strengthen existing medical equipment maintenance system across the country	Output	% of facilities who have a maintenance system in place with frequency included	By end of 2023	Administrative report

Indicator	Indicator level (e.g., output, outcome)	Definition	Target	Source
Objective 5: To strengthen collaboration and partnership across the entire medical oxygen value chain.				
Revenue mobilization mechanism developed.	Output	Amount in budget mobilized/allocated	GH₵ 7,581,290 million (USD 789,323 equivalent) per year	MoH Financial reporting
Medical Oxygen reimbursed as part of NHIS	Output	Enactment of policy to reimburse medical oxygen as part of NHIS	End of 2023	
Objective 6: Establish a robust monitoring and evaluation system for medical oxygen.				
Facilities reporting into LMIS and HMIS	Output	% of facilities that report oxygen indicators through LMIS and HMIS	100%	HMIS, LMIS
Facilities reporting maintenance and Oxygen management updates on LMIS	Output	% of facilities reporting oxygen systems maintenance and management indicators through LMIS	100%	LMIS, administrative documents

APPENDIX II: Table 9A. - Strategic Leadership

Strategic Leaders		
S/N	**Name**	**Designation/Organisation**
1	Hon. Kwaku Agyeman-Manu	Minister for Health
2	Hon. Tina Mensah	Dep. Minister for Health
3	Hon. Alhaji Mahama Asei Seini	Dep. Minister for Health
4	Mr. Kwabena Boadu Oku-Afari	Chief Director, Ministry of Health
5	Dr. Francis Chisaka Kasolo	Country Representative, WHO
6	Ms. Anne-Claire Dufay	Country Representative, UNICEF
7	Mr. Leslie Emegbuonye	Country Representative, CHAI

APPENDIX II: Table 10B. - Technical Leadership

Technical Leadership		
S/N	**Name**	**Designation/Organisation**
1	Ben Ampomah Nkansah	Director Infrastructure, Ministry of Health
2	Dr. Emmanuel Odame Ankrah	Director, PPME, Ministry of Health
3	Dr. (Mrs.) Martha Gyansa-Lutterodt	Director, Technical Coordination, Ministry of Health
4	Dr. Nicholas Adjabu	Head, Biomedical Engineering Unit-ID, Ministry of Health
5	Benjamine Nyakutsey	Head, Policy Unit - PPME, Ministry of Health

APPENDIX II: Table 11C. - Technical Working Group (TWG)

Technical Working Group		
S/N	**Name**	**Organisation**
1	Dr. Nicholas Adjabu	Minister for Health
2	Alhaji Inua .I. Yusuf, Esq	Ministry of Health
3	Mrs. Sally Pobee Tetteh	Ministry of Health
4	Dr. Angela Ama Ackon	World Health Organization
5	Dr. Priscilla Wobil	UNICEF
6	Dr. Jacob Abebrese	Ghana Health Service
7	Dr. Nicodemus K Gebe	Ghana Health Service
8	Dr. Ernest Asiedu	Ministry of Health
9	Dr. Baffour Awuah	Ministry of Health
10	Dr. Christian Owoo	UG Medical School/Korle-bu Teaching Hospital
11	Mr. Benjamin Nyakutsey	Ministry of Health
12	Mrs. Ruth N. Y. Appiah	Ministry of Health
13	Mr. Theodore Amponsah	Ministry of Health
14	Ms. Bless Yayra Darku	Ministry of Health
15	Mr. Philip Quayson	Ministry of Health
16	Mr. Prince Tuffour	Ministry of Health
17	Mr. Daniel Gyan	Ministry of Health
18	Mr. Samson Awudanjon	Ministry of Health
19	Mr. Cephas Denutsui	Ministry of Health
20	Elizabeth Adjei-Aquah	Ministry of Health
21	Mr. John Zienaa	Ghana Health Service
22	Ms. Yolanda Adwoa Adusei-Poku	Ghana Health Service
23	Mr. Gregory Peters	Komfo Anokye Teaching Hospital
24	Mrs. Adah Allotey-Pappoe	Food and Drugs Authority
25	Nicholas Amoah Owusu	Food and Drugs Authority
26	Mr. Vincent Arthur	Ghana Standards Authority
27	Mr. Edward Ofosuhene	Ghana Standards Authority
28	Mr. Tuffour Ampem Gyekye	Ghana Society of Biomedical Engineers

Technical Working Group		
S/N	**Name**	**Organisation**
29	Ms. Enyonam Marjorie Nudo	Clinton Health Access Initiative
30	Ms Mensimah Bentsi-Enchill	Clinton Health Access Initiative
31	Mr. Ebenezer Atto Brown Appiah	Clinton Health Access Initiative
32	Mrs. Irene Sarkodie	Clinton Health Access Initiative
33	Ms. Faustina Ofosua Mintah	Clinton Health Access Initiative

APPENDIX II: Table 12D. Key Stakeholders

Key Stakeholders		
S/N	**Name**	**Organisation**
1	Dr. Ali Samba	Korle-Bu Teaching Hospital
2	Dr. Eric Kofi Ngyedu	Cape Coast Teaching Hospital
3	Dr. Abass Adams	Tamale Teaching Hospital
4	Dr. Jacob Abebrese	Ghana Health Service
5	Dr. Francis Kasolo	WHO
6	Dr. Angela Ackon	WHO
7	Dr. Philip Bannor	HeFRA
8	Dr. Mrunal Shetye	UNICEF
9	Dr. Priscilla Wobil	UNICEF
10	Dr. Adwoa T. Twum Barimah	National Health Insurance Authority
11	Dr. Taurus Valmont	Volta River Authority
12	Dr. Frank Ankobea	Ghana Medical Association
13	Ms. Ruby Mac-Kafri	Ministry of Energy
14	Mr. Robert Yeboah	Energy Commission
15	Ing. Gregory Atta Peters	Komfo Anokye Teaching Hospital
16	Ing. John Zienaa	Ghana Health Service
17	Ing. Tuffour Ampem Gyekye	Ghana Society of Biomedical Engineers
18	Mr. Derek Wiredu	Ministry of Trade and Industry
19	Mr. Nicholas Amoah Owusu	Food and Drugs Authority
20	Mrs. Olivia A. Gyamfi	Ghana Revenue Authority, Customs Division

Key Stakeholders		
S/N	**Name**	**Designation/Organisation**
21	Mr. James Nwinsayra	Ghana Association of Certified Registered Anaesthetists
22	Mr. Ansong F. Bridjan	National Ambulance Service
23	Mr. Vincent Arthur	Ghana Standards Authority
24	Mr. Edward Ofosuhene	Ghana Standards Authority
25	Mrs. Heidi-Marie Boakye	Office of the Attorney General
26	Mr. Edmund Ofori Nyame	Ghana Investment Promotion Centre
27	Mr. Emmanuel Kwame Asiedu	Christian Health Association of Ghana
28	Nana Yaw Asante	RikAir Company Limited
29	Philip Creech-Jones	RikAir Company Limited
30	Mr. Richard Rockson	AirLiquide Ghana
31	Mr. Samuel Assiaw	AirLiquide Ghana
32	Mr. Varun Tyagi	Indo-Ghana Industries Limited
33	Mr. George Dey	Indo-Ghana Industries Limited
34	Raymond Amoro	Atmo Gas
35	NVV Chalapathi Rao	B5 Plus Group
36	Mr. Kunwardeep Singh	Ferro Fabrik Ghana Ltd


MINISTRY OF HEALTH
FREEDOM AND JUSTICE
REPUBLIC OF GHANA