Context

Kenya has made impressive gains in reducing child deaths, with a 43% decline in under-five mortality (from 101 to 43 per 1,000 live births) and a reduction in neonatal mortality (from 28 per 1000 live births to 21 per 1000 live births) from 1990 to 2019. Despite this progress, the majority of children still die from preventable causes. Poor quality of maternal and newborn and child health (MNCH) services remains a hindrance to achieving the Sustainable Development Goals, ending preventable maternal, newborn and child deaths, and reducing the large disparities in coverage and outcomes still existing between counties in Kenya.

Between September 2020 and June 2021, the Ministry of Health (MoH) and UNICEF, with financial support from USAID, collaborated with Nairobi County to improve the quality of newborn and pediatric quality of care (QoC) with a focus, triggered by the current COVID-19 context, on strengthening access to and safe use of oxygen, pulse oximetry, and infection prevention and control measures in five high-volume health facilities.

COVID-19 in Kenya

At the time of this report, Kenya has had 4 waves of COVID-19 with Nairobi county, a major transit center, recording the highest burden of cases.

The Kenya MoH and partners have continued to implement key approaches aimed at responding to COVID-19 and maintaining essential health services. Thus, Kenya has seen only a minimal decline in key MNCH indicators. UNICEF provided technical support and funds that were used for the procurement of personal protective equipment (PPE), training of health workers on IPC, development of guidelines for maintenance of essential health services, including integrated outreach services, risk communication, and community engagement.

Efforts to improve maternal, newborn and pediatric quality of care

As part of Kenya’s overall efforts to improve maternal, newborn, and pediatric QoC, UNICEF has supported 5 high volume facilities in Nairobi Country since 2014 to establish maternal-newborn health centers of excellence. These facilities have upgraded and renovated wards and enhanced the capacity of health service providers and managers to operationalize high impact MNCH interventions (e.g. emergency obstetric and neonatal care, uterine balloon tamponade, and kangaroo mother care), equipped health facilities for optimal maternity and newborn services, and
procured and equipped ambulances to basic life-support standards for the referral of pregnant women who require emergency treatment.

In 2017, UNICEF and Grand Challenges Canada through the Centre for Public Health and Development (CPHD) and Hewa Tele Enterprise, supported the establishment of an oxygen plant at Mama Lucy Hospital. The aim was to expand availability of life-saving oxygen to a patient population with a high burden of newborn and pediatric pneumonia cases. The plant produces 850 cubic meters of oxygen used to supply all five health facilities.

The initiative described here complemented these investments by UNICEF in the five health facilities, in the five health facilities, specifically in Pumwani and Mama Lucy Hospitals, to provide additional support including piping for medical oxygen in the newborn and pediatric units, and to address observed gaps in capacity of health care workers in safe oxygen use and IPC. It also included training of Maternal Newborn Health Quality Improvement focal point managers from the county and sub-county teams and facility Quality Improvement focal point health care workers on the use of pulse oximeters to detect hypoxemia, administration of therapeutic oxygen, and IPC.

The implementation was aligned with the broader National MoH agenda on expanding access to oxygen in the country. UNICEF worked with the MoH and partners supporting the expansion of oxygen access, including national teams responsible for oxygen expansion, namely CHAI, PATH, USAID, and the World Bank.

Capacity building
UNICEF, National MoH (leading on the development of policy and standards), and the Nairobi County health management team (leading on implementation) planned and held trainings on therapeutic oxygen and pulse oximeter use in children. Facilitators drawn from the Kenya MoH (Division of Neonatal and Child Health) and the national level Kenya Medical Training College (KMTC) trained 10 clinical health workers as trainers of trainers (TOTs). The 10 TOTs together with the National MoH and KMTC facilitators trained 50 clinical health care workers who were focal points for quality improvement of maternal, newborn and pediatric care from five high volume facilities in Nairobi Country as well as sub-countries. The trainings included practical demonstrations and focused on safe use of pulse oximeters and oxygen delivery devices, including troubleshooting, in the management of sick newborns and children, as well as key IPC practices.

The proportion of trainees achieving 80% or more on a skills test increased from 74% in the pre-test to 92% in the post test.

During the training sessions, it was observed that health workers had little understanding of the importance of documenting oxygen use for quality assurance as well as supply
planning. Nairobi Metropolitan Services Department of Health Services, in liaison with the Kenya National MoH, subsequently agreed to provide tools to record and monitor oxygen use and include it in the District Health Information System (DHIS).

**Onsite supportive supervision and mentoring**

Following the training, it was recommended to strengthen mentorship and on-the-job training to ensure solidification of the learnings and continue capacity building, as well as to expand trainings and mentorship to health care workers in other facilities to ensure the entire county is able to safely administer oxygen to children.

A five-day mentorship supervision activity was conducted by 12 mentors from the Kenya MoH at national level and technical managers of the Nairobi County/Metropolitan Services to the five high volume health facilities to provide on-the-job training, reinforce the skills learned in the initial training, review newborn resuscitation skills, and to identify existing gaps.

A total of 30 healthcare workers were mentored and showed they were able to use oxygen equipment and safely administer oxygen. Further observations made during the training were shared with management of the five facilities and during regular quarterly review meetings with Department of Health, the quality improvement focal points from the five health facilities, Kenya National MoH, and UNICEF, to determine actions and timelines for implementation. Key gaps identified included:

- need to develop and implement tools to monitor oxygen consumption for quality assurance, supply planning as well as patient monitoring;
- clear Standard Operating Procedures (SOPs) for oxygen therapy including target saturation, flow rate, and frequency of monitoring of oxygen saturation, should be made available at all service delivery points; and
- continued infrastructure improvements are required to address leakages in oxygen pipes and ensure appropriate oxygen supplies for use in newborns and children.

**Infrastructure improvement**

UNICEF reviewed assessments previously done by Kenya MoH and partners, and identified gaps in two of the health facilities, Mama Lucy Kibaki Hospital and Mbagathi Hospital, both of which manage a high volume of newborn and pediatric illnesses.

Mbagathi Hospital received additional pulse oximeters. The newborn unit was supported to have a complete oxygen system through installation and testing of all medical oxygen outlets, alarms, and emergency shut-off valves. A cylinder manifold cage was fabricated, erected, installed, and pressure tested.

Training of core health workers was conducted on maintenance of the medical gas accessories.

At Mama Lucy Hospital, the newborn unit room and the pediatric acute room were upgraded each to an eight-cylinder capacity manifold and interconnected to the existing 6-cylinder manifold to increase the capacity of the oxygen bank. Oxygen cylinders were delivered to the facility to increase the holding capacity of the hospital. In addition, piping and oxygen terminals were installed with flowmeters.

Training was conducted for users on safe and effective use, handling and maintenance of oxygen cylinders, pipework,
terminals, and accessories. Users were further trained on safe use of oxygen as a therapeutic gas.

**Impact**

Overall, the initiative improved availability and use of pulse oximetry, uninterrupted oxygen supplies, and record keeping to monitor oxygen delivery and outcomes.

Health worker capacity and supply of oxygen for newborns and children has improved across all five high volume health facilities in Nairobi County. While the implementation period was too short to demonstrate the impact of the interventions, early data indicate an increase in the percentage of admitted newborns in the five health facilities who were managed with oxygen.

**Lessons learned**

1. Strong collaboration of partners, at national level, with Nairobi Metropolitan Services and UNICEF, ensured ownership, design, and implementation of quality improvement interventions.

2. Onsite mentorship and on-job training provided real time support for health care workers, motivated and enhanced performance, and improved the quality care to patients and their families.

3. The new “Skills lab” at Pumwani Maternity Hospital will further enhance this approach of onsite mentorship of health care workers by providing high-quality training to more health workers from various parts of the county.

4. Enhancement of infrastructure for therapeutic medical oxygen, including infection, prevention and control, and monitoring, is a life-saving MNCH intervention, which improved care in the selected hospitals, and should be prioritized in all level 3 and 4 health facilities treating sick newborns and children.

**Sustainability and next steps**

UNICEF will continue engaging the Kenya MoH at national level and Nairobi County/Metropolitan Services in continuous periodic virtual MNCH QoC assessments and use the evidence generated to advocate for improvements in the areas of gaps.

UNICEF is supporting the establishment of a training resource center at Pumwani Hospital and plans to set up a skills laboratory as center of excellence. The skills lab would be used by all five high volume facilities in the Nairobi Metropolitan area for trainings on MNCH QoC, and other innovative approaches, as well as onsite mentorship of health care workers, including safe use of oxygen. UNICEF plans to set up skills labs in four additional counties with high burdens of maternal and neonatal mortality, to be used as regional hubs for use by counties in designated geographic areas to contribute to improvement of MNCH QoC skills and practice.

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