

Implementation of the Kangaroo Care in Burundi NEST KANGAROO CARE PROJECT CASE STUDY

# List of acronyms

AOA	Amahoro Onlus Association
ABUPED	Burundian Association of Pediatrics
ABUNE	Burundian Association of Neonatology
BPS	Provincial Health Office
CF	Chiesi Foundation
СРАР	Continuous Positive Airway Pressure
DHS	Demographic and Health Survey
EDSB	Burundi Demographic and Health Survey
EONC	Emergency Obstetric and Neonatal Care
GDP	Gross Domestic Product
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
IMF	International Monetary Fund
КС	Kangaroo Care
КМС	Kangaroo Mother Care
КМСИ	Kangaroo Mother Care Unit

# List of acronyms

КРІ	Key Performance Indicator
LBW	Low Birth Weight
MSF	Médecins Sans Frontières
NEST	Neonatal Essential Survival Technologies
NICU	Neonatal Intensive Care Unit
PNSR	National Reproductive Health Program
RMNCAH	Reproductive, Maternal, Neonatal, Child and Adolescent Health
SARA	Services, Availability and Readiness Assessment
SDG	Sustainable Development Goals
SWOT	Strengths, Weaknesses, Opportunities, Threats
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UHC	Universal Health Coverage

WHO World Health Organization

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# **EXECUTIVE SUMMARY**

# BACKGROUND

Despite global efforts to reduce neonatal deaths, a significant proportion still occurs in resource-limited countries, particularly in sub-Saharan Africa, which accounts for nearly one in three neonatal deaths<sup>1</sup>. The majority of these deaths are preventable, as over 80% of newborn deaths result from preterm birth, perinatal complications, or infections such as sepsis, meningitis, and pneumonia<sup>2</sup>. To address this<sup>3</sup>, UNICEF is focusing on two key steps: increasing access to and improving the quality of healthcare<sup>4</sup>.

In 2020, according to the WHO, approximately 13.4 million children were born prematurely, i.e., before the 37th week of gestation. Complications related to prematurity remain the leading cause of death among children under 5 years of age (around 900,000 deaths in 2019<sup>5</sup>). Many of these deaths could be prevented through low-cost interventions.

Since 2014, the Chiesi Foundation has been implementing interventions based on the Neonatal Essential Survival Technology (NEST) model. This long-term program aims to reduce neonatal mortality (0-28 days) among preterm newborns, those with low birth weight, or those with a pathology in sub-Saharan African countries, with a particular focus on French-speaking countries. In Burundi, the model has been implemented since 2014 at the Ngozi Regional Hospital.

# **OBJECTIVES**

This case study aims to showcase the NEST model's application in Ngozi province and evaluate the collaboration between the Chiesi Foundation (CF) and Amahoro Onlus Association (AOA) in improving neonatology care at Ngozi Regional Hospital, Burundi. It focuses on the dissemination of Kangaroo Care (KC) by CF and AOA, stakeholders' perceptions of their partnership, and hospital management.

This case study aims to:

- 1. Describing interventions by the Chiesi Foundation, Amahoro Onlus Association, and local/national stakeholders to reduce neonatal mortality at Ngozi Regional Hospital (2014–2023)
- 2. Evaluating the intervention's impact based on selected Key Performance Indicators (KPIs)
- 3. Highlighting good practices, innovations, and strengths of the intervention.

# **MÉTHODOLOGIE**

This cross-sectional descriptive study aims to examine the neonatology department's performance and the collaboration between the Chiesi Foundation and Amahoro Onlus Association (AOA) since 2014. Key Performance Indicators were retrospectively evaluated using data from the establishment of Neonatology Services (2014/2015) and the Kangaroo Mother Care Unit (2019).

<sup>[1]</sup> Lawn JE, Cousens S, Zupan J, et al. « 4 million neonatal deaths: when? where? why? » Lancet. 2005;365(9462):891-900.

<sup>[2]</sup> United Nations Children's Fund. « Every child alive: the urgent need to end newborn deaths ». Geneva (Switzerland); 2018.

<sup>[3]</sup> New K, Konstantopoulos A, Arulkumaran S, et al. « Every newborn: the professional organisations' perspective ». Lancet. 2014;384(9938):e25-e26.

<sup>[4]</sup> United Nations Children's Fund. « Every child alive: the urgent need to end newborn deaths ». Geneva (Switzerland); 2018.

<sup>[5]</sup> Perin J, Mulick A, Yeung D, et al. « Global, regional, and national causes of under-5 mortality in 2000-19: an updated systematic analysis with implications for the Sustainable Development Goals ». Lancet Child. Adolesc. Health 2022; 6(2): 106-15

# RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

The Ngozi Regional Hospital is central in providing neonatal health care services throughout the province and is the referral hospital for obstetric and neonatal emergencies for other district hospitals. Between 2019 and 2023, there was a significant increase in births at the hospital. These data also attest to the importance of neonatology in Ngozi province and the quality of care provided there, as shown by the increasing number of children admitted there. According to 2023 data, approximately 30% of newborns admitted to the neonatology ward at the Ngozi Regional Hospital (including inborn and outborn newborns) were preterm, and 30% of the 143 newborns admitted to the Kangaroo Mother Care Unit (KMCU) had a very low birth weight (less than 1.5 kg).

According to the analysis of the data from the study, it is understood that the mortality rate of newborns admitted to the KMCU remains above 10% when at least 80% of children leave while respecting the discharge criteria (in 2023 this percentage was attested to 84%).

It can be said that investment in infrastructure, equipment and training have contributed to making neonatology and in particular the KMCU the reference center for the care of newborns and in particular premature newborns. On the institutional level, the lessons learned highlight that the KC pilot project benefits from strong national and institutional anchoring, which has allowed the Ngozi center to be recognized at the national level as a reference center for KC (as evidenced by the signing of the National Reproductive Health Plan on November 29, 2023), in line with the targets set by t he ENAP in terms of the number of KMCU established and as the headquarters of training on neonatology at the provincial and national levels.

The national and local health authorities therefore play a fundamental role here, not only formally, but also essential for alignment with the national strategy for strengthening and decentralizing maternal and neonatal care.

### CONCLUSION

The KC pilot project within the framework of the application of the NEST model is associated with a mortality rate of newborns admitted to neonatology which, despite the increase in admissions, remained above 20%. In addition, the quality of care provided in the KMCU is high as 80% of admitted cases are discharged in compliance with the discharge criteria.

On the qualitative side, the interventions of the Chiesi Foundation have succeeded in promoting among stakeholders and at the local level (including health providers) the dignity of the newborn as a patient and the importance of care for premature babies at all levels (institutional, service providers as well as parents of newborns).

In addition, the activities carried out by the Chiesi Foundation in conjunction with the Amahoro Onlus Association have contributed to the dissemination of the approach to health care that is respectful and adapted to the needs and values of each family (family-centered care<sup>6</sup>). These are concepts that are put into practice by healthcare providers and by mothers who access the services offered in neonatology, as we have observed.

<sup>[6]</sup> Standards for improving quality of care for small and sick newborns in health facilities. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.

# **CHAPTER 1 | INTRODUCTION**

Despite sustained global efforts to reduce neonatal deaths, a significant proportion of these deaths occur in resource-limited countries, particularly in sub-Saharan Africa, which accounts for nearly one in three neonatal deaths<sup>7</sup>. The vast majority of these deaths are preventable, as over 80% of newborn deaths result from preterm birth, perinatal complications, or infections such as sepsis, meningitis, and pneumonia<sup>8</sup>. Given the importance of timely access to quality care for newborns<sup>9</sup>, UNICEF is focusing on two key steps: increasing access to health care and improving the quality of health care<sup>10</sup>.

In 2020, according to the WHO, approximately 13.4 million children were born prematurely, before the 37th week of gestation. Complications related to prematurity remain the leading cause of death among children under five years of age (approximately 900,000 deaths in 2019<sup>11</sup>). The majority of these deaths could be prevented through low-cost interventions such as Kangaroo Care, as recommended by the <u>WHO</u>.

Since 2014, the Chiesi Foundation has been implementing interventions based on the Neonatal Essential Survival Technology (NEST) model, a longterm program aimed at reducing neonatal mortality (0-28 days) of premature, low birth weight, or pathological newborns primarily in French-speaking sub-regions of sub-Saharan Africa. In Burundi, the model has been implemented in different phases since 2014 at the Ngozi Regional Hospital.



<sup>[7]</sup> Lawn JE, Cousens S, Zupan J, et al. « 4 million neonatal deaths: when? where? why? » Lancet. 2005;365(9462):891-900.

<sup>[8]</sup> United Nations Children's Fund. « Every child alive: the urgent need to end newborn deaths ». Geneva (Switzerland); 2018.

<sup>[9]</sup> New K, Konstantopoulos A, Arulkumaran S, et al. « Every newborn: the professional organisations' perspective ». Lancet. 2014;384(9938):e25-e26.

<sup>[10]</sup> United Nations Children's Fund. « Every child alive: the urgent need to end newborn deaths ». Geneva (Switzerland); 2018.

<sup>[11]</sup> Perin J, Mulick A, Yeung D, et al. « Global, regional, and national causes of under-5 mortality in 2000-19: an updated systematic analysis with implications for the Sustainable Development Goals ». Lancet Child. Adolesc. Health 2022; 6(2): 106-15

The main objective of this case study is to provide a concrete example of the application of the NEST model in the specific context of the province of Ngozi and to evaluate the results of the collaboration between the Chiesi Foundation (CF) and the Amahoro Onlus Association (AOA) in their efforts to improve the neonatology care at the Ngozi Regional Hospital in northern Burundi.

This study will examine the neonatology-focused components of the NEST program, particularly Kangaroo Care (KC), which is considered a priority for preterm newborns, as well as stakeholder perceptions of the collaboration between the two organizations and the Ngozi Regional Hospital.

This study was conducted from April to September 2024 and includes observations made during a field visit conducted from September 17 to 19, 2024. The survey specifically considered aspects related to the history of collaboration between the two mentioned organizations, the results achieved, good practices related to neonatal health, as well as the application of KC while highlighting successes and areas of weakness requiring improvement.

The conclusions drawn will allow for relevant targeting within the new projects prepared within the framework of the collaboration between the Chiesi Foundation, the AOA, and the health authorities of the province of Ngozi, to continue improving the quality of maternal and newborn health care.

### **1.1 BACKGROUND**

Burundi, a landlocked country in East Africa with a population of 12,890,000 as of 2022<sup>12</sup>, is experiencing a structural socio-economic and political crisis aggravated by cyclical climate shocks. Long-term development issues such as widespread poverty and lack of access to basic services are persistent challenges. The poverty rate continues to rise, reaching 87.1% of the population in 2021. In 2022, Burundi ranked 187th out of 189 countries on the Human Development Index (HDI).

With a Gross Domestic Product (GDP) per capita of USD 269 according to October 2022 figures from the International Monetary Fund (IMF), Burundi is among the poorest countries globally. Approximately 80% of the population lives below the poverty line<sup>13</sup>. The Multidimensional Poverty Index established by the United Nations Development Programme (UNDP) stands at 75.1%, indicating that nearly 8.1 million individuals (out of a population of 12.3 million, 65% of whom are under 25<sup>14</sup>) live in multidimensional poverty<sup>15</sup>. GDP growth remains insufficient to keep pace with one of the highest population growth rates in sub-Saharan Africa and the world (3.5% per year, with a birth rate of 6.4 children per woman)<sup>16</sup>. Burundi is also one of the most densely populated countries, with 470 inhabitants per km<sup>2</sup>, and sparsely urbanized (14.4%)<sup>17</sup>.

Despite advancements in maternal and neonatal health, infant mortality rates for children above five years old stand at 53 per 1,000 live births, with neonatal mortality rates at 20 per 1,000<sup>18</sup> (2021).

[12] Countdown to 2030 Burundi

[13] <u>https://donnees.banquemondiale.org/indicateur/SI.POV.DDAY?locations=Bl;</u>

https://www.unicef.org/burundi/media/1161/file/Burundi:%20rapport%20sur%20la%20pauvret%C3%A9%20des%20enfants.pdf

<sup>[14]</sup> Enquête intégrée sur les conditions de vie des ménages au Burundi (EICVMB) 2019-2020, ISTEEBU. Population burundaise : 12,3 millions de personnes (50,4 % de femmes). Structure démographique caractérisée par son extrême jeunesse : 44 % de la population à moins de 15 ans, 47 % de moins de 18 ans, 65 % de la population de moins de 25 ans

<sup>[15]</sup> UNDP. « Rapport sur le Développement Humain 2021/2022 »

<sup>[16]</sup> According to ISTEEBU: average of 6.4 children per woman, with 752 births recorded per day and demographic projections of 12.8 million in 2022 and 14.8 million in 2035. Which will then bring the population density to 565 inhabitants/km<sup>2</sup>

<sup>[17]</sup> Source ISTEEBU

<sup>[18]</sup> UNICEF, IGME 2022, https://data.unicef.org/countdown-2030/country/Burundi/1/

Neonatal deaths constitute the majority of deaths among children under five years old (39%). According to WHO data, the main causes of neonatal death are prematurity (42%) and asphyxia (24%). Although there has been progress in reducing neonatal mortality, the country is far from achieving the targets set by the National Strategic Plan for Reproductive, Maternal, Neonatal, Child, and Adolescent Health (PSN-RMNCAH: 2019–2023), aiming to reduce neonatal mortality by 35% by 2030 compared to the 2016/2017 levels.

For instance, Burundi has one of the highest child stunting rates globally, with over 56% of children under five affected<sup>19</sup>. Stunted children face significant cognitive and physical limitations that can last a lifetime, hindering productive activities. The Human Capital Index (ICH) indicates that children born in Burundi in 2020 will reach only 39% of their potential had they received full education and good health care.

Despite recent improvements, the health status of the Burundian population remains precarious. Only a quarter of the population benefits directly from free and minimal healthcare services, which are fragmented and low-quality. The targeted free care for pregnant women and children, adopted in 2006, is enshrined in national policies and supported by development partners, particularly the European Union. This initiative marks a step towards Universal Health Coverage (UHC)<sup>20</sup>. Recent UNICEF data from October 2022 shows that while the health of children under five has improved, these gains remain fragile<sup>21</sup>.

Children aged 7 to 13 suffer from multiple deprivations, with food insecurity (67.7%), lack of access to sanitation (60.5%), inadequate hygiene, poor water quality, housing issues, limited access to literacy education, and lack of a protective environment being the most common<sup>22</sup>. Additionally, only 42% of children received sufficient information on these topics.

The results of the National Reproductive, Maternal, Newborn, Child, and Adolescent Health Strategy (RMNCAH) and family planning initiatives remain modest<sup>23</sup>. Adolescents aged 14 to 19 years, who represent 13.5% of the total population, face high risks related to fertility<sup>24</sup> and early childbirth.

Burundi's health system operates on performancebased financing and provides free care for women during pregnancy and for children under five years of age. Free treatment includes hospitalization (additional examinations and injectable drugs only) and outpatient consultations in hospitals but excludes examinations and medicines prescribed on an outpatient basis.

#### [19] Ibid

<sup>[20]</sup> Antenatal care services were used in 2016 by 47% of expectant mothers (21% in 2010), but in 2021, the proportion of women who had at least one of the four early antenatal consultations reached only 40.5%, predicting the failure to achieve the 2023 SRMNIA target set at 52%. In addition, the assisted delivery rate has fallen to 5% below the target set (91%). The maternal death ratio, which fell between 2010 and 2016 to reach 334 deaths per 100,000 births, remains well above the 2030 SDG target (less than 70 deaths); the mortality rate, meanwhile, reached 23 deaths per 1,000 births (2030 SDG target: 12 / 1,000). In fact: the midterm evaluation of the SRMNIA strategy notes that only 10% of Health Centers (mostly private) have services and care for newborns.

<sup>[21]</sup> The infant mortality rate is estimated at 54/1000 children (i.e. 1 in 18 children in 2022); globally, it is 37.6/1000 (i.e. 1 in 27 children in 2021). Mortality of children under 5 years of age fell from 62/1000 live births in 2017 to 54/1000 in 2020. Its decline is slowed by neonatal mortality, which fell very little between 2017 and 2020: 1.5 children/1000 (from 22.4 to 20.9).

<sup>[22]</sup> Social Policy Research Institute « Privations Multidimensionnelles au Burundi (MODA) » 2022.

<sup>[23</sup> The SRMNIA Strategy and the targets on family planning (FP) of 26%, modest compared to the global average (75.7% in 2019-WHO), did not exceed 23.6% in 2021. Universal access to Sexual and Reproductive Health (SRH) is progressing far too slowly: 30% of women in union (sexually active) have unmet needs for family planning and the contraceptive prevalence rate remains low (29% in 2017). 8% of adolescent girls aged 15-19 have already started their reproductive life (of which 6% have at least one child and 2% are pregnant). This percentage varies greatly with the level of education: it is 4% for those who have reached secondary or higher level; it is 19% for those with no level of education. Access to sexual and reproductive health services remains problematic for unmarried adolescents and young people. The fertility rate thus remains very high: between 5.2 and 6.4 per woman of childbearing age, depending on the year and the source.

<sup>[24]</sup> Their early entry into reproductive life and the multiple deprivations they have to face (since childhood) translate into health problems through psychosocial disorders, early and unwanted pregnancies (which sometimes lead to gynecological and obstetric problems), lack of knowledge of sexually transmitted diseases, etc.

According to the Services, Availability, and Readiness Assessment (SARA) survey conducted in 2017<sup>25</sup>, 38% of health facilities have at least one provider trained in neonatal resuscitation.

The survey also revealed that only 57% of health facilities offer neonatal resuscitation services. The Kangaroo Method for preterm or very small newborns is utilized in only 29% of facilities, though cord hygiene and immediate exclusive breastfeeding show higher coverage rates (78% and 76%, respectively).

A 2012 report by the Ministry of Public Health and the Fight against AIDS in Burundi[1] indicated the total number of human resources in health was 15,937, including 5,957 nurses, 418 doctors, 16 midwives, and other support staff. This translates to one doctor for every 19,231 inhabitants, while the WHO recommends at least one doctor for every 10,000 inhabitants.

Conversely, the nurse-to-population ratio is satisfactory, with one nurse for every 1,349 inhabitants (the WHO standard being one nurse per 3,000 inhabitants). However, there is a significant shortage of midwives (one midwife for every 124,312 women of childbearing age). Most provinces lack specialist doctors as 70% of them are based in Bujumbura City, along with 50.5% of all doctors and 21% of all nurses.

Providing sustainable access to quality care in Burundi poses a significant challenge due to the available resources and rapid population growth. Indicators related to Universal Health Coverage (UHC) associated with Sustainable Development Goal (SDG) 3.8 (coverage of essential health incidence services, of household health expenditure) and population health status (maternal and neonatal mortality rates (SDG 3.2.2), adolescent fertility rate, malnutrition) reflect a critical situation that necessitates а multidimensional approach.

# **1.2 SPECIFIC CONTEXT IN THE PROVINCE** OF NGOZI

In Burundi, the risk of infant mortality is highest during the first 28 days of life (neonatal period), with approximately 39% of all deaths of children under 5 years of age occurring during this time<sup>27</sup>.

Almost half of neonatal deaths transpire within the first 24 hours of life, and 75% occur within their first week.

The primary causes of these deaths are prematurity (42%), severe infections such as sepsis and pneumonia (26%), and asphyxia (24%)<sup>28</sup>.

The current infant mortality rate in Burundi stands at 47 per thousand, rising to 60 per thousand in the province of Ngozi<sup>29</sup>.

In comparison, Sustainable Development Goal (SDG) 3.2.1 aims to reduce under-5 mortality to 25 per thousand by 2030, and SDG 3.2.2 aims to reduce neonatal mortality to a maximum of 12 per 1,000 live births.

 [25] Republic of Burundi, Ministry of Public Health and the Fight against AIDS « Résumé analytique du profil sanitaire du Burundi » https://files.aho.afro.who.int/afahobckpcontainer/production/files/Profil Sanitaire Burundi Version finale du 22 MAI 2021.pdf
 [26] https://extranet.who.int/countryplanningcycles/sites/default/files/planning\_cycle\_repository/burundi/profil rh vf 22 janvier 20121.pdf
 [27] Countdown to 2030 Burundi Country Profile <a href="http://countdown2030.org/wp-content/uploads/2018/01/Burundi-CD2030.pdf">http://countdown2030.org/wp-content/uploads/2018/01/Burundi-CD2030.pdf</a>

[28] Ibidem

[29] ENAP – Every Newborn Action Plan, SDG target 3.2.

# Overview of Ngozi Province

- Area: 1,474 km<sup>2</sup>
- Number of inhabitants of the city of Ngozi: 120,557
- Number of municipalities in the province: 9
- Number of inhabitants by health district: Ngozi (325,918), Buye (228,293), Kiremba (309,255)

FIGURE 1. Burundi and its provinces

Below is a comparative table of selected maternal and newborn health indicators at the national and provincial (Ngozi) levels.

Table 1 – Maternal and Newborn Healt	Indicators at the National	and Provincial Levels (Ngozi)
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Indicator	Burundi	Ngozi Province
% of births among women aged 15-19 years	8%	15%
% of women who received antenatal care	99%	99%
Institutional delivery rates	84%	86%
Rate of home births/community level	12%	-
Rate of Assisted Deliveries in the Health Unit	85%	87%
Maternal mortality ratio per 100,000 live births	334	-
Neonatal mortality rate per 1000 live births	20	-
Infant mortality rate (under 5 years of age) per 1000 live births	53	60
% of women who received assistance within 48 hours of giving birth	51%	-
% of newborns who died in a health facility	3.60%	-
Rate of newborns with a birth weight of less than 2.5 kg	4.80%	-
Rate of newborns who received care within 48 hours of birth	49%	-
Rate of children under 5 years of age with stunting	56%	61%
Infant mortality rate (children under 12 months of age)	47	60
Neonatal mortality rate among under-5 deaths	39%	-
HIV prevalence rate among women of reproductive age (15 – 49 years)	1.40%	0.30%
Rate of prematurity	11%	24.10%
KC (Kangaroo Care) coverage rate	29%	-
Stillbirth rate	27%	-

Sources: USAID, UNICEF, Ministry of Health. EDSB 2016-2017, PSN-RMNCAH 2019-2023 Ministry of Health; Countdown to 2030 Burundi



#### Ngozi Regional Hospital Overview

The Ngozi Regional Hospital was established in 1930. It underwent its first renovation in 1997, when Médecins Sans Frontières (MSF) conducted partial rehabilitation work. In 2004, with financing from the World Bank, extensive additional renovations were completed. New structures, including management offices, emergency room, clinics, operating theatre, laboratory, and pharmacy, were constructed, while existing hospital pavilions were renovated. Further interventions were carried out with funding from the Amahoro Onlus Association.

Within the Burundian health system, Ngozi Regional Hospital functions as a third-level regional hospital for the northeastern provinces of Burundi, serving a reference population of approximately 4 million inhabitants. Ngozi province comprises 96 health facilities, of which 75 (78%) have maternity wards, including 65 health centres (six faith-based, four private, and 55 public), seven hospitals (four public, three private), and three medical centres (two private, one conventional). The organizational system in this province is based on the Hub-and-Spoke model<sup>30</sup>.

Health centres manage physiological pregnancies carried to term and refer cases with specific pathologies or complications to district hospitals. At the apex of this system is Ngozi Regional Hospital, serving as the third-level referral centre. Ngozi Regional Hospital provides a wide array of diagnostic and care services, including emergency, intensive care, outpatient consultations, internal medicine, surgery, obstetrics, pediatrics, neonatology (with a KC Unit and NICU), malnutrition, odontostomatology, physiotherapy, laboratory analysis, HIV care, radiology, transfusion services, pharmacy, motor rehabilitation, and outpatient ophthalmology consultations. Data collection is managed using the Open Clinic system.

Since 2009, the hospital has also served as a practical training facility for students pursuing Diplomas in Nursing Sciences at the University of Ngozi and, more recently, other universities in the country, including the University of Bujumbura.

In 2012, with funding from the Cariverona Foundation and the Swiss Cooperation, construction commenced on a building dedicated to maternal and child health.

This new structure now spans 5,000m<sup>2</sup> and includes obstetric and pediatric emergency departments, neonatology, pediatrics, delivery rooms, and operating theatres.

The following medical staff are currently in charge of maternal and child health services:

Table 2 – Maternal and child health staff in Ngozi Regional Hospital

Type of staff	Number
General practitioners	5
Specialists	1 pediatrician (external consultant)
Nurses	39 in pediatrics: 16 in neonatology, 10 in delivery rooms
Midwives	8

[30] The hub-and-spoke is a model that consists of a key establishment (hub) that offers a wide range of services, accompanied by secondary establishments (spoke) offering a more limited range of services and which redirect patients requiring more intensive treatment and care to the hub. Cfr. https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-017-2341-x Although specialized medical staff are available, their numbers are insufficient to meet the increasing demand for maternal and neonatal services in hospitals and to maintain quality standards of care for newborns with complications.

It is recommended to have at least three pediatricians to ensure that a specialist in neonatal health care is available 24 hours a day, along with nurses specialized in intensive care for newborns.

Additionally, the number of pediatricians, as well as other nurses and doctors<sup>31</sup>, remains inadequate. Nationally, there are an estimated 24 pediatricians, which is insufficient for the pediatric population (under 5 years old) and adolescents (aged 5-19), who together constitute almost 47% of the total population.

# <u>Overview of the Neonatology Department of the</u> <u>Ngozi Regional Hospital</u>

Ngozi Regional Hospital is a key provider of neonatal health care services in the province and serves as the referral hospital for obstetric and neonatal emergencies for other district hospitals. Between 2019 and 2023, there was a notable increase in births.

According to data from 2023, approximately 30% of newborns admitted to the NICU, including both "inborn" and "outborn" infants, were premature. Additionally, 30% of the 143 newborns admitted to the KMCU had a very low birth weight, defined as less than 1.5 kg.

Table 3 – Overview of the hospital's activities since 2020 in the field of maternal and newborn health

	2020	2021	2022	2023
Total number of births	3,569	3,358	3,709	4,019
Number of live births	3,540	3,328	3,682	3,877
Number of admissions to the Neonatal Intensive Care Unit (NICU): inborn + outborn	1,616	1,447	1,463	1,487
Number of newborns cared for in the NICU with a weight of less than 2 kg	751	638	781	703
Number of newborn deaths managed in the NICU	200	147	183	255

Source: Evaluation report of the neonatal assistance of hospitals in the Ngozi Health Province, by the AOA (September 2023). Data collected from the neonatology department and KMCU registries.

The neonatology department, which became fully operational in 2019, has a considerable accommodation capacity with 38 beds, offering neonatal intensive care in the NICU.

Newborns are distributed across various rooms based on their pathology, accommodating between 30 to 50 infants daily. The NICU comprises three rooms: a reception room, a hygiene room where parents and visitors can wash their hands and receive personal protective equipment, and a dedicated intensive care room equipped with incubators. Located adjacent to the delivery room, the neonatology department allows for immediate transfer of newborns and facilitates effective teamwork between the obstetrics and neonatology departments. Additionally, there is an admissions room and a room for the follow-up of newborns during the first 48 hours post-physiological delivery. Two doctors are assigned to the neonatology department: an expatriate pediatrician (Dr. Chiara Mezzalira) and a general practitioner Head of Service, trained on-site by the neonatal health care specialist (Dr. Sandrine Mukeshimana).

[31] WHO has identified an index of 4.45 health personnel (doctors, nurses and midwives) per 1000 population to achieve the SDGs by 2023.

Number of newborns admitted to neonatology	2019	2020	2021	2022	2023
Total Admissions	1,521	1,616	1,447	1,463	1,487
Inborn	1,030	1,024	984	1,003	1,023
Outborn	491	592	463	460	464
Deaths	208	200	147	183	255

Table 4 – Analysis of in-born – outborn admissions between 2019 and 2023

The data indicates fluctuations in the number of deaths. This trend can be attributed to the implementation of interventions aimed at enhancing the quality of care services for critically ill newborns, as detailed in this case study. Additionally, Ngozi Neonatology serves as a referral center for obstetric and neonatal emergencies due to its status as a third-level hospital. It is anticipated that the number of deaths will decline in the long term as secondary-level (district) hospitals improve their capacity to manage obstetric and neonatal emergencies and as the quality of care in Ngozi Neonatology increases.

Since 2013, the Kangaroo Care method (KC) has been employed for premature and/or low birthweight newborns. In 2014, despite space constraints, intermittent kangaroo care was practiced when mothers were alongside their babies, demonstrating cooperation with staff.

By August 2015, a larger room equipped with sun loungers and beds near incubators was established. Since 2019, dedicated spaces for continuous KC, complete with maternal beds, have been created, forming a distinct "unit" within the neonatology department. The KC unit serves as a supportive environment for families to practice Kangaroo Care under medical supervision, fostering mother-child bonding and promoting newborn neuroprotection. It also facilitates shared learning experiences for mothers and families. From 2019 to 2024, key areas of focus included: the training and preparation of KMCU staff, the development and implementation of clinical guidelines and protocols, enhancement of communication within the neonatology team and with hospital staff, and the establishment of a network between Ngozi Regional Hospital and other birth centers in Ngozi Province, recognizing it as a national reference center for KC training and dissemination.

Ngozi Regional Hospital, particularly the KMCU, functions as a hub for practical training and the dissemination of the KC model. It is equipped with facilities to organize training sessions, courses, and promotional activities on KC and essential maternal and newborn care.

The main objectives of the KMC Unit are to:

- Improve care and achieve better outcomes for preterm and/or low birth weight newborns.
- To ensure the best possible physical, psychological, neurological and emotional development for the newborn and also to allow his mother and family to have a positive experience of birth in a context of fragility. This component is implemented through the distribution of meals and breakfasts, or through the realization of practical and educational activities for mothers.
- Provide a place where the mother, as well as her family, can feel comfortable.

Within the neonatology department, the space designated for the KMCU comprises a rest room for mothers, a visiting room, a room for workshops and training, and a refectory. The unit also contains a 7-bed room (mother-child unit) where mothers and their newborns are cared for following discharge from the maternity ward (within the first 30 days of life) or transferred from the neonatology department when dealing with chronic pathologies.

A dedicated nurse is assigned to the unit, ensuring adherence to a protocol that outlines admission and discharge criteria. Educational activities and meal distribution are organized to encourage mothers to remain in the KMCU until their children meet the discharge criteria. Additionally, upon discharge, mothers receive family hygiene kits designed to promote good practices upon leaving the hospital. The KMCU also features a consultation room that operates on an outpatient basis for newborns discharged from the maternity ward. During admission, neonatal staff assist mothers and their babies to the KMCU, where an evaluation procedure assesses admission parameters (e.g., weight) and provides clean clothing for the mother. Furthermore, breastfeeding attachment and skinto-skin contact are supported and facilitated by the staff.

The KC project involves the collection and storage of activity data by the nursing staff of the hospitals and the participating Health Training (health centers with maternity wards and delivery rooms). According to the memorandum of understanding between the AOA, Chiesi Foundation, and the Management, signed in November 2022, the medical and hospitalization costs for all mothers and their newborns are covered by the Ngozi Regional Hospital.

The KMCU has the following human resources:

- 1. Medical staff: Head of the Neonatology
- 2. Coordination staff: one nurse (AOA)
- 3. Nurses: three nurses (AOA)
- 4. Hygiene and laundry staff: two sisters, Sisters of Mercy (AOA)
- 5. Cleaning staff: one person (Ngozi, workers in common for all neonatology)
- 6. Psychological support staff: a psychologist (AOA)

This memorandum of understanding stipulates that Ngozi Regional Hospital will, in the future, formalize the contractualization of human resources concerning points (iii) and (vi). It should be noted that the local staff of AOA refer to the management of Ngozi Regional Hospital for their work. They will perform their duties according to Burundian laws and the agreements signed between Ngozi Regional Hospital and AOA. During the study, it was observed that the admission procedures and the initial vision advocated for Kangaroo Care (KC) were adopted and implemented by the staff and beneficiaries (kangaroo mothers) through all the interventions supported by AOA in collaboration with the Chiesi Foundation and the Hospital. Specifically, this vision encompasses:

- Adoption of comprehensive care within the developmental care framework: promoting a strategy that focuses not only on medical treatment but also on practices aimed at protecting and fostering the growth and development of newborns. Examples include gradual contact, parental involvement in newborn care, and decision-making regarding treatment. This approach is crucial in reducing stress for the newborn.
- Family-centered care: an approach that emphasizes respectful assistance aligned with family values. This includes unrestricted access for parents, promotion of exclusive breastfeeding, and gradual contact, which are widely practiced in the KMCU of Ngozi.

Below is the evolution of the number of admissions to the KMCU since 2019:

	Sep - Dec 2019	2020	2021	2022	2023	Jan - Aug 2024
Total Admissions	83	215	185	170	143	100

This document will later provide an analysis of this evolution in the section on Key Performance Indicators (KPIs). However, it is already evident that since the establishment of neonatology, there has been an increase in both admissions and deaths. This is a common outcome when implementing programs intended to enhance neonatal care quality.

Furthermore, Ngozi Regional Hospital holds a pivotal role in the region for obstetric and neonatal emergencies, thus an increase in newborn admissions, particularly critical cases. was anticipated given its status as the reference NICU for the entire region. In conclusion, interventions aimed at improving care quality, alongside the operationalization of high-quality and intensive care services such as neonatology, make this trend foreseeable. Strengthening care in district hospitals and health centers that refer to the hospital may lead to a reduction in admissions, especially those involving the most severe cases. Consequently, a decrease in the number of deaths can be expected.

# **1.3 OBJECTIVES OF THE CASE STUDY**

In Burundi, as in the rest of the world, the neonatal period (less than 28 days) is the most critical for child survival, with mortality during this time accounting for approximately 39% of deaths occurring before the age of five.

The Chiesi Foundation, through its NEST model, is dedicated to promoting and disseminating the Kangaroo Care (KC) method at the provincial level to enhance the quality of neonatal care, particularly for premature newborns. This commitment involves strengthening newborn care and encouraging skin-to-skin practices at the hospital. The objectives of this case study are to:

- Provide a comprehensive description of the interventions by the Chiesi Foundation and its partner, AOA, along with other stakeholders at both local and national levels, who are engaged in efforts to reduce neonatal mortality at Ngozi Regional Hospital from 2014 to 2023
- Evaluate the impact of these interventions based on the Key Performance Indicators (KPIs) selected by AOA and the Chiesi Foundation
- Illustrate best practices, highlight the innovations and strengths of the intervention, and identify its weaknesses, obstacles encountered, and future opportunities.

Finally, this case study attempts to answer these questions:

- To what extent has the implementation of the NEST model. along with the relevant interventions by both organizations in collaboration with the management team of Regional Hospital, contributed Ngozi to enhancing access to quality neonatal care, including Kangaroo Care services?
- What lessons have been learned, and what strengths, innovations, and best practices have emerged from the intervention that could be replicated in other hospitals within the Ngozi province?
- What are the future prospects for continually improving the quality of neonatal care, particularly for premature newborns, in Ngozi province?

# **CHAPTER 2 | METHODOLOGICAL NOTES**

# 2.1 TOOLS AND BIBLIOGRAPHIC SOURCES

This cross-sectional descriptive study with an analytical purpose aims to highlight the functioning of the neonatology department as well as the results of the collaboration between the Chiesi Foundation and the Amahoro Onlus Association (AOA) since 2014.

To do this, the evaluator analysed the information and data contained in the following documents:

- "Progetto pilota sulla diffusione del metodo canguro nei Centri nascita della Provincia di Ngozi"
   Project report, phases 1 and 2 (2022/2024)
- "Evaluation of Maternal and Neonatal Care in the Ngozi Health Province" (WeWorld GVC – Amahoro Onlus Association, 2021)
- "Pediatric Department of the Autonomous Third Reference Hospital of Ngozi" - Activity report (April-June 2022, Dr M. Vittoria Mattei)
- Burundi Statistical Yearbook 2022 and 2023
- Presentation "Experience of the Kangaroo Care Unit in the interior of the country: the case of the Ngozi Regional Hospital"
- Database of the KMC Unit and the Neonatology Department of Ngozi and the OBS Department
- Other data from the Burundian health information system
- Memoranda of Understanding between stakeholders.

The primary source of health data utilized is the AOA's monitoring database, which consolidates information periodically collected from targeted health facilities.

This selection was founded on the indicators outlined in the expected results for the first phase of the NEST model and the KC pilot.

Data collection occurs during routine supervision conducted by the Amahoro Onlus Association at the hospital.

Where necessary and feasible, the information was corroborated and/or supplemented with official diagnostic data from Emergency Obstetric and Neonatal Care (EONC).

This audit was carried out in collaboration with the hospital management and the neonatology department, assisted by AOA staff who provided relevant documentation, such as visit reports.

Additionally, international data were employed to benchmark against nationally recognized health goals, including the SDGs.

Sources consulted include recent publications by international organizations, such as specialized agencies of the United Nations, and the online archive of official national health statistics by country (including the UNSOC diagnosis). However, several limitations must be considered when interpreting some of the data used in this case study:

- The data was analyzed retrospectively. It should be noted that the availability of some data, particularly for KCs, is limited; although monitoring and evaluation systems exist, they can still be improved.
- The generalization of the results of this study is confined to the specific context of the province of Ngozi (with the Ngozi Regional Hospital being the only facility in this region).
- Each component of the intervention by the Chiesi Foundation and the AOA should be analyzed separately to understand its impact fully.

# **2.2. INTERVIEWS CONDUCTED**

The evaluators used discussions with local stakeholders to verify, refine and confirm the accuracy of the information from the project documents. The following interviews were conducted remotely and during the field mission:

Organization	Name	Function / Role	Interview dates
Association Amahoro Onlus	Prof Ezio Maria Padovani	Vice-President	Various contacts from June 2014 and during the course of the study
Association Amahoro Onlus	Dr Chiara Mezzalira	Pediatrician. Assigned to the neonatology department of the Ngozi Regional Hospital	Field mission from 16 to 18 September 2024 (interview on 16 September)
Chiesi Foundation	Michela Papotti	Project Manager	Various contacts from June 2024 and during the field mission (17 September)
Chiesi Foundation	Federica Cassera	Program Development Officer	Various contacts from June 2024, during the conduct of the study and during the field mission (17 September)
Chiesi Foundation	Massimo Salvadori	Coordinator	Various contacts from June 2024, during the conduct of the study and during the field mission (17 September)
Chiesi Foundation Consultant	Dr Lucia Tubaldi	Neonatologist NEST Trainer	Interview conducted on September 5, 2024
Ngozi Regional Hospital	Dr Guillaume Ntawukuriryayo	Director	Field mission from 16 to 18 September 2024 (interview on 16 September)
Ngozi Regional Hospital	Dr Sandrine Mukeshimana	Head of the Neonatology Department	Field mission from 16 to 18 September 2024 (interview on 16 September)
Ngozi Provincial Health Bureau (PNSR)	Dr Jean Bosco Niyonzima	Medical Director of the Ngozi Health Province	Field mission from 16 to 18 September 2024 (interview on 18 September)
National Reproductive Health Program (PNSR)	Dr Ananie Ndacayisaba	Program Director	Field mission from 16 to 18 September 2024 (interview on 17 September)
AAO	Israel Yamuremye	Nurse - Responsible for the follow-up of newborns in the neonatology unit	Mission between 16 and 18 September 2024 (interview on September 17, 2024)
AAO	Jacqueline Namahoro	Nurse dedicated to the Kangaroo Mother Care Unit	Mission between 16 and 18 September 2024 (interview on September 17, 2024)

# 2.3. KEY PERFORMANCE INDICATORS (KPI)

In order to assess the impact of the Chiesi Foundation's interventions in partnership with the AOA and to answer the first research question, the following indicators were selected from the KMCU database made available by the hospital staff. This selection was made in coordination with the technical referents of the Chiesi Foundation and the AOA.

# 2.3.1 Key Performance Indicator 1

This study looked at the evolution between 2014 and 2023 of:

1.1. Number of admissions to the neonatal ward at Ngozi Regional Hospital (inborn/outborn) and % of newborns admitted to the NICU among newborns born in hospital

1.2. Institutional mortality rate in the Ngozi NICU

This data provides insights into the trends in neonatal admissions, including among live births at Ngozi Regional Hospital. Additionally, they reflect the impact of interventions under the NEST model and the training conducted in recent years (see List of Training Courses – Appendix 2). An analysis of the causes of admissions for 2023 was performed as a retrospective study, examining the causes since 2019 with more detailed research.

# 2.3.2 Key Performance Indicator 2

To evaluate the accessibility of Kangaroo Care (KC) at Ngozi Regional Hospital, an indicator has been selected that pertains to the number of newborns receiving KC at this health facility.

Indicator 2 considers the total number of new births admitted to the KMC Unit (KMCU), which operates under a specific protocol. This indicator analyzes several data points related to the functioning of the KMCU. These include the number of newborns transferred to the unit who are discharged according to protocol criteria, as well as the mortality rate among newborns admitted to the KMCU. These indicators can provide partial insights into the quality of service offered. The data used for analysis were collected from the KMC Unit on admitted patients since its establishment in 2019.

# 2.3.3 Key Performance Indicator 3

As part of the assessment of preterm newborn care, with a particular focus on the quality of services provided within the Kangaroo Mother Care Unit (KMCU), a key performance indicator was selected for analysis. The indicator in question is the duration of stay in the KMCU, and its trend from 2020 to 2023 was examined. It is important to note that the duration indicated here does not represent the total hospitalization period from arrival or birth to discharge, as there is an initial stabilization period in the Neonatal Intensive Care Unit (NICU) before transfer to the KMCU.

Calculation and description of the indicators. Number of N-Borns welcomed in relation to their weight at the Kangaroo Mother Care Unit:

- Weight <1,000 gr
- 1,001 1,500 gr
- 1,500 2,000 gr
- >2,000 gr

These indicators were selected as key indicators in the monitoring recommended by the WHO<sup>32</sup> and which were available.

# **CHAPTER 3 | ANALYSIS OF RESULTS AND DISCUSSION**

# 3.1 HISTORY OF THE PARTNERSHIP FOR THE IMPLEMENTATION OF THE NEST MODEL IN BURUNDI

The Chiesi Foundation has facilitated the implementation of the NEST model at Ngozi Regional Hospital, adopting a comprehensive approach to enhancing the quality of essential neonatal care. In pursuit of this goal, the Chiesi Foundation has bolstered the efforts of the Amahoro Onlus Association (AOA), which has been active in Burundi since 2000. The AOA undertakes within the socio-health projects sector. collaborating with the hospital and the University of Ngozi to improve the quality of care by reorganizing neglected services.

Over time, the Amahoro Onlus Association has initiated various interventions aimed at improving infrastructure and strengthening the capabilities of health personnel, thereby contributing to establishing Ngozi Regional Hospital as the regional reference center, particularly in maternal and neonatal health. Due to its extensive experience with the University of Ngozi-an institution that maintained a partnership with the University of Verona in Italy—the AOA has become the primary partner in the field of neonatal care. This interuniversity collaboration encompassed the construction of the University of Ngozi's headquarters and the organization of nursing courses, intending to transform Ngozi Regional Hospital into a practical training ground.

The Chiesi Foundation began supporting the

enhancement of neonatal care following the NEST model in the Ngozi region in 2014, forming an agreement with the Amahoro Onlus Association. This protocol addressed the organization of the department Ngozi neonatology at Regional Hospital. In 2017, the Chiesi Foundation, in collaboration with the Amahoro Onlus Association, health authorities, and hospital management, committed to initiating a new project at Ngozi Regional Hospital. This project aimed to establish the KMCU, a unit dedicated to the integrated reception of mothers and newborns and the promotion of the Kangaroo Care method. By 2019, the KMCU was established to offer Kangaroo Care (KC), a WHO-recommended practice that enhances the health and well-being of newborns and their mothers through early, continuous, and prolonged skin-to-skin contact. The KMCU, comprising eight beds, is situated within the neonatology department. From 2014 to the present, the Chiesi Foundation has worked mainly in partnership with the Amahoro Onlus Association, in the following context:

### 2014-2016

- Chiesi Foundation Amahoro Onlus Association Agreement: this agreement signed in 2014 provides for the creation of a partnership for the implementation of activities for the organization of neonatal healthcare, more specifically for the operationalization of the NICU
- Integrative letter of the Agreement with Amahoro Onlus Association signed in 2015 for the acquisition of equipment for neonatology.

### 2017-2019

• Memorandum of Understanding 2017-19 between the Chiesi Foundation and the Amahoro Onlus Association (signed in 2017 and renewed in 2018): this agreement aimed to contribute to the reduction of neonatal mortality through i) support for the infrastructure of the new neonatology in the mother-child department of the Ngozi Regional Hospital, and ii) specific support for the new neonatology department, the creation of a training and communication network between the Ngozi Regional Hospital, the hospitals of the districts of Mivo, Kiremba and Buye, and the health centers. This Memorandum of Understanding was renewed in 2018.

### 2020

 In October 2020, a new Memorandum of Understanding (MoU) was signed by the Chiesi Foundation with the AOA to i) set up a training center in Ngozi Regional Hospital and widely disseminate the KC methodology in hospitals in the health districts of Ngozi Province, and ii) implement a project to improve data collection.

### 2021-2023

• From 2021 to 2023, the two organizations signed several agreements and addenda related to the implementation of the pilot project for the dissemination of KC in the Ngozi Regional Hospital and in the hospitals of the health districts of the province of Ngozi.

Among the most important partners are the local governments and the hospital management team, which are at the same time partners in the implementation of activities and beneficiaries of technical assistance in the management and organization of neonatal care. The AOA, together with the Chiesi Foundation, has signed memoranda of understanding with:

- The Ngozi Regional Hospital, represented by its management
- The BPS of Ngozi, represented by the Chief Medical Officer of the Province
- These agreements show the strong anchoring of the project in public programs and institutions at all levels and form the basis of actions to sustain the project.

# 3.2 THE KANGAROO CARE PROJECT AND ITS IMPLEMENTATION

In this subsection, we will examine the anticipated results of the Kangaroo Care pilot project and assess their level of completion to determine its effectiveness. The term Kangaroo Care, rather than Kangaroo Mother Care, was chosen to highlight the importance of both the mother and newborn by promoting a care strategy inclusive of all family members. The AOA, in collaboration with the Chiesi Foundation, is executing this project to reduce neonatal mortality by adhering to principles of essential care and scientific evidence through an economically, technically, and environmentally sustainable approach. The primary intervention promoted is the widespread adoption of the Kangaroo method (KC) for managing premature and/or low birth weight newborns in maternity wards within Ngozi province.

The objective is to propagate KMS as a management method for preterm and/or low birth weight infants as part of a continuum of care that begins at birth, continues throughout hospitalization, and extends after discharge until the infant reaches 40 weeks of corrected gestational age or a weight of 2.5 kg.

The project, titled "Progetto pilota diffusione della KC nei Centri nascita della Provincia di Ngozi," comprises multiple phases, with the second phase currently ongoing. The project was initiated with the establishment of the KMCU at the Ngozi Regional Hospital to reinforce and disseminate it at the provincial level. The KMCU was established in 2019 and serves as a pilot center for training and dissemination of the KC method. The Unit accommodates mothers and premature newborns transferred from neonatology and continuously practices the KC method.

The KMCU includes rooms, lounges, spaces for support activities, and follow-up consultations for newborns' and mothers' post-discharge. Additionally, there are rooms available for practical training, positioning the KMCU as a model center for teaching and disseminating the kangaroo method, supported by the Chiesi Foundation.

Based on the needs assessment conducted jointly with WeWorld in the provincial health facilities of Ngozi, the AOA and the Chiesi Foundation formulated a pilot project to disseminate the kangaroo method in the birthing centers of Ngozi Province. During its first phase (2022-2023), the pilot project focused on strengthening the Ngozi Regional Hospital's KMCU as a training center for KC. Activities included the development of training materials, and capacity building of the Ngozi Hub, and all these efforts led to the certification of the Ngozi Regional Hospital as a reference center. The second phase of the project, which is ongoing, has not yet concluded and focuses on training district hospital staff on Kangaroo Care. The third phase will concentrate on community engagement through awareness-raising and outreach activities, yet to be finalized.

# Expected Result 1 (Phase 1) – Ngozi Regional Hospital is recognized at the Ministry level as a national reference center for Kangaroo Care

This result includes the following activities:

- The development and signing of a Memorandum of Understanding between the AOA, the Chiesi Foundation, and the Ngozi Regional Hospital on the management of the KMCU were completed before the end of 2022.
- The certification of the KMCU as a reference center for KMCs and the validation of the KC manual by the PNSR were also achieved. The memorandum of understanding was signed in 2022.

Furthermore, the Ngozi Regional Hospital was recognized as a reference center by the Minister of Health on November 29, 2023.

This accomplishment has been confirmed during interviews with authorities, hospital management who acknowledged the significance of the KMCU, and the Director of the PNSR who commended it.

Indicator	Degree of achievement
By the end of 2022, a process has been launched for the signing of the MoU with the Director of the Ngozi Regional Hospital for the management and operation of the Kangaroo Care service for training and dissemination of the methodology.	The Memorandum of Understanding was signed at the end of 2022 between the AOA, the Chiesi Foundation and the hospital management.
By the end of 2022, the process of accreditation of Ngozi Regional Hospital as a National Kangaroo Care Reference Centre has been launched	Certificate from the PNSR and the Ministry of Health which recognizes the KMCU as a reference center for the dissemination of KC

Expected Result 2 (Phase 1) - The KC training manual and training program have been validated at the departmental and scientific community levels

The project successfully implemented the planned activities under this outcome. This included a workshop at Ngozi Regional Hospital to validate the equipment and the training program, which involved other scientific participants and institutional representatives in the mother-child health sector (including ABUNE and ABUPED). These activities led to the validation of the training manual developed by a team comprising AOA technical staff, with input from PNSR, the Ministry of Health, technical staff from the Chiesi Foundation, and Ngozi Regional Hospital staff.

Therefore, it can be confirmed that this result has been fully achieved, as evidenced by the production of the manual, the validation consultations, and various interviews.

Indicator	Degree of achievement
Training manual validated by the Ministry of Health and the PNSR.	The manual has been validated at the national level and is now used as a reference.

# Expected Result 3 (Phase 1) - The KC team of trainers was created and trained through a train-the-trainer model.

A dedicated team was established to disseminate Kangaroo Care (KC) knowledge and practices and oversee training across six hospitals within the Ngozi Regional Hospital reference province.

Initially, 16 KC trainers were trained by experts from the Chiesi Foundation and the AOA. Subsequently, a comprehensive KC course was delivered to all nursing staff in various hospital departments, including the delivery room, operating room, neonatology, obstetrics, and gynecology, encompassing a total of 57 individuals (50 nurses and 7 doctors). Between 2022 and 2023, 23 representatives (7 doctors, 6 midwives, 10 nurses) from the six hospitals in the province received extensive training and subsequently became qualified trainers.

Following their training, these hospital representatives educated the staff members in the pediatrics, neonatology (where applicable), delivery room, and operating room departments of each hospital.

This effort successfully trained an additional 130 nurses and midwives, along with 13 doctors, between 2023 and 2024.

Indicators	Degree of achievement
By 2022, the process of signing the MoU with the Provincial Doctor for the dissemination of Kangaroo Care (KC) of Ngozi province has been launched	The Memorandum of Understanding between the AOA, the Chiesi Foundation and the Ngozi Provincial Health Bureau was signed in March 2023. This is a Memorandum of Understanding that provides a framework for the operational partnership for the strengthening and dissemination of the kangaroo method in the birth centers of the province of Ngozi.
At the end of the project, 2 Burundian healthcare providers assigned to the Kangaroo Care project participated in an international congress	The Head of the Neonatology Department, Dr. Sandrine Mukeshimana, participated in the 13th International Conference on Kangaroo Maternal Care in Madrid and presented a case study entitled "Establishment of KC at Ngozi Regional Hospital and Next Steps to Expand it Across Ngozi Province". KC trainers participated in the NEST Partner meeting held in Ngozi from 16 to 21 October 2023.
In each hospital in the province of Ngozi, there will be at least one person in charge of Kangaroo Care (KC)	A total of 23 operators (7 doctors, 6 midwives, 10 nurses) from the province's 6 hospitals were trained during the month of October 2023.
By the first half of 2023, at least 90% of professionals working in maternal and neonatal wards in district hospitals will have been trained in Kangaroo Care (KC).	130 nurses and midwives and 13 doctors were trained between 2023 and 2024, representing about 90% of the staff eligible for training.

# Expected Result 4 (Phase 1) - Data collection system for surveillance and follow-up of newborns in KC is launched

The project involved developing and implementing a system for collecting data from the KC project and newborn follow-up, and sharing it with spoke hospitals, including six provincial hospitals.

At the time of this case study's development, initial evaluations were started to enable the use of the system from the beginning of kangaroo care in maternal and neonatal wards at Ngozi provincial hospitals. Specifically, the project facilitates the development of the following components: a database, a processing system, and an analysis system.

For each district hospital, a dedicated individual is to be identified for collecting and sending data to the KMCU in Ngozi, which will function as a central hub. Additionally, workshops are planned every three months to evaluate the collected data, address potential challenges, and discuss project management issues.

Activities related to this outcome are only partially completed. A KMCU staff member has been assigned to collect data for the Ngozi Regional Hospital.

Although a register exists in the unit and data is recorded in the computer system, these data are not yet fully developed or analyzed.

Furthermore, service quality indicators have not been identified, nor is there a regular monitoring and evaluation system in place.

Currently, it cannot be confirmed that an adequate data collection system exists beyond the mere compilation of registers.

Indicator	Degree of achievement
At the end of the first half of the project, the data collection system was developed and shared with the reference hospitals.	This indicator has yet to be achieved.
Within each hospital in Ngozi province, there is at least 1 reference person, responsible for collecting data for the follow-up of newborns.	This indicator remains to be achieved, as soon as the system is in place.

# Expected Result 5 (Phase 1) – The Kangaroo Care (KC) project is known nationally and internationally

This was achieved with the participation of project staff in various national and international events to raise awareness of the KC project, including:

- On November 17, 2022, in observance of World Premature Baby Day, a conference was organized at the University of Ngozi and the Ngozi Regional Hospital to raise awareness of issues related to prematurity and kangaroo care.
- Dr Sandrine Mukeshimana, Head of the Neonatology Department, participated in the 13th International Conference on Kangaroo Care in Madrid (November 2022) where she presented a scientific poster on the Project.
- The NEST Partners Meeting was organized in Ngozi by the Chiesi Foundation in October 2023.

Indicator	Degree of completion
By the end of the first year, at least two national events with the scientific community regarding Kangaroo Care had been organized.	Two events were organized by the Chiesi Foundation.

The second phase of the project "*Fase 2 Progetto Pilota - Diffusione del metodo canguro nei centri nascita della provincia di Ngozi*" (2023/2025) includes training and support for medical and nursing staff at district hospitals in Ngozi Province on Kangaroo Care, facilitated by periodic missions from trainers at the Ngozi Regional Hospital.

This phase also involves establishing a Kangaroo Care data collection system across six hospitals in Ngozi Province and conducting technical assessments to identify necessary structural and organizational interventions for implementing Kangaroo Care.

To enhance the care of newborns with

cardiorespiratory issues, this phase will introduce a training course on neonatal care at birth in the six target hospitals in Ngozi Province, coupled with the distribution of neonatal resuscitation kits.

Additionally, the project will undertake awarenessraising activities and produce communication materials on neonatal care, particularly Kangaroo Care, targeting authorities and beneficiaries. Concerning the follow-up of newborns, the project includes evaluating and analyzing the follow-up service at the Ngozi Regional Hospital, establishing a data collection system for newborns discharged from the hospital, and conducting a feasibility study to create a provincial-level newborn follow-up system. The fifth expected result (AR 5) of this second pilot project focuses on strengthening the Ngozi Regional Hospital as a reference center for training and delivering Kangaroo Care. The sixth expected result (AR6) entails organizing a final meeting where stakeholders will jointly develop new actions.

It should be noted that the implementation of the second phase has faced challenges, as outlined in progress reports. Notable differences in infrastructure and care levels among the six hospitals in Ngozi Province have required the Chiesi Foundation to work with AOA and provincial authorities to adapt trainings and establish Kangaroo Care services in district hospitals.

As for the preparation of this case study, the second phase of the Kangaroo Care project is ongoing, preventing a complete assessment of best practices and lessons learned. Some expected results, particularly those related to RA-IR5, have been achieved, with the Ngozi Regional Hospital recognized at the ministerial level as a national training center for Kangaroo Care.

However, other activities, such as provincial-level data collection, are yet to commence or strengthen due to the system not being fully operational at the hospital level.

Despite this, there is an opportunity to review the logical framework and assess any updates based on the Chiesi Foundation's NEST model approach, which emphasizes perinatal care strengthening. This would involve a participatory process with AOA staff, the Chiesi Foundation, field staff, hospital management, and other stakeholders. In conclusion, the second phase of this pilot project is rich in diverse interventions. It is recommended to focus on priorities identified with BPS, emphasizing components such as:

- 1.monitoring and evaluation, data collection based on a set of key indicators for KC (selected with hospital management and BPS) starting from the Ngozi Regional Hospital and extending to the six district hospitals
- 2. joint supervision with the Province for coaching sessions on KC for district hospital staff
- 3. provision of essential equipment and consumables to prevent stock shortages.

This reorientation should be aligned with stakeholders' involvement, particularly BPS and the management of the Ngozi Regional Hospital.

# 3.3 UPDATE OF KEY PERFORMANCE INDICATORS

# 3.3.1. Neonatal admissions to Ngozi Regional Hospital and mortality/morbidity – KPI 1

In 2015, the neonatology department relocated from the old pediatrics unit to a spacious area in the new facility. By 2018/2019, the neonatology department in the new facility was fully operational, including the KMC Unit.

This timeline accounts for the increase in hospitalizations and deliveries. The table illustrates a steady and significant rise in live births.

However, the slight increase in the mortality rate in 2023 may be attributed to several factors, including the arrival of more severe cases at the hospital.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total number of live births	2,268	2,965	2,850	3,128	3,345	3,609	3,540	3,328	3,682	3,877
Total number of admissions to neonatology	934	1,128	1,340	1,360	1,635	1,521	1,616	1,447	1,463	1,487
Total number of newborn deaths managed in the NICU	147	236	245	206	265	208	200	147	183	255
Mortality rate in the NICU	16%	21%	18%	15%	16%	14%	12%	10%	12%	17%

Below is an analysis of the origin of the newborns admitted to the Ngozi Third Referral Hospital.

Nombre de nouveaux nés admis à la néonatologie	2019	2020	2021	2022	2023
Total admissions	1,521	1,616	1,447	1,463	1,487
Inborn	1,030	1,024	984	1,003	1,023
Outborn	491	592	463	460	464
Deaths	208	200	147	183	255
Hospitalization rate in Neonatology of N-Born in Hospital (inborn) out of the number of newborns admitted to the NICU	68%	63%	68%	68%	69%

The hospitalization rate in the neonatology department at Ngozi Regional Hospital indicates that most of the admitted cases are inborn, originating from the hospital itself. Conversely, the number of outborn newborns, those born outside the hospital, remains relatively stable. For a more comprehensive analysis beyond the distinction between inborn and outborn, it is necessary to include data on deaths categorized by these two groups.

Neonatology Data	Source	Total Number	% of admissions	% of outborns
Total Admissions	-	1,487 (1,023 inborn, 464 outborn)	-	-
Inborn	References of the obstetrics department	1,023	68.7%	
Outborn	Self-referral (newborns who were already in the NICU and were readmitted from the previous month)	150	10%	32.3%
	Health Centers	79	5.3%	17%
	Other hospitals	235	15.8%	50.6%

In 2023, there were a total of 1,487 hospitalizations in the neonatology department. Of these, 68.7% (1,023 newborns) originated from the obstetrics department of the Ngozi Regional Hospital (inborn), while 31.2% (464 newborns) were referred from external sources (outborn). Outborns were referred by various facilities, including hospitals within Ngozi province and other provinces such as Kirundo, Muyinga, Cibitoke, among others (50.6% of outborns), and health centers (17% of outborns). The overall mortality rate for admissions in 2023 was 17%.

### 3.3.2. Kangaroo Care - KPI 2

	September – December 2019 (Baseline)	2020	2021	2022	2023
Number of newborns admitted to the KMCU of Ngozi Regional Hospital	83	215	185	170	143
Number of newborns admitted to the KMCU and discharged according to protocol criteria	47	170	162	152	121
% of newborns discharged from the KMCU according to protocol criteria	78%	80%	87%	88%	84%
Number of newborns admitted to the KMCU discharged and referred	0	0	0	0	0
Number of newborns admitted to the KMCU who died before discharge	0	1	1	0	3
Percentage of newborns admitted to the KMCU who died before discharge	0%	0.45 %	0.58 %	0%	2%
Number of newborns who returned to the NICU and died	0	2	0	1	4
Number of babies who returned to the NICU after their stay at the KMCU and after they were released alive	8	34	21	12	11
Number of mothers who leftthe KMCU on their own initiative	0	2	0	1	2
Number of newborns admitted to the KMCU who were discharged after the mother's request	5	8	1	5	2

\*KMCU discharge criteria are presented in the protocol developed by neonatal physicians with the support of the AOA are aligned with internationally applied discharge parameters and adapted to the context. Thanks to these figures, it is clear that the mortality rate of newborns admitted to the KMCU remains above 5% when at least 80% of children leave the hospital following the discharge criteria.

# 3.3.3 Kangaroo Care - KPI 3

	2021	2022	2023				
Number of N-Borns welcomed in relation to their weight at the Kangaroo Mother Care Unit (KMCU)							
Weight <1,000 gr	7	1	2				
1,001 - 1,500 gr	76	39	42				
1,500 - 2,000 gr	90	48	54				
>2,000 gr	13	5	6				
Average Stay in the KMCU of Ngozi	9	11	14				

Most newborns admitted to the KMCU weight 1,001 – 1,500 grams or 1,500 – 2,000 grams, although cases of newborns with a weight below 1,000 grams still occur.

It is noteworthy that the average number of days of stay has increased in 2023 compared to 2021. This trend is positive, as typically, a child weighing 1,500 grams may require 20-30 days to reach 2.5 kilograms.

This aspect warrants further investigation to determine whether it is associated with improvements in the quality of care.

A more comprehensive study is necessary to identify the determinants of the length of stay, to ensure that the minimum duration of 20 days is consistently achieved.

# 3.4 LESSONS LEARNED AND GOOD PRACTICES

### 3.4.1. SWOT Analysis

This section presents the results of the SWOT analysis conducted by stakeholders, including the Chiesi Foundation, Amahoro Onlus Association (AOA), BSP, PNSR, and Ngozi Regional Hospital Management.

The analysis was performed based on interviews conducted during a participatory process involving key stakeholders: staff involved in the KC project, staff from the Chiesi Foundation and AOA, management of the Ngozi Regional Hospital, and representatives from the BSP and PNSR. This analysis also served as the foundation for identifying lessons learned and best practices from the KC pilots.

#### Forces

- Organization of services and patient circuit very relevant and in line with international standards
- Health and institutional staff strongly involved in the continuous improvement of the quality of services
- KMC training manual available and validated, clear and posted management protocols
- Infrastructure at the level of a national reference neonatology and availability of water, sanitation and hygiene services, with the availability of running water in each room/unit
- Management of hygiene conditions for mothers of premature newborns (separation of rooms to access neonatology, distribution of kits to mothers at the entrance and exit)
- Availability of nutritional, educational, recreational, and support services to motivate mothers to continue care after discharge
- Accreditation by the Ministry of Health of the Neonatology Service as a national reference centre for quality neonatal care and KC training

#### Weaknesses

Threats

- Lack of a plan to sustain KC's interventions Insufficient qualified staff and high turnover
- Lack of equipment, consumables and medicines
- Irregular equipment maintenance services
- Data collection carried out on registers, which can cause errors in encoding
- The data collected at the neonatal level are neither developed nor analyzed, which prevents the proper reorientation of interventions
- The audit of neonatal deaths is never done by the hospital, and the audits of maternal deaths are not done systematically
- The risk of infection is high because of the practices of reusing equipment in neonatology
- Lack of a neonatal focal point for infection prevention and control

#### Opportunities

- Appreciation of the support of the Chiesi Foundation and the work of AOA
- Interest of the Ngozi Regional Hospital Management in strengthening the quality of and access to neonatal care (including KC)
- Availability of human resources motivated to increase their capacity and knowledge in neonatal care
- Effective engagement of mothers in the care of preterm infants
- Existing partnership between the University of Ngozi and the University of Verona to promote the training of nurses specialized in perinatal health
- Integration of neonatal service costs into the hospital's financial planning
- Adequate oxygen therapy infrastructure for the delivery room, neonatology and emergency departments. Recommendation for the use of CPAP
- Presence of physicians in training as part of the mentoring program and those assigned to neonatology could be asked to provide a kit of basic equipment and consumables to deal with consumable shortages in neonatology.

- Overload of work for staff that may compromise the quality of care. Overburden due to the central role that the hospital plays in the Burundian health system and in the north of the country
- Overcrowding and high number of births, especially among adolescent girls and multiparous women at higher risk of preterm birth
- Lack of financial resources at the national level and in the field of health
- Frequent stock-outs affecting the availability of medicines and inputs, and basic equipment
- Non-allocation of staff to infection prevention and control and high turnover of medical staff in multiple departments outside of neonatology
- Clinical supervision/coaching sessions are not carried out by the authorities or in a very irregular manner
- Lack of spaces for discussion on cases and data analysis with the maternity ward
- Lack of a strategy for the sustainability of neonatal interventions funded by the Chiesi Foundation and the AOA. Lack of a phased handover strategy.

### 3.4.2. Lessons learned

- Investing in neonatal care, and in particular Kangaroo Care, helps to address the growing need to reduce neonatal mortality in Burundi and particularly in a province that has worrying maternal and neonatal health indicators.
- The work carried out by the Amahoro Onlus Association and the Chiesi Foundation in partnership with the local authorities has an impact on the well-being of the mother-child unit that accesses the Ngozi Regional Hospital and the district and local referral structures
- The hospital can guarantee access to care for the most vulnerable groups of the population, in particular mothers of premature babies admitted to Kangaroo Care.
- Building a climate of trust and collaboration by involving the hospital management and the local and national authorities and supporting, as far as possible and compatible with the objectives of the project, the requests and needs expressed by them can have positive repercussions on each of the areas of intervention. For example, the accreditation work of the KC unit in Ngozi with provincial and national authorities has been an activity that has had positive effects on the overall relations with stakeholders and partners and is a pillar for the sustainability of the interventions themselves.
- 1.The choice to carry out a continuing education program can be appreciated by taking advantage of the expertise of the Amahoro Onlus Association and the Chiesi Foundation through experts from both organizations capable of evaluating the progress of certain nodes of the project and with regard to the training needs and in terms of organization of neonatal education, services and Kangaroo Care.
- The improvement of neonatal infrastructure, the strengthening of the capacities of health personnel and the investment in awareness sessions for parents who access neonatal services, including Kangaroo Care, are all activities that allow a greater influx of the population to the Hospital. In addition, women who have given birth in the hospital and/or who access neonatal services access the neonatal emphasizing follow-up service by the relationship of trust in the services and care providers.
- The collaboration of the Amahoro Onlus Association, mainly with the Chiesi Foundation, but also with other entities (NGOs), in addition to the local authorities, represented an excellent opportunity for integrated work for the two associations who were very respectful of each other and tried to complement their activities while respecting their respective intervention objectives but always maintaining an open dialogue. This approach was also perceived very positively by the counterpart, both at the level of the staff and the local authorities as well as by the management of the Hospital.

# FOCUS: KANGAROO CARE

### **Lessons** learned

For insights into best practices and lessons learned in building capacity for Kangaroo Care:

- The development of training materials titled "Kangaroo Care as Support for Newborn Development" was based on guidelines and the international framework. The manual aims to train trainers to enhance the capabilities of local health personnel and promote South-South learning.
- The effectiveness of these training materials was evaluated with care providers at Ngozi Regional Hospital during a session held in December 2022, where care providers contributed suggestions for improvement.
- The cascade training program commenced in early 2023. Staff assigned to Ngozi Regional Hospital received training at the Kangaroo Mother Care Unit (KMCU), recognized as a center of excellence for Kangaroo Care. Subsequently, district staff were trained.
- The training comprises both theoretical instruction and practical work experience at Ngozi Regional Hospital.

- At the institutional level, the insights gained highlight that the KC project has robust national and institutional backing. This support has enabled the Ngozi Regional Hospital to be officially recognized as a national reference center for KC, as evidenced by the signing of the PNSR on November 29, 2023, and as the headquarters for neonatology training at both provincial and national levels. Furthermore, the training manual was validated by the Ministry of Health through a participatory process involving national associations such as ABUNE (Burundian Association of Neonatology) and ABUPED (Burundian Association of Pediatrics).
- National and local health authorities play a crucial role in this context, not only formally but also in ensuring alignment with the national strategy for strengthening and decentralizing maternal and newborn care.

# 3.5 CONCLUSIONS AND RECOMMENDATIONS

# 3.5.1 Conclusions

The impact of the initiatives undertaken by the Chiesi Foundation and AOA within the framework of the KC project and the NEST model can currently only be partially described through the indicators identified during the project's development and progress evaluation towards the achievement of objectives.

Feedback from stakeholders and other locally active institutions indicates that numerous specific activities supported by the Chiesi Foundation and implemented by the AOA have had almost immediate effects on improving the quality of neonatal healthcare, particularly in the field of healthcare.

Although the establishment of the KMCU in neonatology is recent, rendering its impact on neonatal mortality in the Ngozi region difficult to assess, several changes in the delivery of care were observed during the field visit and study development:

- Skin-to-skin contact and Kangaroo Care (KC) are now practiced in a dedicated space equipped to welcome newborns and involve parents in the care, thanks to the support of dedicated staff.
- New care practices such as proper positioning, nursing, pain control, and management of the care environment have been introduced to reduce stress in newborns.
- The family, especially the mother-child bond, is central to care, and this concept has been well integrated into neonatal care practices.

These changes result from an integrated approach to all aspects of newborn care, implemented based on local needs and priorities. Preliminary results suggest that collaboration between international staff and experts, along with hospital management, holds significant potential for improving care and driving lasting change.

Specifically, the KC pilot project has, in line with its objectives, enhanced the quality and quantity of care for preterm newborns at the Ngozi Regional Hospital.

The service needs for preterm newborns are complex in the intervention area; however, the KC project architecture presents a coherent chain of changes and promotes childcare at all levels, including the community level, which appears fundamental.

Key Performance Indicators selected in this study are used to evaluate the effectiveness of the interventions carried out by the Chiesi Foundation and the AOA. These indicators include the proportion of newborns admitted to neonatology and the KMCU, their length of stay, and the mortality rate in neonatology and among newborns admitted to the KMCU.

While these metrics may quantify the impact, they do not account for qualitative benefits for mothers and newborns, as well as potentially for staff. For instance, KC has been shown to offer psychological benefits to mothers, reducing stress levels compared to conventional care and fostering a sense of empowerment and confidence, leading to a better bond between mother and child. In conclusion, the primary change resulting from the interventions carried out by the Chiesi Foundation and the Amahoro Onlus Association involves the attitudes of all those involved in the care of newborns, particularly premature newborns. Equal attention is given to newborns as to other patients, if not prioritized. Staff and management recognize the importance of neonatal intensive care and the need for a higher level of attention. Furthermore, the family-centered model of care ensures that newborns are not separated from caregivers, a methodology fully embraced by the staff aware of its importance for improving survival chances for these highly vulnerable patients.

All activities undertaken by the Chiesi Foundation in collaboration with the Amahoro Onlus Association have thus enabled the Neonatology of Ngozi to qualify as a national model, with the prerogatives for further improving NICU care quality.

# 3.5.2. Recommendations

Based on the various findings made during this study, the main recommendations for future interventions that can be formulated at this stage are as follows.

The Ngozi Regional Hospital has the potential to become a national reference for neonatology and a model of excellence. We can leverage this opportunity to advocate for additional resources, including equipment, consumables, and personnel, to enhance the quality of care.

Key recommendations include:

• Strengthening aspects related to equipment handling and increasing the availability of basic equipment to ensure quality care in neonatology.

- Establishing a Monitoring Framework for Neonatology and KC projects, assigning dedicated staff within the framework of Chiesi Foundation-funded projects for monitoring and evaluation. This includes writing narrative reports and coordinating with the technical team and the Hospital's Statistics Department. This recommendation is also linked to defining key indicators for monitoring and evaluating interventions under the NEST model.
- Conducting surveys to assess the effectiveness of training programs and identifying gaps among health personnel to guide future training initiatives.
- Supporting the organization of neonatal death audits.

At the institutional level:

- Strengthening dialogue with institutional actors, including the Ministry of Health, the National Reproductive Health Program, the Provincial Health Bureau, and the management of Ngozi Regional Hospital, to secure human and financial resources for the neonatology unit at Ngozi as a national model. Address the sustainability of ongoing actions, particularly regarding support for the KMCU (e.g., repairs, hygiene kits, and associated staff) with hospital management and the AOA.
- Establish a data collection system on newborns, • especially related to KC (refer to the recommendation for the KC pilot project), at the provincial level aligned with the hospital-level system. It is recommended to organize a workshop or integrate this within ongoing the activities with BPS and hospital management to co-develop an indicator sheet for monitoring and evaluating KC and neonatology activities.
- Refer to the appendix for recommendations on collecting and monitoring data on the quality of Kangaroo Care (KC).

Regarding the Kangaroo Pilot Project Phase 2, it is advised to review the logical framework/activities to ensure their continued relevance and integrate the following activities:

- Prioritize the implementation of infrastructural interventions based on a comprehensive needs assessment of provincial hospitals to ensure sufficient spaces and materials for the provision of Kangaroo Care (KC).
- Include in the activities regular joint supervision and mentoring with provincial authorities and district hospital staff involved in the project.
- Conduct surveys of mothers with premature babies to gain a better understanding of their knowledge levels regarding neonatal care.
- Establish an agreement with the hospital on a set of indicators for KC and Neonatal Intensive Care Units (NICU) and systematically collect and review data to adjust services as needed. A list of indicators for KC, developed by the NGO Save the Children and Healthy Newborn Network, is provided in the appendix (source: https://healthynewbornnetwork.org/resource/2 013/saving-newborn-lives-monitoringindicators-2010/).
- Enhance the monitoring and evaluation function in close coordination with the Hospital's Statistics Unit, which is responsible for data development and periodic evaluations in neonatology. This function could be fulfilled by part-time staff or assigned full-time through the Amahoro Onlus Association or the Hospital.

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# MONITORING AND EVALUATION OF KANGAROO CARE AT THE LEVEL OF HEALTH FACILITIES

This document includes a minimum set of indicators to monitor and evaluate Kangaroo Care in facilities. There are two types of indicators: core indicators and supplementary.

No.	Indicator	Numerator	Denominator	Source	Frequency	Level	Notes
1.1	Proportion of LBW babies who received KMC	# of LBW babies who received KMC	# of LBW babies <sup>1</sup> (estimate)	Registers Monthly summaries	Annual	Core	Outline assumptions for denominator; definition of LBW (<2,000g or <2,500g)
1.2a	Proportion of facilities where KMC is operational <sup>2</sup> , by level of facility <sup>3</sup> and type of KMC service <sup>4</sup>	# of facilities where KMC is operational, by level of facility and type of KMC service	# of health facilities	Supervision checklist Program records	Quarterly	Core	Define operational
1.2b	Proportion of targeted <sup>5</sup> facilities where KMC is operational <sup>2</sup> , by level of facility <sup>3</sup> and type of KMC service <sup>4</sup>	# of targeted facilities where KMC is operational, by level of facility and type of KMC service	# of targeted health facilities	Supervision checklist Program records	Quarterly	Core	Define operational
1.3	Number of health providers trained in KMC, by level of health provider <sup>6</sup>	# of health providers trained in KMC, by level of health provider	NA	Program documents	Quarterly	Core	
1.4	Number of health facility staff <sup>7</sup> oriented <sup>8</sup> in KMC	# of health facility staff oriented in KMC	NA	Program documents	Quarterly	Core	
1.5	Number of KMC admissions, by birth weight category <sup>9</sup>	# of KMC admissions, by birth weight category	NA	Registers Monthly summaries	Quarterly	Core	
1.6	Number of babies who received KMC that are discharged, by birth weight category	# of babies who received KMC that are discharged, by birth weight category	NA	Registers Monthly summaries	Quarterly	Core	
1.7	Proportion of babies who received KMC lost to follow up <sup>10</sup> after discharge	# of babies who received KMC lost to follow up after discharge	# of babies who received KMC	Registers Monthly summaries	Quarterly	Core	
1.8	Proportion of deaths in babies who received KMC, by birth weight category	# of deaths of babies who received KMC, by birth weight category	# of KMC babies	Registers Monthly summaries	Quarterly	Core	
1.9	Average length of stay in KMC services (days)			Registers Monthly summaries	Quarterly	Suppl ement ary	
1.10	Average number of follow-up visits			Registers Monthly summaries	Quarterly	Suppl ement ary	
1.11	Proportion of babies who graduated from KMC <sup>11</sup>	# of babies who graduated from KMC	# of babies who received KMC	Registers Monthly summaries	Quarterly	Suppl ement ary	Tanzania, Malawi

[1] All LBW babies (born at home and in a facility) in the catchment area of the KMC facilities

[2] Operational – To be defined

- [4] Type of KMC service Separate KMC unit or KMC integrated into PNC ward
- [5] Targeted facilities Facilities where Save the Children is supporting KMC services (SNL and/or MCHIP)

[6] Level of health provider – Doctor, nurse, auxiliary worker

[7] Staff – Hospital administrator, health provider, etc.

[8] Oriented – To be defined

[9] Birth weight categories - <1,000g, 1,000g-1,499g, 1,500g-1,999g, 2,000g-2,500g

[10] Lost to follow - Missed two subsequent follow-up visits

[11] Graduated – Successfully completed KMC based on standard criteria (To be defined)

<sup>[3]</sup> Level of facility – Tertiary level (National Hospital, Training institution/teaching hospital), central/regional/provincial hospital, district hospital, health center/health post

# MONITORING AND EVALUATION OF COMMUNITY KANGAROO CARE

This document includes a minimum set of indicators for monitoring and evaluation of community-based Kangaroo Care currently being implemented in Bangladesh and Malawi. This is a new technical area, and these indicators need to be tested before they are finalized. As with maternal kangaroo care in a facility, there are two types of indicators: core and supplementary.

No.	Indicator	Numerator	Denominator	Source	Frequency	Level	Notes
2.1	Number of LBW/small babies identified	# of LBW/small babies identified	NA	Community Health Worker (CHW) registers Monthly summaries	Quarterly	Core	Define LBW (<2000g) or "small size"
2.2	Proportion of identified LBW/small babies given skin- to-skin <sup>1</sup> , by birth weight category <sup>2</sup> or size perception	# of identified LBW/small babies given skin-to-skin, by birth weight category or size perception	# of identified LBW/small babies	CHW registers Monthly summaries	Quarterly	Core	
2.3	Proportion of identified LBW/small babies given KMC <sup>3</sup> , by birth weight category or size perception	# of identified LBW/small babies given KMC, by birth weight category or size perception	# of identified LBW/small babies	CHW registers Monthly summaries	Quarterly	Core	
2.4	Proportion of identified LBW/small babies with immediate breastfeeding or cup feeding using breast milk <sup>4</sup>	# of identified LBW/small babies with immediate breastfeeding or cup feeding using breast milk	# of identified LBW/small babies	CHW registers Monthly summaries	Quarterly	Core	
2.5	Proportion of identified LBW/small babies with KMC who are exclusively breastfed <sup>5</sup> or cup fed using breast milk in first seven days of life (0-7 days)	# of identified LBW/small babies with KMC who are exclusively breastfed or cup fed using breast milk in first month of life (0-7 days)	# of identified LBW/small babies	CHW register Monthly summaries	Quarterly	Core	Define "with KMC"
2.6	Proportion of identified LBW/small babies with additional PNC home visits	# of identified LBW/small babies with additional PNC home visits	# of identified LBW/small babies	CHW registers Monthly summaries	Quarterly	Core	
2.7	Number of identified LBW/small babies referred to health facility	# of identified LBW/small babies referred to health facility	NA	CHW registers Monthly summaries	Quarterly	Core	
2.8	Proportion of deaths among identified LBW/small babies who received any KMC <sup>6</sup> in first month of life (0-28 days) <sup>7</sup>	# of deaths among identified LBW/small babies who received any KMC in first month of life (0-28 days)	# of identified LBW/small babies	CHW registers Monthly summaries	Quarterly	Core	Define "who received KMC"
2.9	Average duration of skin-to- skin (hours)			CHW registers Monthly summaries	Quarterly	Suppl ement ary	
2.10	Average duration of KMC (hours per day)			CHW registers Monthly summaries	Quarterly	Suppl ement ary	Define categories for hours
2.11	Average duration of KMC (days) during first seven days of life (0-7 days)			CHW registers Monthly summaries	Quarterly	Suppl ement ary	
2.12	Proportion of identified LBW/small babies who were referred to health facility who went to facility	# of identified LBW/small babies who were referred to health facility who went to facility	# of identified LBW/small babies	CHW registers Monthly summaries	Quarterly	Suppl ement ary	

[1] Skin-to-skin - Putting the baby on the mother's abdomen/chest immediately after delivery and after drying of the baby

[2] Birth weight categories - <1,000g, 1,000g-1,499g, 1,500g-1,999g, 2,000g-2,500g

- [3] KMC Prolonged skin-to-skin beyond the immediate skin-to-skin period (Need to define if needed minimal number of hours per day)
- [4] Immediate breastfeeding/cup feeding using breast milk Within one hour of birth
- [5] Exclusive breastfeeding/cup feeding using breast milk No foods or liquids other than breast milk (except for medicines) based on 24-hour recall [6] This refers to any KMC at home or at a facility
- [7] In programs where babies only receive follow-up to Day 7, this indicator can be revised to include only the first seven days of life (0-7 days)

# LIST OF TRAININGS CARRIED OUT BY AOA AND THE CHIESI FOUNDATION IN COLLABORATION WITH THE NGOZI REGIONAL HOSPITAL BETWEEN 2017 AND 2024

Dates	Торіс	Number of participants
2017		
Advanced courses (February)	Training course for the function of internship supervisor for didactic activities	8
Continuing education in neonatology (5 sessions between October 10 and November 9)	1. Newborn temperature check 2. Apgar score and cord care 3. Routine newborn care in the delivery room 4. Helping Baby Breathe (HBB) 5. Essential Care for All Healthy Babies	30
Advanced courses (November 27 – December 2)	Newborn Resuscitation Training Course in the Second Level Delivery Room	19
2018		
Continuing education (5 sessions between January 23 and April 24)	<ul> <li>1.Principles of breastfeeding</li> <li>2.Breastfeeding in special situations</li> <li>3.Liquid Management</li> <li>4.Neonatal jaundice</li> <li>5.Rh and ABO incompatibility</li> </ul>	31
Refresher courses in obstetrics (6-12 March)	Advanced courses in obstetrics and obstetrical ultrasound	23
Advanced courses (24-26 April)	Training courses in hygiene and prevention of healthcare-associated infections	28
Remote Assessment Course (5-6 June)	Neonatal Resuscitation Remote Assessment Course	22
Continuing education	Preparatory course for the opening of the neonatology department on hygiene and organizational aspects	16
Continuing education (During the year)	5 modules on hygiene and the prevention of healthcare-associated infections: 1.Hand hygiene 2.Hygiene of medical devices 3.Clothing hygiene 4.Organization and ethics of hygiene 5.Environmental health	14
Continuing education (2 sessions between 12 and 21 June)	1.The newborn's feeding adventure 2.Indications and proper use of the pulse oximeter	23
Continuing education in obstetrics (6 sessions between November 20 and December 6)	<ul> <li>1.Intrapartum Care: Essential Maternal Resources and the Partograph (2 Repeat Sessions)</li> <li>2.WHO model of intrapartum care (2 repeated sessions)</li> <li>3.Position during labor and delivery (2 repeated sessions)</li> </ul>	14
Continuing education (4 sessions on 13-14-17-18 December)	Management of the newborn malformed at birth and during the first hours of life	24
Continuing education (During the year)	Tutoring Streaming Reinforcement Course	(Variable) 4 to 8 per session
2019		
Continuing education (15 December 2018, 4-5- 7-12 March 2019)	Preparatory course on KC	16
Training Courses (April 3-9)	Training of health personnel of the mother-child service of the Ngozi Regional Hospital on the value of work in the medical and personal field	58
Advanced courses (May)	Training Course on Welcoming and the Kangaroo Method	33
Advanced courses (6-12 May)	Advanced courses in obstetrics and obstetrical ultrasound	26
Conference (May 9)	Emergency ultrasound	16
Training Courses (22-29 May)	1.Use of centrifuge and bilirubinometer 2.Preparation of the alcohol solution	7

# APPENDIX 2 – TRAINING ACTIVITIES

Advanced courses (20-21 June)	Further training on the appropriate use of antibiotics	12
Advanced courses (4 sessions from 26 June to 2 July)	Resuscitation of the newborn in the delivery room (repeated course)	65
Residential Training Courses	Residential training course for providers of Nyanza Lac Hospital (Makamba) carried out in the neonatology department of Ngozi Regional Hospital	3
Continuing education (6 sessions between 15 October and 7 November)	<ul> <li>1.Triage in pediatrics, introduction to IMCI (2 repeated sessions)</li> <li>2.Management of diarrhoea: rehydration (2 repeated sessions)</li> <li>3.Diarrhoea: causes and manifestations (2 repeated sessions)</li> </ul>	32
Continuing education (6 sessions from 12 to 27 November)	<ol> <li>Pre/postnatal diagnostic criteria for malformative pathologies limiting life span or with an unfavorable prognosis (repeated sessions)</li> <li>Identification and creation of the team for the management of malformed newborns (repeated sessions)</li> <li>Palliative care and comfort care (repeated sessions)</li> </ol>	52
Continuing education(20-22-27 November)	Neonatal Jaundice / Management of the newborn during the first hours of life	18
Scientific Conference (November 29)	The Kangaroo Method	150
2020		
Continuing education (6 sessions between January 23 and February 13)	<ol> <li>Evaluation, implementation, and correction of the first session on diarrhoea repeated sessions)</li> <li>Clinical examination and observation of the pediatric patient, the parameter in pediatrics (2 repeated sessions)</li> <li>The pediatric medical record and its importance (2 repeated sessions)</li> </ol>	19
Continuing education (6 sessions between January 25 and March 1)	1.Comfort treatments (2 repeated sessions) 2.Management of the risk of premature delivery (2 repeated sessions) 3.Management of the premature newborn at birth (2 repeated sessions)	54
Advanced courses (2 sessions between 25 March and 1 April)	Diagnosis in pediatrics: classification according to the ICD, computerization and statistics code in pediatrics	-
Continuing education (Between April 13 and 30)	Training course on the prevention of Covid-19 infection	65
Residential Training Course (July 20-31)	Residential training course for providers of Gashoho Hospital (Muyinga) carried out in the neonatology department of Ngozi Regional Hospital	5
Residential Training Course (August 25 – September 4)	Residential training course for providers of Muyinga Hospital carried out in the neonatology department of Ngozi Regional Hospital	3
2021		
2022		
Training of Trainers Course (November 28 to December 2)	<ul> <li>Training of trainers from the KMCU of the Ngozi Regional Hospital and internal validation of the KC manual. The training course successively included:</li> <li>1.Trainers from the KC center of Ngozi Regional Hospital (10)</li> <li>2.The staff of the neonatology department</li> <li>3.The specific training of trainers in the 6 hospitals of the Ngozi health province (3 health workers per hospital, i.e. 18 trainers)</li> </ul>	-
2023		
Training Courses (15-16-21-22-23 February and 1- 2-28 March)	Kangaroo Basic Training Course for All Nursing Staff in the Maternal and Child Health Unit of Ngozi Regional Hospital	-



Largo Belloli 11/A 43122 - Parma (Italy) VAT Code 92130510347 info@chiesifoundation.org

www.chiesifoundation.org