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Characteristics, interventions, and status of infants discharged from 14 hospitals in the African Neonatal Network, 2024

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Abstract *Background:* Sub-Saharan Africa has the world's highest neonatal mortality rate; however, availability of high-quality patient-level data remains limited. To address this gap, the African Neonatal Network (ANN) was established in 2023 through a partnership between the African Neonatal Association and Vermont Oxford Network. This study presents baseline data from the first year of ANN activity.

Methods: Infants admitted to a neonatal unit within the first 28 days and discharged between January 1 and December 31, 2024, in 14 hospitals located in Ethiopia, Nigeria, Rwanda, Uganda, and Zimbabwe were included. All analyses use descriptive statistics.

Results: A total of 11,791 infants were discharged in 2024. Median gestational age was 38 weeks (IQR 35–40), median birth weight was 2,880 grams (IQR 2,140–3,370) and 26% were small for gestational age. Antibiotics were administered to 65% of infants, 33% received CPAP, and 47% achieved normothermia on admission. The most common diagnoses included early-onset sepsis (33%), hyperbilirubinemia (25%), and respiratory distress (24%). Among infants born <32 weeks, 59% were exposed to antenatal steroids, 52% received methylxanthines, 20% had a cranial ultrasound and 12% received a retinal examination. Of 169 infants screened, 53% had retinopathy of prematurity. Overall survival to discharge was 85%. Among survivors, 95% were discharged on human milk alone, and 41% had discharge weights < 10th percentile.

Conclusion: These data provide a valuable snapshot of neonatal care across diverse African hospitals and highlight several areas for improvement, including thermal care, antimicrobial stewardship, and specialized care and screening for preterm infants.

Keywords: Infant, Newborn; Premature; Neonatal mortality; Registries; Hospitals, Pediatric/statistics and numerical data; Outcome Assessment, Health Care; Africa South of the Sahara; Global Health

Résumé *Contexte:* L'Afrique subsaharienne présente le taux de mortalité néonatale le plus élevé au monde; cependant, la disponibilité de données néonatales de qualité au niveau individual rest elimitée. Pour combler cette lacune, le Réseau Néonatal Africain (ANN) a été créé en 2023 grâce à un partenariat entre l'Association Néonatale Africaine et le Vermont Oxford Network. Cette étude présente les données de référence issues de la première année d'activité de l'ANN.

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Méthodes: Les nouveau-nés admis dans une unite néonatale dans les 28 premiers jours de vie et sortis entre le 1er janvier et le 31 décembre 2024 dans 14 hôpitaux situés en Éthiopie, au Nigeria, au Rwanda, en Ouganda et au Zimbabwe ont été inclus. Toutes les analyses reposent sur des statistiques descriptives.
Résultats: Au total, 11791 nouveau-nés ont été sortisen 2024. L'âge gestationnel median était de 38 semaines (IQR: 35–40), le poids de naissance median était de 2880 grammes (IQR: 2,140–3,370) et 26% étaient petits pour l'âge gestationnel. Des antibiotiques ont été administrés à 65% des nouveau-nés, 33% ont reçuune PPC (CPAP), et 47% ontatteint la normothermie à l'admission. Les diagnostics les plus frequents comprenaient une sepsie précoce (33%), une hyperbilirubinémie (25%) et un e détresse respiratoire (24%). Parmi les nouveau-nés de moins de 32 semaines, 59% avaient été exposés à des corticosteroids anténataux, 52% ont reçu des méthylxanthines, 20% ont eu une échographie crânienne et 12 % un examen rétinien. Parmi les 169 nouveau-nés dépistés, 53% présentaient une rétinopathie du prématuré. La survie globale jusqu'à la sortie était de 85%. Parmi les survivants, 95% ont été sortis avec du lait humain exclusivement, et 41% avaient un poids de sortie inférieur au 10e percentile.
Conclusion: Ces données offrent un aperçu précieux des soins néonatals dans divers hôpitaux africains et mettent en évidence plusieurs axes d'amélioration, notamment la prise en charge thermique, l'utilisation raisonnée des antibiotiques et les soins spécialisés et le dépistage chez les prématurés.

Introduction

Africa has the world's highest fertility rate, with an average of 4.1 births per woman[1] resulting in an estimated 46 million births annually, with approximately 1.2 million neonatal deaths each year.[2,3] The neonatal mortality rate in sub-Saharan Africa is 27 per 1,000 live births, the highest in the world. A newborn in Africa is ten times more likely to die in the first 28 days compared to a baby born in a high-income country.[4]

The leading causes of neonatal mortality in Africa include prematurity, infections, congenital abnormalities, and hypoxic-ischemic encephalopathy (HIE or "birth asphyxia"). Evidence suggests that over half of these deaths could be prevented through relatively simple interventions such as quality antenatal care, skilled intrapartum care, neonatal resuscitation, thermal care, infection prevention measures, and access to CPAP for respiratory support.[5]

To address this challenge, the African Neonatal Association (ANA) was established in 2021 with the vision to *"Ensure every newborn in Africa survives and thrives, receiving the best possible start to life."*[6]

Recognizing the urgent need for high-quality neonatal data, ANA prioritized the creation of a continent-wide neonatal database. This goal led to a partnership with Vermont Oxford Network (VON),[7] a voluntary worldwide community of practice dedicated to improving the quality, safety, and value of newborn care through a coordinated program of data-driven quality improvement, education, and research,[8] forming the African Neonatal Network (ANN) in 2023, modelled on the success of the Ethiopian Neonatal Network.

A core dataset for ANN hospitals was developed through a collaborative and iterative process, drawing on established African databases such as the Ethiopian Neonatal Network and NEST360 inpatient database, and expert input from multi-disciplinary ANN faculty. Data points were selected cognizant of relevance, accuracy, availability, utility and modifiability.

The purpose of this paper is to describe the neonatal population admitted to ANN-participating hospitals, focusing on patient characteristics, clinical interventions, diagnoses, and outcomes. This data aims to support researchers, healthcare planners, and policymakers, while also serving as an essential baseline snapshot for future ANN benchmarking and quality improvement initiatives.

Methods

This secondary analysis of prospectively collected data utilized the Vermont Oxford Network Global Health Newborn Quality Improvement Database. The Global Health database was developed in partnership with the ANN. Data collectors at participating hospitals submit data on infants' primary admission to a neonatal unit within 28 days of birth, following standardised definitions published in a manual of operations.[9] Data undergo multiple error checks and all hospitals complete a finalization process certifying that all eligible infants have been recorded annually.

Fourteen hospitals in the ANN submitted data to the Global Health Newborn Quality Improvement Database. We included infants who were discharged from the neonatal units from January 1, 2024, to December 31, 2024.

Definitions for items found in this study are in the manual of operations except small for gestational age, which was defined as less than the 10^{th} percentile for birth weight, sex, and age on the Fenton growth charts, and discharge weight less than the 10^{th} percentile for birth weight, sex, and age on the Fenton growth charts.[10] Weight measures from birth and the day of initial disposition (the first time the infant was discharged or transferred from the member hospital) were converted to z-scores for age and sex. The change in z-score from birth to initial disposition represents growth relative to the reference foetus, the recommended standard.[11]

All analyses in this study are descriptive and were calculated using SAS 9.4. The collaborative QI project and subsequent assessments received individual and hospital institutional research and ethics review approvals at the start of the collaborative and learning initiative. The Global Health Database does not meet the United States' federal definition of human subjects under Section 45 CFR 46.102(e)(1) and therefore does not require IRB review.

Results

In 2024, 11,761 infants were discharged from 14 hospitals of which 898 (8.0%) were born at less than 32 weeks' gestational age. Maternal and infant characteristics (Table 1). On average, mothers were 29 years old (SD: 6 years) with two total pregnancies and one previous live birth. The majority of admissions were inborn births from vaginal deliveries. Over 60% of mothers had four or more antenatal care visits. Antenatal steroid exposure among infants was 21.6%; among infants born at less than 32 weeks gestation, 486 of 823 (59.1%) were exposed to steroids. Infants were born at a median 38 weeks (IQR: 35, 40) gestational age and 2,880 grams (IQR: 2,140, 3,370). Ten percent of infants were part of a multiple gestation and 26% were small for gestational age. Infant characteristics did not differ by whether the infant was inborn at the reporting hospital (Table 1).

Over 93% of infants had temperature and pulse oximetry readings registered within one hour of admission to the neonatal unit (Table 2). Of those, 46.6% of infants were normothermic, temperatures between 36.5°C and 37.5°C, and 45.0% were hypothermic, temperatures less than 36.5°C, while 84.7% had pulse oximetry readings of at least 90%. Fifty percent of infants had an objective respiratory assessment with the Downes or Silverman-Andersen score done on admission of which 48% had a score of four or more. There was a higher percentage of infants born less than 32 weeks' gestational age admitted with temperatures less than 36.5°C, pulse oximetry saturation less than 80%, an objective respiratory score completed, and an objective respiratory support score of four or more. However, admission assessments did not differ by whether the infant was inborn at the reporting hospital (Table 2).

Table 1: Maternal and infant characteristics for infants admitted to the neonatal units at 14 African Neonatal Network hospitals

All Infants (N=11,761)	N	%
Place of delivery, %		
Inborn	11,700	72.7
Other hospital	11,700	10.0
Health centre or clinic	11,700	15.3
Home	11,700	1.6
In transit	11,700	0.4
Mode of delivery, %		
Vaginal	11,721	51.0
Assisted vaginal	11,721	2.2
Cesarean section	11,721	46.8
Antenatal care, %		
≥4 visits	11,057	63.3
1-3 visits	11,057	35.5
None	11,057	1.2
Maternal HIV, %	10,971	1.7
Mother received anti-retrovirals	181	97.8
Infant received prophylaxis for HIV	176	98.9
Gestational age (w), med (Q1, Q3)	11,180	38 (35, 40)
Gestational Age determined by early ultrasound, %	10,442	55.1
Birth weight (g), med (Q1, Q3)	11,348	2,880 (2,140,3,370)
Birth weight (g), %		
<=1500	11,348	10.9
1501-2000	11,348	11.4
2001-2500	11,348	15.2
2501-3000	11,348	22.6
3001-3500	11,348	23.5
>=3501	11,348	16.5
1 minute Apgar score, med (Q1, Q3)	9,982	7 (6, 8)
5 minute Apgar score, med (Q1, Q3)	9,973	9 (8, 9)
Male, %	11,684	56.5
Multiple gestation, %	11,627	9.8
Small for gestational age, %	10,163	25.9

Supplemental Table 1: Characteristics of mothers and infants admitted to the neonatal units at 14 African Neonatal Network member hospitals

	Inborn		Outborn	
	N	%	N	%
Place of delivery				
Inborn	8,506	100	3,194	0.0
Other hospital	8,506	0.0	3,194	36.5
Health center or clinic	8,506	0.0	3,194	56.0
Home	8,506	0.0	3,194	6.0
In transit	8,506	0.0	3,194	1.4
Mode of delivery				
Vaginal	8,500	41.1	3,173	77.1
Assisted vaginal	8,500	2.1	3,173	2.5
Cesarean section	8,500	56.8	3,173	20.5
Antenatal care				
≥4 visits	8,238	64.8	2,794	58.7
1-3 visits	8,238	34.3	2,794	39.1
None	8,238	0.9	2,794	2.2
Antenatal corticosteroids	8,111	23.9	2,703	14.9
Maternal HIV, %	8,300	2.0	2,649	0.8
Mother received anti-retrovirals	162	97.5	19	100.0
Infant received prophylaxis for HIV	156	98.7	20	100.0
Gestational age, w, med (Q1, Q3)	8,320	38(35, 40)	2,813	38 (36, 40)
Gestational age determined by early ultrasound, %	7,958	54.4	2,452	56.9
Birth weight, g, med (Q1, Q3)	8,462	2,900 (2,100, 3,400)	2,831	2,800 (2,235 , 3,300)
Birth weight, g, %				
<=1500	8,462	11.3	2,831	9.7
1501-2000	8,462	11.6	2,831	10.7
2001-2500	8,462	14.8	2,831	16.4
2501-3000	8,462	21.1	2,831	27.1
3001-3500	8,462	23.6	2,831	23.1
>=3501	8,462	17.6	2,831	13.0
1 minute Apgar score, med (Q1, Q3)	8,223	8 (7, 8)	1,721	7 (5, 8)
5 minute Apgar score, med (Q1, Q3)	8,222	9 (8, 9)	1,713	8 (7, 9)
Male, %	8,462	55.3	3,164	59.5
Multiple gestation,%	8,437	10.9	3,140	6.8
Small for gestational Age, %	7,507	24.5	2,612	29.7

Table 2: Admission assessment for infants admitted to the neonatal units at 14 African Neonatal Network member hospitals

	All Infants		Infants <32 Wks	
	N	%	N	%
Temperature measured within 1 hour of admission	11,520	93.0	876	96.8
Admission temperature (°C)				
<32.0	10,713	0.3	848	1.7
32.0-35.9	10,713	22.4	848	37.5
36.0-36.4	10,713	22.7	848	17.7
36.5-37.5	10,713	46.6	848	41.5
>37.5	10,713	8.1	848	1.7
Pulse oximetry recorded	11,561	93.7	883	95.4
Pulse oximetry saturation				
<80%	10,816	7.4	840	13.5
80%-89%	10,816	7.8	840	14.4
90%-95%	10,816	38.7	840	34.5
96%-100%	10,816	46.1	840	37.6
Objective respiratory assessment done	11,624	50.9	890	86.1
Objective respiratory assessment score				
0-3	11,624	25.2	890	13.1
4-7	11,624	22.8	890	62.7
8-10	11,624	0.6	890	1.0

Supplemental Table 2: Admission assessment for infants admitted to the neonatal units at 14 African Neonatal Network member hospitals

	Inborn		Outborn	
	N	%	N	%
Temperature measured within 1 hour of admission	8,337	91.0	3,129	98.3
Admission temperature (°C)				
<32.0	7,589	0.1	3,075	0.7
32.0-35.9	7,589	20.7	3,075	26.3
36.0-36.4	7,589	25.4	3,075	16.0
36.5-37.5	7,589	48.8	3,075	41.4
>37.5	7,589	5.0	3,075	15.5
Pulse oximetry recorded	8,390	92.5	3,118	96.9
Pulse oximetry saturation				
<80%	7,751	5.0	3,019	13.1
80%-89%	7,751	6.7	3,019	11.0
90%-95%	7,751	37.4	3,019	42.3
96%-100%	7,751	50.9	3,019	33.7
Objective respiratory assessment done	8,432	47.5	3,137	60.2
Objective respiratory assessment score				
0-3	8,432	23.1	3,137	31.2
4-7	8,432	21.5	3,137	26.1
8-10	8,432	0.4	3,137	0.9

Infants received a number of interventions in the delivery room and neonatal unit (Table 3). In the delivery room, 47.4% of infants received delayed cord clamping, 10.1% face mask ventilation, 24.0% continuous positive airway pressure (CPAP), 0.5% intubation, 0.5% epinephrine and 1.4% chest compressions. Among infants born < 32 weeks' gestation, the percent that received delayed cord clamping (31.1%) was lower, while a higher percentage received aspects of neonatal resuscitation, including face mask ventilation (27.1%), CPAP (60.6%), intubation (2.5%), epinephrine (1.5%) and chest compressions (5.0%). In the neonatal unit, the most prevalent interventions were oxygen therapy (47.7% for all infants, 61.0% for infants < 32 weeks), CPAP (32.9% for all infants, 85.9% for infants < 32 weeks), antibiotics (64.8% for all infants, 91.7% for infants < 32 weeks), and phototherapy (27.1% for all infants, 51.6% for infants < 32 weeks). Of infants born less than 32 weeks' gestational age, 51.5% were treated with methylxanthines for apnoea of prematurity, 12.1% had a retinal examination for retinopathy of prematurity and 19.9% had a cranial ultrasound. Kangaroo mother care (KMC) was practiced among 62.6% of infants weighing less than 2000 grams at birth and 50.1% of infants who were born less than 32 weeks' gestational age and less than 2000 grams.

The most frequently reported diagnoses overall (Table 4) included clinical early-onset sepsis (33.1%), hyperbilirubinemia (25.2%), and respiratory distress (23.9%). Of the infants diagnosed with early-onset sepsis, 87% (2,978/3,430) had a blood culture obtained; of those, 8.8% had a positive blood or cerebrospinal fluid culture. Additionally, 14.8% of infants were diagnosed with clinical sepsis after the first three days of which 88% (1,030/1,174) had a blood culture obtained; of those, 40.1% had a positive blood or cerebrospinal fluid culture. Among infants born < 32 weeks' gestation, the most frequent diagnosis was respiratory distress (84.9%). Of the 162 infants < 32 weeks that remained hospitalized on day 28, 30.9% were receiving respiratory support. Of the infants that received a screening retinal examination, 52.7% were diagnosed with retinopathy of prematurity (ROP). Among infants born < 32 weeks, 59.6% of infants screened for ROP were diagnosed with the disease. Among infants born < 32 weeks, 30% of infants screened with cranial ultrasound were diagnosed with intraventricular haemorrhage.

Overall, 84.8% of infants survived; 10.5% died before discharge, 2.7% left against medical advice, and 2.0% were referred to another facility. Among infants born < 32 weeks' gestation, survival to hospital discharge was 63.9%; 1.7% left against medical advice and 2.5% were referred to another facility (Table 5). Overall median length of stay was 4 days (IQR: 3, 8) and did not differ by discharge status. Among infants born < 32 weeks' gestation, median length of stay was 9 days (IQR: 4, 20) and differed by discharge status. Among infants born < 32 weeks and discharged home, the median length of stay was 14 days (IQR: 7, 25). The median length of stay for those who left against medical advice was 14 days (IQR: 8, 23), while the median length of stay for those who died was 4 days (IQR: 2, 7), and the median length of stay for those who were transferred was 9 days (IQR: 3, 15). Of survivors discharged home, 94.5% received human milk only in the 24-hour period before discharge, while 1.1% received formula only and 4.2% received a combination of human milk and formula. Among infants born < 32 weeks, 88.9% received human milk only in the 24-hour period before discharge, while 3.7% received formula only and 6.5% received a combination of human milk and formula. Among surviving infants with length of hospital stay of > 14 days, 78.0% were discharged with weight < 10th percentile. The mean (SD) change in weight z-scores from birth to discharge among this group of infants was -1.6 (1.1), and -1.8 (1.0) among those born at < 32 weeks' gestation.

Among the 1,231 infants who died (Table 6), prematurity was the leading primary cause (34.7%), followed by infection (18.0%), congenital anomalies (17.6%), intrapartum-related causes (16.7%), other causes (11.5%), and hyperbilirubinemia (1.5%). Of the 427 infants who died from prematurity, 90.9% died from respiratory distress. Among the infants born < 32 weeks' gestation, 400 died with prematurity as the leading cause (74.3%), followed by infection (15.8%), congenital anomalies (2.0%), intrapartum-related causes (1.3%), other causes (6.3%), and hyperbilirubinemia (0.5%).

Table 3: Interventions received by infants admitted to the neonatal units at 14 African Neonatal Network member hospitals

	All Infants		Infants <32 Wks	
	N	%	N	%
Antenatal corticosteroids	10,832	21.6	823	59.1
Delivery room interventions				
Delayed cord clamping	9,231	47.4	727	31.1
Face mask ventilation	10,568	10.1	809	27.1
Continuous Positive Airway Pressure (CPAP)	10,513	24.0	813	60.6
Intubations	10,533	0.5	802	2.5
Chest Compressions	10,524	1.4	801	5.0
Epinephrine	10,525	0.5	800	1.5
Neonatal unit interventions				
Kangaroo care	11,559	18.6	886	49.0
Kangaroo care, less than 2000g	2,210	62.6	819	50.1
Oxygen	11,686	47.7	888	61.0
CPAP	11,705	32.9	896	85.9
Mechanical ventilation	11,667	3.7	887	14.3
Methylxanthines	11,613	8.0	881	51.5
Surfactant	11,605	1.2	882	9.8
Retinopathy of prematurity examination	11,598	1.5	879	12.1
Antibiotics	11,716	64.8	894	91.7
Phototherapy	11,685	27.1	890	51.6
Blood transfusion	11,678	7.8	891	22.2
Exchange transfusion	11,674	0.9	888	1.2
Anticonvulsant medication	11,665	5.5	886	2.0
Surgery	11,671	2.6	885	1.5
Cranial ultrasound	11,625	4.5	885	19.9

Table 4: Final diagnoses received by infants admitted to the neonatal units at 14 African Neonatal Network member hospitals

	All Infants		Infants <32 Wks	
	N	%	N	%
Hypoxic ischemic encephalopathy	11,608	7.3	n/a	n/a
Meconium aspiration	11,666	7.9	889	0.4
Birth injury	11,655	3.0	889	0.3
Transient tachypnoea of the newborn	11,608	7.3	882	0.8
Pneumonia	11,602	1.0	882	0.9
Seizure	11,674	3.7	888	2.0
Respiratory distress	11,696	23.9	897	84.9
Necrotizing enterocolitis	11,604	1.4	884	7.8
Respiratory support on day 28[a]	457	17.3	162	30.9
Respiratory support at 36 weeks[b]				
Mechanical ventilation			70	0.0
Nasal cannula >2 L/min or CPAP			70	4.3
Nasal cannula ≤ 2 L/min			70	27.1
None			70	68.6
Hypoglycaemia	11,599	6.1	882	12.7
Hyperbilirubinemia	11,676	25.2	889	38.1
Anaemia	11,608	4.7	881	13.6
Congenital anomaly	11,660	7.8	885	5.0
Congenital infection	11,616	0.8	881	0.7
Early-onset bacterial sepsis	10,312	33.1	865	41.7
Culture confirmed	2,978	8.8	309	13.6
Late-onset bacterial sepsis	7,893	14.8	656	29.9
Culture Confirmed	1,030	40.1	163	50.9
Retinopathy of prematurity[c]	169	52.7	104	59.6
Intraventricular haemorrhage[d]	333	24.9	140	30.0

a. Among those in hospital on Day 28
b. Among those in hospital on the Date of Week 36
c. Among those who received a retinal examination
d. Among those who received cranial imaging

Table 5: Final diagnoses received by infants admitted to the neonatal units at 14 African Neonatal Network member hospitals

	All Infants		Infants <32 Wks	
	N	%	N	%
Final Disposition, %				
Discharged home alive	11,689	84.8	1,644	63.9
Absconded or left against medical advice	11,689	2.7	1,644	1.7
Died in hospital	11,689	10.5	1,644	31.9
Referred to another facility	11,689	2.0	1,644	2.5
Length of Stay (d), median (IQR)	11,761	4 (3, 8)	1,671	9 (4, 20)
Discharged home	9,911	5 (3, 8)	1,051	14 (7, 25)
Absconded or left against medical advice	318	4 (3, 8)	28	14 (8, 23)
Died in hospital	1,231	3 (2, 7)	524	4 (2, 7)
Referred to another facility	229	4 (2, 9)	41	9 (3, 15)
Discharge Weight (g), median (IQR)	10,210	2,800 (2,100, 3,285)	1,535	1,535 (1,260, 1,795)
Feeding at discharge[a]*, %*				
Human milk only	10,108	94.5	1,089	88.9
Formula Oonly	10,108	1.1	1,089	3.7
Combination	10,108	4.2	1,089	6.5
None	10,108	0.3	1,089	0.9
Discharge weight <10th percentile[b], %	794	78.0	464	78.2
Weight Z-scores[b]*, mean (SD)*				
Birth	906	-0.7 (1.4)	485	-0.1 (1.4)
Discharge	895	-2.3 (1.5)	478	-1.9 (1.3)
Change from birth to discharge	867	-1.6 (1.1)	470	-1.8 (1.0)

a. Among survivors
b. Among survivors with length of stay > 14 days

Table 6: Causes of death among infants admitted to the neonatal units at 14 African Neonatal Network member hospitals

	All Infants (N=1,231)		Infants <32 Wks (N=400)	
	No.	%	No.	%
Prematurity	427	34.7	297	74.3
Respiratory distress	388	90.9	268	90.2
Necrotizing enterocolitis	9	2.1	7	2.4
Intraventricular haemorrhage	4	0.9	2	0.7
Bronchopulmonary dysplasia	0	0.0	0	0.0
Other	26	6.1	20	6.7
Infection	222	18.0	63	15.8
Probable sepsis	137	61.7	39	61.9
Culture-positive sepsis	67	30.2	19	30.2
Culture-positive meningitis	3	1.4	0	0.0
Pneumonia	1	0.5	0	0.0
Tetanus	3	1.4	0	0.0
Other	11	5.0	5	7.9
Intrapartum-Related	205	16.7	5	1.3
Hypoxic ischemic encephalo pathy	175	85.4	2	40.0
Meconium aspiration	19	9.3	0	0.0
Birth injury	1	0.5	0	0.0
Other	10	4.9	3	60.0
Congenital Anomaly	217	17.6	8	2.0
Cardiac	83	38.2	2	25.0
Chromosomal	27	12.4	0	0.0
Neurological	10	4.6	0	0.0
Abdominal or pelvic	24	11.1	0	0.0
Respiratory or airway	61	28.1	6	75.0
Hyperbilirubinemia	19	1.5	2	0.5
Other	141	11.5	25	6.3

Discussion

This study reports on a relatively large, contemporary dataset drawn from multiple hospitals across five African countries. Overall, 10.5% of infants died before discharge, primarily of prematurity. Most of the infants were term, however, and inborn at the reporting facilities, and the most frequently reported diagnoses in the neonatal unit included early-onset sepsis, hyperbilirubinemia, and respiratory distress. The median length of stay was 4 (IQR: 3, 8) days overall and 9 (IQR: 4, 20) among infants born < 32 weeks' gestation (median 4 days for died, 9 days for referred to another facility, and 14 days if discharged home).

The reported maternal HIV prevalence of only 1.7% is notably low. While this may reflect genuine progress in HIV prevention and management, it could also be a function of sampling bias, incomplete maternal testing, or under-documentation. Published prevalence rates are considerably higher—7% in Nigeria, 27% in South Africa, and 8% in Ethiopia.[12–14] Among babies less than 32 weeks, the relatively low rates of antenatal steroid exposure (59.1%) and use of any methylxanthine (51.5%) present an opportunity for low cost, high impact quality improvement.

It is encouraging that 55.1% of admitted neonates had their gestational age assessed by early ultrasound, enhancing the reliability of analyses related to prematurity and growth restriction. The prevalence of normothermia on admission was only 46.6%, and only 41.5% among infants born less than 32 weeks' gestational age, in keeping with other studies from the region[15,16] but highlighting a critical area for improvement that could significantly reduce neonatal mortality.

Antibiotic use was reported in 64.8% of admissions, considerably higher than rates in high-income countries, such as 35.9% in 2021 at 735 NICUs in the United States.[17] The high rate in the ANN suggests an important opportunity for antimicrobial stewardship and cost reduction, especially in settings where overuse may contribute to resistance and other iatrogenic harms. Antibiotic stewardship is amenable to quality improvement as shown by a multi-centre collaboratives led by VON[18] and one in California.[19]

Of concern is the very low number of babies born less than 32 weeks' gestation screened for ROP—only 104 in total—and the alarmingly high incidence of ROP among those screened (59.6%). As reported by Henderson et al., five hospitals in the ANN have inpatient screening and four offer outpatient screening; regarding treatment, four hospitals in the ANN have anti-VEGF but only one offers laser surgery.[20] There is an urgent need for improved preventive strategies and access to ROP screening before a potential epidemic of preventable blindness develops in Africa.

Recognizing that the leading cause of death among children under 5-years of age is prematurity, the ANN database provides timely data on the receipt of interventions and services recommended for preterm infants. Notably, the World Health Organization (WHO) recommends antenatal corticosteroid therapy for women with high likelihood of preterm birth from 24 to 34 weeks' gestation when gestational assessment can be accurately undertaken, there is a high likelihood of preterm delivery within 7 days, no clinical evidence of maternal infection, adequate childbirth and preterm newborn care is available.[21] In the ANN, 59.1% of infants born less than 32 weeks' gestation were exposed to antenatal steroids; an important benchmark from which to improve through collaboration with obstetric and midwifery colleagues, and family engagement. For low birth weight or preterm infants, the WHO recommends KMC as routine care, and that it should be started as soon as possible after birth.[22] Among infants admitted to ANN units with birth weights < 2 kg, 62.6% received KMC, and among infants born < 32 weeks' gestation and with birth weights < 2kg, 50.1% received KMC while in the NICU.

These results align with those of Mony et al. studying the implementation of KMC among infants with birth weight < 2kg who survived the first 3 days in Ethiopia and India.[23] Following a three-phase implementation model, KMC coverage reached 68% of infants in

Ethiopia and 55% in India. As raised by Stevenson et al. KMC has been identified as a priority for quality improvement within the ANN.[24] The WHO conditionally recommends CPAP immediately after birth for very preterm infants (< 32 weeks' gestation) and methylxanthines (caffeine) for prevention of apnoea in preterm infants born before 34 weeks' gestation. Within the ANN, we found that 60.6% of infants born at < 32 weeks' gestation were initiated on CPAP in the delivery room and 85.9% received CPAP while admitted to the NICU. Methylxanthine was administered to 51.5% of admitted infants born at < 32 weeks' gestation across the ANN. As an optimal package of interventions for preterm infants is refined for neonatal units that care for small and sick newborns in sub-Saharan Africa, this baseline coverage data along with outcomes will be useful to evaluate for improvements as further investments are made to effectively and efficiently optimize care of preterm infants and their families.

The median discharge weight for babies born at a gestation < 32 weeks of 1,535grams (IQR: 1,260 to 1,795) is very low by international standards, and future research should explore ex-utero growth failure and monitor the outcomes of these small babies at home after discharge. That 78% of infants were discharged with weights less than the 10th percentile is notable and concerning. This rate reflects both intra- and extra-uterine growth restriction and calls for more research into optimizing the nutrition and growth of these vulnerable infants. Challenges with resources to adequately provide nutritional support for small and sick newborns are likely related to the worsening of weight z-scores from birth (-0.7 overall and -0.1 among infants born < 32 weeks) to discharge (-2.3 overall and -1.9 among infants born< 32 weeks). The overall change in z-score from birth to discharge shows a greater deviation from the foetal reference than what is published in the literature from the VON member hospitals in the United States, -0.88 among very low birth weight infants fed human milk only at discharge.[25] As Abayneh et al., reported, only four ANN hospitals have total parenteral nutrition, clearly contributing to the postnatal growth failure problem among small and sick newborns.[26]

An exceptionally high percentage (94.5%) of infants were discharged on human milk alone. For comparison, data from VON demonstrate significant regional variation in exclusive human milk feeding at discharge, from as low as 9.1% in North America to 49% in Africa.[27] It is worth noting that VON data from other African countries predominantly represent affluent, private-sector facilities, while the ANN hospitals are largely public-sector and serve lower-income populations. This finding raises the provocative hypothesis that high breastfeeding rates may be one of the few positive side effects of poverty—a reflection of necessity rather than structured policy. These data are in keeping with other publications demonstrating an increase in the use of breast milk substitutes with increasing national wealth.[28,29] There is some institutional support for breastfeeding in the ANN hospitals; 10 of the 14 hospitals provide containers and refrigerated storage space for expressed milk, although no hospitals provide manual breast pumps and one provides electric breast pumps.[26]

Interestingly, the rate of discharge against medical advice (DAMA) was relatively low at 2.7%, especially when compared to previously published rates in other low- and middle-income countries: 11.1% in Nigeria[30], 25.7% in Bangladesh[31], and 25% in Iran.[32]

The strengths and limitations of this study are intertwined. The results provide a valuable snapshot of neonates, interventions, and outcomes across 14 ANN hospitals, using a relatively large sample to offer an important glimpse into the current state of neonatal care in Africa. However, the participating hospitals are not necessarily representative of the continent at large, and data quality and completeness remain variable. It is important to acknowledge that the participating hospitals are predominantly urban and often teaching or referral centres, which limits generalize ability to the broader population. This may help explain the relatively high caesarean section rate of 46.8%, compared with an estimated continental average of approximately 5%.[33] While this paper can only report a limited selection of indicators, it highlights the ANN database as a promising resource for researchers interested in answering more specific, nuanced questions.

The ANN is fundamentally a quality improvement (QI) initiative, and as such, the data were collected primarily for QI rather than formal research. As the number of participating hospitals grows, the utility, diversity, and representativeness of the data will likewise improve. The critical input of participating ANN teams in co-developing and iteratively improving and updating the data items included in the database underscores the synergy of ANA and VON working in partnership toward a shared vision. Future investments should focus on enriching the ANN with increased participation across the continent while continuing to strengthen data accuracy and completeness, and on developing transparent mechanisms for monitoring and reporting data quality.
The data presented here reflect the first complete year of network activity. Over time, longitudinal data will enable assessment of trends and the impact of QI efforts. Ultimately, however, the true value of the dataset lies not in academic publication but in its application—as a tool to drive meaningful improvements in care for neonates across the continent. It is our shared responsibility to ensure that the data are used to accelerate progress toward safer, higher-quality, and more equitable neonatal care for African families.

Conclusion

This study presents findings from the first 12 months of data collection by the ANN involving 14 hospitals across five countries. It describes the characteristics, interventions, and outcomes of neonates admitted to participating hospitals, and identifies multiple areas for improvement. While the data reflect the challenges of working in resource-limited settings, they also highlight important opportunities to strengthen care. There is an urgent need to improve the quality, equity, and safety of neonatal services across Africa—and the ANN provides a promising platform to support that mission.

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