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Beyond proximity: an observational study of stillbirth rates and emergency obstetric and newborn care accessibility in The Gambia

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ABSTRACT

Introduction Stillbirths are disproportionately concentrated in sub-Saharan Africa, where geographical accessibility to basic/comprehensive emergency obstetric and newborn care (BEmONC and CEmONC) significantly influences maternal and perinatal outcomes. This study describes stillbirth rates within healthcare facilities in The Gambia and examines their distribution in relation to the geographical accessibility of these facilities.

Methods We analysed 97 276 births recorded between 1 January 2013 and 31 December 2018, from 10 major public healthcare facilities in The Gambia. To standardise definitions, stillbirths were defined as fetal deaths with a birth weight of ≥500 g. Fresh stillbirths were reclassified as intrapartum, and macerated stillbirths were reclassified as antepartum. Linear regression with cubic splines was used to model trends, and AccessMod software estimated travel times to facilities.

Results Among recorded births, 5.1% (4873) were stillbirths, with an overall stillbirth rate of 51.3 per 1000 births (95% CI: 27.5 to 93.6). Intrapartum stillbirths accounted for 53.8% (27.6 per 1000 births; 95% CI: 14.4 to 49.8). Fully functional CEmONC facilities reported the highest stillbirth rates, including the National Teaching Hospital (101.7 per 1000 births, 95% CI: 96.8 to 106.8). Approximately 42.8%, 58.9% and 68.3% of women aged 15–49 lived within a 10, 20 and 30 min travel time, respectively, to fully functional CEmONC facilities, where high stillbirth rates were concentrated.

Conclusions In The Gambia, intrapartum stillbirth rates remain alarmingly high, even in geographically accessible CEmONC facilities. Inadequate documentation of fetal heart rate on admission hampers accurate classification, complicating targeted interventions. Ensuring that EmONC-designated facilities—particularly those providing BEmONC services—are fully functional with essential equipment, trained staff and robust referral systems, while enhancing the timeliness and quality of obstetric care, is crucial to reducing stillbirth rates.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Stillbirths are not evenly distributed globally, with a higher burden in some regions.
⇒ In sub-Saharan Africa, particularly West and Central Africa, women face a higher risk of stillbirth compared with other regions.
⇒ Access to health facilities is recognised as a significant factor influencing stillbirth rates.

WHAT THIS STUDY ADDS

⇒ Using routine facility-based data, we analysed the total and intrapartum stillbirth rates in 10 large, busy public health facilities in The Gambia.
⇒ Our study compared stillbirth rates among these facilities, based on their Emergency Obstetric and Newborn Care (EmONC) characteristics.
⇒ Additionally, we investigated the association between stillbirth rates at the facility level and the accessibility of fully functional comprehensive EmONC facilities for women aged 15–49 in The Gambia, measured by travel time in 10 min intervals.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our findings show that the stillbirth rates in these facilities are considerably higher than the national and international SDG targets, even though most women have geographical access to EmONC facilities. Expanding the availability of fully functional EmONC facilities and improving the timeliness and quality of care provided is crucial to address this issue.

INTRODUCTION

An estimated 1.9 million stillbirths occur annually, but the actual burden remains unclear due to widespread misclassification and underreporting, undermining efforts to accurately address and prevent these losses.[1] Most stillbirths are preventable, with high

rates indicating inadequate antenatal and intrapartum care. Accurate stillbirth data are crucial but remains limited, particularly in sub-Saharan Africa (SSA), which accounts for 45% of global stillbirths.[2] Inconsistent definitions and subjective classifications further complicate data reliability. Stillbirths are classified as antepartum (before the onset of labour) or intrapartum (after labour begins but before birth), reflecting the quality of antenatal care and intrapartum monitoring, respectively.[3] Fetal heart rate (FHR) monitoring on admission is crucial for determining the timing of intrauterine death but is often inconsistently documented in resource-limited settings.[4] In the absence of FHR data, healthcare providers rely on surrogate markers, using the appearance of the fetus at delivery to infer the timing of death. A macerated stillbirth, characterised by degenerative skin changes, suggests that death occurred antepartum. In contrast, a fresh stillbirth with intact skin and no visible changes is presumed to have died within 8 hours or less of birth, most likely intrapartum.[4 5]

Intrapartum stillbirths are often linked to hypoxic-ischaemic injury during labour.[6] Prompt and appropriate intervention during obstetric emergencies is essential to ensure fetal survival, as delays significantly increase the risk of stillbirths, particularly intrapartum stillbirths.[7] Skilled birth attendants and timely access to quality emergency obstetric and neonatal care (EmONC) are key to reducing stillbirths.[8] Basic EmONC (BEmONC) can prevent up to 45% of intrapartum stillbirths, while Comprehensive EmONC (CEmONC), which includes BEmONC functions, caesarean sections and blood transfusions, can reduce intrapartum stillbirths by 75%.[8]

In SSA, pregnant women face significant barriers to adequate healthcare, with geographical accessibility—measured by distance or travel time—being a key factor influencing maternal and neonatal outcomes, including stillbirths.[9] Longer travel times to well-staffed and equipped facilities are strongly linked to higher risks of intrapartum stillbirth, especially in urban slums, remote rural areas and underserved regions.[10 11] Geospatial modelling has proven valuable in studying accessibility and the utilisation of EmONC services,[12–14] as well as its impact on neonatal outcomes.[15–17] However, the influence of distance and travel time on stillbirth rates (SBRs) remains underexplored, despite its critical importance for maternal and perinatal health interventions.[10 11] This study aimed to describe total and intrapartum SBRs (IPSBR) in selected public health facilities in The Gambia using routinely collected facility-based data and to examine their distribution in relation to the facilities' EmONC status and geographical accessibility (travel time).

METHODS

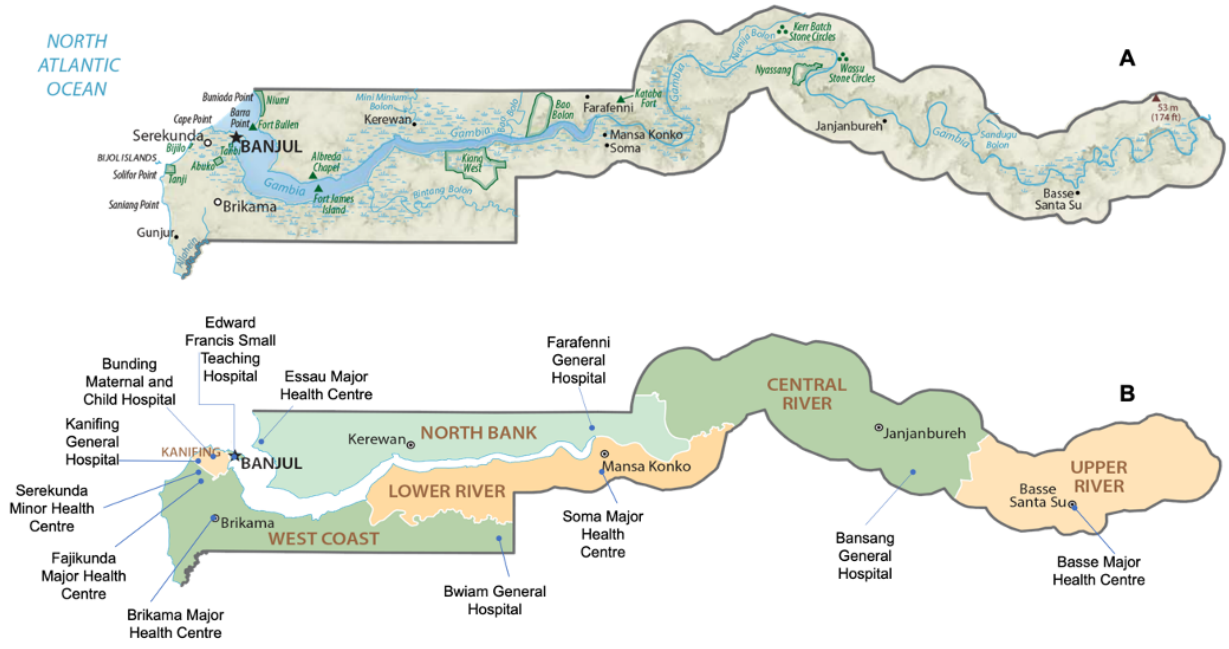
Study setting and population

The Gambia, one of Africa's smallest countries, has a population of approximately 2.5 million,[18] with an estimated 82 000 total births annually.[19] The River Gambia divides the country into two narrow strips, complicating access between the north and south banks (figure 1A). This is further hindered by only one inland bridge and a limited ferry service in the capital city, Banjul. Administratively, the country is divided into seven regions and eight local government areas, with healthcare services managed across seven health regions that do not always align with administrative divisions (figure 1B).[20]

The public healthcare system operates in three tiers: primary, secondary and tertiary.[21 22] The primary tier includes the village health service (VHS), supported by community birth companions and village health workers, who provide antenatal care, family planning and health education. The secondary tier consists of health posts and minor and major health centres, which serve as referral points. The tertiary tier includes five general hospitals and the Edward Francis Small Teaching Hospital (EFSTH), the country's sole teaching hospital and final referral destination, offering specialised care. At the time of the study, EFSTH was the only facility with a neonatal unit capable of advanced care. The healthcare infrastructure included 46 minor health centres, 6 major health centres, 5 general hospitals and 1 teaching hospital.

The VHS refers obstetric complications to local facilities, as it is not authorised to provide EmONC services. Secondary-tier facilities serve as the first point of contact for EmONC care, with minor health centres delivering BEmONC, district hospitals and major health centres providing CEmONC services. Tertiary-tier facilities are fully equipped for CEmONC. A nationwide EmONC assessment by the Ministry of Health (MoH) in the year before the study evaluated 92 out of 98 public and private facilities with deliveries.[23] It identified only nine functional EmONC facilities: seven CEmONC (six public, one private) and two BEmONC (both public). These fall short of the WHO-recommended 14 BEmONC but exceed the four CEmONC facilities needed for The Gambia's population. The remaining facilities were either partially functional, missing essential signal functions or non-functional, unable to perform critical services.

In collaboration with the MoH, we selected 11 facilities across the country for this study, making sure that those selected allowed for a comprehensive overview of delivery outcomes across facility types and EmONC status, as determined by the nationwide EmONC services assessment (regardless of functionality) as well as regional representation across The Gambia. We selected the largest and busiest facilities with annual delivery capacity of >500 in each region. The chosen facilities comprised the national teaching hospital, four general hospitals (Kanifing, Farafenni, Bansang and Bundung Maternal and Child Health Hospitals), five major health centres (Fajikunda, Brikama, Essau, Soma and Basse) and one minor health centre (Serekunda) (figure 1).



Region	Catchment area population (2012)[a]	Facility	Average annual Births[c]	EmONC status (prior to audit period)[d]
Banjul	44, 747	Edward Francis Small Teaching Hospital	6000+	Fully functioning CEmONC
Kanifing	422, 617	Kanifing General Hospital	3000+	Fully functioning CEmONC
		Bundung Maternal and Child Hospital *(Formerly Jammeh Foundation for Peace Hospital)*	5000+	Not fully functioning CEmONC (No removal of retained products and caesarean section performed)
West Coast	518, 946	Fajikunda Major Health Centre	2000+	Fully functioning BEmONC
		Serekunda Minor Health Centre	2000+	Not fully functioning BEmONC (No assisted vaginal delivery)
		Brikama Major Health Centre	6000+	Fully functioning CEmONC
North Bank	236, 879	Essau Major Health Centre	1200+	Non-EmONC (No manual removal of placenta, removal of retained products, assisted vaginal delivery and caesarean section performed)
		Farafenni General Hospital *(Formerly Armed Forces Provisional Ruling Council (AFPRC) Hospital)*	1500+	Fully functioning CEmONC
Lower River	97, 901	Soma Major Health Centre	800+	Not fully functioning CEmONC (No removal of retained products and caesarean section performed)
Upper River	261, 382	Basse Major Health Centre	2000+	Fully functioning CEmONC
Central River	256, 975	Bansang General Hospital[b]	2500+	Fully functioning CEmONC

[a] data from The Gambia Bureau of Statistics. [b] not included in the stillbirth audit. [c] data from individual facility service delivery reports. [d] data from the 2012 national assessment for EmONC

Figure 1 (A) Physical and (B) administrative map of The Gambia with spatial distribution of study facilities. BEmONC, basic Emergency Obstetric and Newborn Care; CEmONC, comprehensive Emergency Obstetric and Newborn Care.

Study design and data collection

This was a retrospective secondary data analysis. With approval from the MoH, we accessed routine health service delivery data from public facilities. Due to logistical constraints, data collection from Bansang General Hospital in the Central River Region was not feasible and was, therefore, excluded from the analysis. We extracted delivery records for all births occurring between 1 January 2013 and 31 December 2018 from standard government-issued delivery registers at the remaining 10 selected health facilities. The extracted data included maternal age, parity (number of previous pregnancies), admission date, delivery date and time, mode of delivery (spontaneous vaginal, vacuum-assisted, caesarean or forceps), birth attendant designation, newborn sex, birth weight and delivery outcome. The aggregated data from all the facilities were managed and stored using REDCap electronic data capture tools hosted by the MRC Unit, The Gambia at the London School of Hygiene and Tropical Medicine.[24 25]

Classification of stillbirths

In The Gambia, the assessment and recording of gestational age at delivery are not standard practices, and FHR on admission is not documented in delivery registers, complicating the accurate determination of stillbirth timing. Instead, healthcare providers rely on the physical appearance of the fetus at delivery to infer timing.

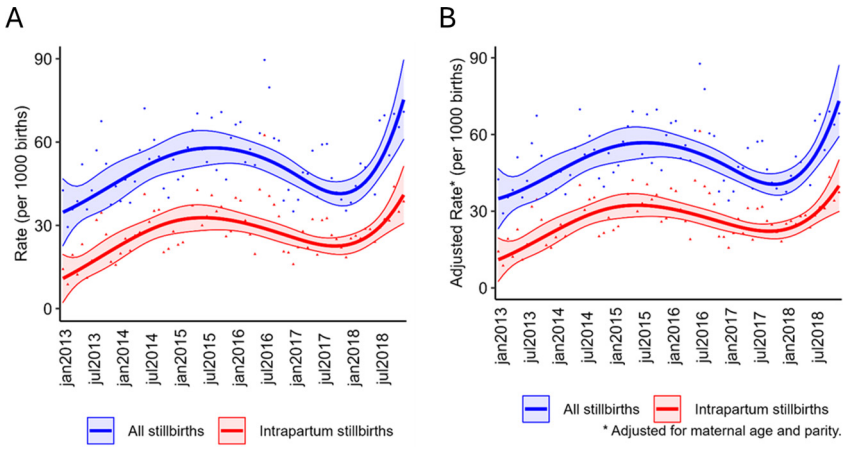


Figure 2 (A) Unadjusted trend in total stillbirth and intrapartum stillbirth rates, (B) adjusted trend in total stillbirth and intrapartum stillbirth rates in The Gambia, 2013–2018.

To ensure consistency and comparability, we reclassified all documented stillbirths based on birth weight, using a threshold of 500 g or more as an approximate marker for 22 weeks of gestation.[26 27] Macerated stillbirths were reclassified as 'antepartum,' while fresh stillbirths were classified as 'intrapartum.' We carefully excluded miscarriages from the classification process. Where the outcome was documented as a stillbirth/IUFD/Abortion, but the birth weight was less than 500 g or not recorded, we reclassified this as a 'miscarriage.

Modelling facility catchment, population and travel time

We used travel time to measure potential geographical access to health facilities providing CEmONC services for women aged 15–49 years.[10] We chose travel time because it considers factors such as elevation, barriers, road network and travel speed that affect geographical accessibility more accurately than straight-line travel distances.[28]

For each 1-by-1-km grid, the least accumulative travel time cost was estimated to the nearest health facility, thereby creating health facility catchments, which is considered one of the best approaches for delineating catchments.[29] We combined spatial topographical data to model travel times to health facilities using AccessMod, a free and open-source WHO tool to model geographical accessibility.[30] The travel time model accounts for multimodal transportation, including walking, bicycling and mechanised travel modes. To estimate travel times, we used a gridded layer (friction layer) that incorporated roads,[31] water features,[31] land cover types[32] and travel speeds.[33] This model helps determine the feasibility of travel across each 1-by-1-km grid. We used the travel speeds previously applied in Ghana[33] in our model because the context is similar to The Gambia and accounts for the nature of roads, which prevents underestimating the geographical

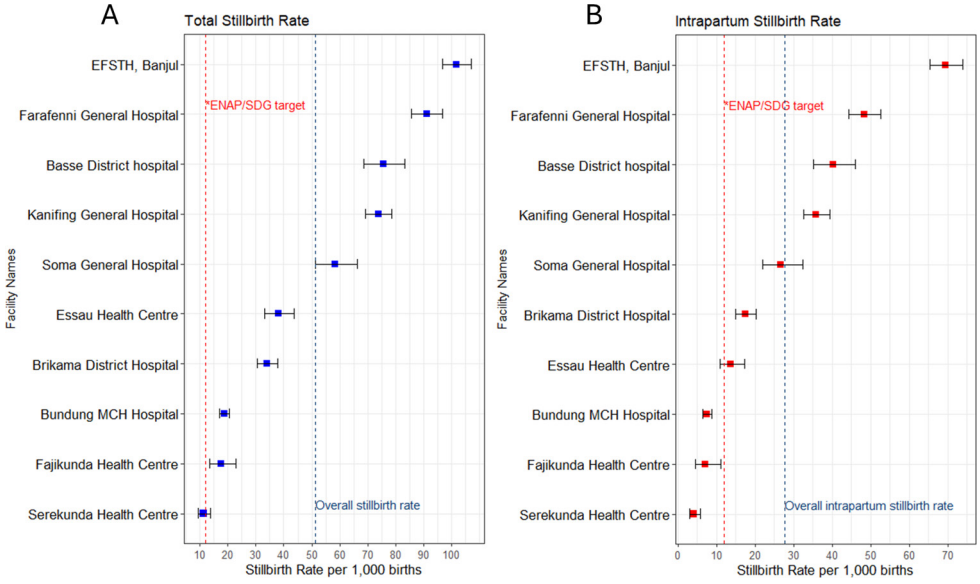


Figure 3 Adjusted facility-level total and intrapartum stillbirth rates (IPSBR) per 1000 births across 9 health facilities in The Gambia, 2013–2018. (The red dashed line indicates the ENAP/SDG target, while the blue dashed line indicates the national SBR and IPSBR). EFSTH, Edward Francis Small Teaching Hospital; ENAP, Every Newborn Action Plan; SDG, Sustainable Development Goal.

Table 1 Distribution of birth outcomes by maternal age, parity, birth weight, delivery mode and stillbirth sex

	Delivery outcomes					
	% Stillbirths that are intrapartum (95% CI)	P value	Total SBR per 1000 births (95% CI)	P value	IPSBR per 1000 births (95% CI)	P value
Total	53.8 (42.7 to 64.6)		51.3 (27.5 to 93.6)		27.6 (14.4 to 52.4)	
Maternal age (years)		0.96		<0.001		0.03
<16	52.9 (35.0 to 70.1)		60.9 (45.9 to 80.6)		32.2 (19.0 to 54.1)	
16–35	54.0 (42.2 to 65.3)		48.9 (28.6 to 82.7)		26.4 (13.3 to 51.6)	
>35	53.2 (44.8 to 61.4)		71.8 (48.6 to 105.1)		38.2 (24.8 to 58.4)	
Parity (previous deliveries)		0.09		<0.001		<0.001
0	51.2 (35.5 to 66.6)		52.9 (32.2 to 85.9)		27.1 (13.5 to 53.5)	
1	57.6 (48.7 to 66.1)		39.5 (24.0 to 64.3)		22.8 (12.4 to 41.4)	
2–4	54.8 (41.5 to 67.5)		46.5 (25.5 to 83.3)		25.5 (12.1 to 53.1)	
≥5	52.1 (43.2 to 60.8)		74.2 (50.2 to 108.3)		38.6 (23.9 to 61.7)	
Birth weight (grams)		0.004		<0.001		<0.001
<1000	31.9 (21.0 to 45.3)		607.2 (520.6 to 687.6)		194.0 (148.8 to 248.9)	
1000–1499	41.4 (25.6 to 59.2)		479.6 (420.5 to 539.4)		198.5 (137.9 to 277.2)	
1500–2499	50.3 (39.0 to 61.5)		127.3 (84.8 to 186.6)		64.0 (36.9 to 108.5)	
2500–3999	67.3 (57.3 to 75.9)		24.6 (13.9 to 43.3)		16.5 (8.6 to 31.7)	
≥4000	66.0 (51.5 to 78.1)		52.8 (28.7 to 95.1)		34.8 (17.1 to 69.4)	
Delivery mode		<0.001		<0.001		<0.001
Spontaneous vaginal	49.0 (39.2 to 58.8)		44.0 (25.7 to 74.3)		21.6 (11.3 to 40.8)	
Assisted vaginal (breech)	49.7 (41.2 to 58.2)		158.2 (129.5 to 191.8)		78.6 (58.0 to 105.6)	
Instrumental	75.3 (55.9 to 88.0)		61.7 (42.0 to 89.8)		46.5 (29.7 to 72.0)	
Caesarean section	76.4 (72.7 to 79.6)		98.9 (72.6 to 133.4)		75.5 (55.0 to 102.8)	
Child sex		0.50		0.57		0.78
Female	53.3 (43.0 to 63.3)		51.6 (30.3 to 86.7)		27.5 (14.2 to 52.5)	
Male	54.4 (42.2 to 66.1)		50.9 (30.5 to 83.9)		27.7 (14.5 to 52.3)	

IPSBR, Intrapartum Stillbirth Rate; SBR, Stillbirth Rate.

access challenges.[34] We used elevation data[35] to moderate walking speeds towards a health facility. We summed the population of women of reproductive age (aged 15–49 years) in The Gambia who can reach a fully functional CEmONC facility within 10 travel time intervals (ie, <11 min, 11–20 min, 21–30 min, 31–40 min, 41–50 min, 51–60 min and >60 min). We then mapped this data and described the distribution of women using percentages. To estimate the number of women aged 15–49 years in The Gambia during the study period, we used the WorldPop gridded age-sex data for the relevant years.[36]

Statistical analysis

The missing data were filled using the multivariate imputation by chained equations method.[37] The imputation model included variables such as the Gambia routine classification of pregnancy outcome, maternal age, parity, child sex, history of miscarriage, birth weight, hospital, mode of delivery, month and year, and birth attendant skill status. After the imputation, dummy variables for stillbirth (all stillbirth yes/no and intrapartum stillbirth yes/no) were created from the imputed pregnancy outcome variable. We generated 10 independent datasets with imputed missing values, and estimates were pooled using Rubin's rule.[38] Logistic regressions were used to model the binary stillbirth outcome variables. Cluster robust SEs were used to account for possible clustering within health facilities. We calculated the predicted total SBR and IPSBR and their confidence intervals using logistic regression models. Stata V.14 (StataCorp) performed the imputation and data analysis.

To analyse the SBR and IPSBR trends, we used unadjusted and adjusted predicted rates obtained from univariable and multivariable logistic regressions, respectively. Cluster robust SEs were used for both. The univariable model only considered the time variable, which combined the month and year of delivery, while the

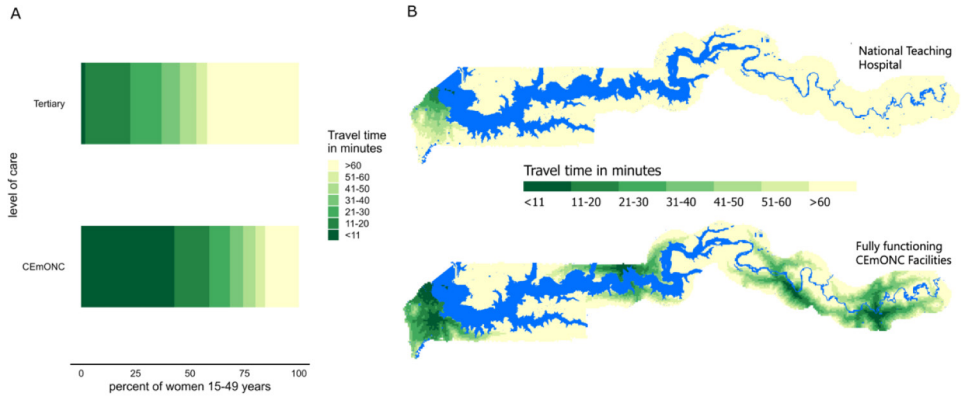


Figure 4 (A) The travel time needed to access National Teaching Hospital and fully functional CEmONC services and the proportion of women in the reproductive age group (15–49 years) within each travel time band and (B) the spatial distribution across The Gambia. CEmONC, comprehensive Emergency Obstetric and Newborn Care.

multivariable model included maternal age and parity as covariates. We approximated the SEs of the predicted rates using the delta method[39] and compiled the unadjusted and adjusted rates in a dataset. Then, we modelled the trend of unadjusted and adjusted rates using linear regression with cubic splines based on 5 df, which can accommodate non-periodic functions.[40] The model was weighted by the inverse of the rates' variance to account for the outcome variables being estimated rather than observed. Finally, we plotted the trend curves for the unadjusted and adjusted rates and their 95% CIs using the 'gg-formula' package in R software.[41]

RESULTS

We collected data on 97 276 births across 10 health facilities during the review period. Birth outcome data and other variables in routine labour ward registers were generally incomplete. Only three facilities (Bundung Maternal and Child Hospital, Serekunda Minor Health Centre and Farafenni General Hospital) had data for all the years (online supplemental table 1). Bundung Maternal and Child Hospital, the National Teaching Hospital (EFSTH) and Kanifing General Hospital, all in the West Coast region, reported the highest number of births, accounting for 23.8% (23 144), 14.6% (14 153) and 12.0% (11 709) of total births, respectively. The distribution of birth outcomes by facility and other key variables is presented in online supplemental table 2.

SBRs and associations

Of the recorded births, 4873 (5.1%) resulted in stillbirths, with a total SBR of 51.3 per 1000 births (95% CI: 27.5 to 93.6). Intrapartum stillbirths accounted for 53.8% (95% CI: 42.7% to 52.4%) of cases, resulting in an IPSBR of 27.6 per 1000 births (95% CI: 14.4 to 52.4). Notably, stillbirths (total and intrapartum) peaked in 2015 and 2018, patterns that persisted after adjusting for maternal age and parity trends (figure 2A,B).

Figure 3 shows the total SBR and the IPSBR per 1000 births across the study facilities during the reviewed period. The highest SBRs were observed at fully functional CEmONC facilities: the National Teaching Hospital (101.7 per 1000; 95% CI: 96.8 to 106.8), Farafenni General Hospital (91.1 per 1000; 95% CI: 85.6 to 96.8), Basse District Hospital (75.5 per 1000; 95% CI: 68.6 to 83.1) and Kanifing General Hospital (73.7 per 1000; 95% CI: 69.1 to 78.6) (figure 3A). The lowest SBR, 11.3 per 1000 births (95% CI: 9.3 to 13.8), was recorded at Serekunda Health Centre, a partially functional BEmONC facility. IPSBRs showed a similar trend (figure 3B).

The distribution of birth outcomes varies based on factors such as the facility where the birth took place, maternal characteristics and stillbirth characteristics (table 1). Women over 35 (38.2; 95% CI: 24.8 to 58.4) and those who had given birth five or more times (38.6; 95% CI: 23.9 to 61.7) had significantly higher IPSBRs. Intrapartum (fresh) stillbirths occurred notably more among women who underwent caesarean section (76.4%; 95% CI 72.7% to 79.6%) and instrumental (vacuum/forceps) deliveries (75.3%; 95% CI 55.9% to 88.0%). However, the highest rates of intrapartum stillbirths were observed following vaginal breech delivery (78.6; 95% CI 58.0 to 105.6) and a caesarean section (75.5; 95% CI 55.0 to 102.8). No differences were observed based on the sex of the stillborn child.

Geographical accessibility of CEmONC services across The Gambia

Overall, 42.8%, 58.9% and 68.3% of women of reproductive age (15–49 years) can access fully functional CEmONC facilities within 10, 20 and 30 min of travel time, respectively, while 15.5% cannot reach any such facility within 60 min (figure 4A). Women in the North Bank region and those outside the Greater Banjul Area in the West Coast region face the greatest challenges (figure 4B). Access to the country's only teaching hospital is even more limited. Only 1.8%, 22.5% and 36.9% of women can reach it within 10, 20 and 30 min, respectively (figure 4A), and 42.2% cannot access it within 60 min, particularly those outside the Greater Banjul Area (figure 4B). This highlights significant barriers to accessing the highest level of specialised care.

DISCUSSION

Our analysis of 97 276 births over 6 years across 10 health facilities in The Gambia revealed a total SBR of 51.3 per 1000 births—more than double the WHO's 2021 estimated national rate of 21 per 1000 births,[2] and over 4 times higher than the ENAP 2030 national target of 12 per 1000 births.[42] Our observed SBR is significantly lower than the hospital-based rates reported in Millennium Development Goal-era studies from The Gambia. Cham *et al*[43] reported an SBR of 116 per 1000 births, while Jammeh *et al*[44] reported an even higher SBR of 156 per 1000 births (95% CI: 138 to 174)—both despite using a 28-week cut-off. These higher rates are likely due to case mix differences, as their data focused on higher-level referral facilities and more complex pregnancies. In contrast, our dataset includes a broader range of healthcare facility levels. We also observed notable disparities in SBRs across facilities, highlighting the need for further investigation and targeted interventions to ensure equitable care. Despite nearly half of women of reproductive age in The Gambia living within a 10 min travel time to a fully functional CEmONC facility, these facilities reported the highest SBR and IPSBR. Additionally, SBRs were higher among women who underwent assisted vaginal (breech) delivery or caesarean section, emphasising the need for improved management of high-risk deliveries.

The five facilities with the highest SBRs (>40 per 1000 births) and IPSBR (>22 per 1000 births) included four fully functional CEmONC facilities and one partially functional CEmONC facility. Several factors may explain these higher rates. According to the 2019 Maternal Death Surveillance and Response Report, most maternal deaths in CEmONC facilities were referred cases. EFSTH, as the nation's highest referral centre, reported that 85% of hospital deliveries were due to obstetric complications.[45] Similarly, Kanifing and Farafenni General Hospitals and Basse Major Health Centre served as the sole fully operational CEmONC facilities in their respective regions. Despite Farafenni serving a smaller population of women of reproductive age compared with Kanifing and Basse, all three facilities met WHO standards for CEmONC availability relative to their regional populations. However, the absence of fully functional BEmONC facilities in these regions meant that all obstetric emergencies were referred to these CEmONC centres. This influx of complex cases likely contributed to the higher SBRs, but determining the proportion of stillbirths resulting from referred cases was challenging due to incomplete records. The higher SBRs could result from several factors, including improved reporting of delivery outcomes, a complex case mix from referrals, delays in accessing timely care during referral, or resource constraints at receiving facilities. However, better reporting alone is unlikely to account for the elevated rates, as none of the facilities maintained complete records. Significant gaps in healthcare worker availability[23] and infrastructure, exacerbated by increased referrals, likely strained already overburdened facilities, leading to shortages in equipment and human resources.

Our data show that nearly half of women of reproductive age in The Gambia can reach a fully functional CEmONC facility within a 10 min travel time. However, due to the lack of routine data collection on this metric, we could not track individual journeys or determine total travel times to birthing facilities. Studies in Nigeria indicate that 50%–70% of women who experienced intrapartum stillbirths had travel times of under 30 min to the nearest government health facility,[10 11] suggesting that factors beyond travel duration may also contribute to stillbirths. Nonetheless, longer travel times are strongly associated with higher stillbirth risk, with one study finding that even travel times of 10–29 min doubled the likelihood of stillbirth. The high SBR and IPSBR at Soma Health Centre may reflect its role as the only facility in the Lower River Region offering some form of EmONC. Although Farafenni General Hospital, the nearest fully functional CEmONC facility, is only 16 km away in the North Bank Region, the River Gambia separates the two regions. This posed significant challenges for patient referrals, especially at night when the ferry service was unavailable. Geographical accessibility between the regions improved after the opening of the Trans-Gambia Bridge in 2019.

Both caesarean deliveries and assisted vaginal (breech) deliveries had similarly high IPSBRs. However, caesarean delivery was the most frequently associated mode of delivery with intrapartum stillbirths, while breech delivery was the least common. These findings align with the findings of Cham *et al*[43] and Jammeh *et al*,[44] which also indicated a higher proportion of fresh stillbirths following caesarean section compared with spontaneous vaginal delivery. In some parts of SSA, obstetricians often advocate caesarean section as the preferred method for term breech presentations. [46 47] While caesarean sections can be life-saving, especially for high-risk cases, studies indicate that in resource-limited settings, they are associated with a higher risk of intrapartum stillbirth if they are performed late.[44 48] We suspect that caesarean sections in these facilities are frequently performed too late, owing to several delays in accessing this service. Unfortunately, the routine data available for this study did not specify the proportion of caesarean deliveries performed for breech presentations or emergencies, nor did it provide details on delays in decision-to-delivery intervals among women who experienced intrapartum stillbirths after caesarean sections. This underscores the importance of timing, as earlier intervention could improve outcomes. A study from the National Teaching Hospital, where the caesarean section rate is 24%, found that over 80% of C-sections were performed as emergency procedures, with 6% resulting in intrapartum stillbirths.[45] Of these emergency caesarean sections, 75% were performed on high-risk patients referred from other facilities. Breech presentation was the third most common indication for caesarean delivery, accounting for 15.6% of cases. Vaginal delivery of a breech presentation at term carries a higher stillbirth risk compared with caesarean

delivery of a breech presentation or vaginal delivery of a cephalic presentation.[49] The presence of a skilled clinician is widely recognised as critical for the safety of vaginal breech births.[50–53] However, the availability of skilled clinicians is inconsistent, and many midwives lack expertise in managing vaginal breech deliveries.[54] In The Gambia, registered midwives are authorised to perform assisted vaginal deliveries, but their training and proficiency in vaginal breech births remain uncertain.[22 23]

Our study has several strengths. It is the first to explore the relationship between facility EmONC status, geographical accessibility and stillbirths in The Gambia, with a large sample size of over 97 000 birth outcomes across diverse health administrative and geographical regions. Few facility-based studies in the subregion collect such comprehensive disaggregated data.[10 11] However, the study has some limitations that should be considered when interpreting the findings. The analysis includes only a portion of total birth outcomes, excluding data from smaller government and private health facilities, which may limit generalisability. To address this, we focused on the largest and busiest facilities, where most stillbirths in The Gambia occur, ensuring a robust representation of outcomes. The higher IPSBR in CEmONC facilities, particularly at the national teaching hospital, likely reflects referral bias and confounding by case mix, as these facilities manage a greater proportion of high-risk pregnancies involving severe complications or complex referrals. Conversely, low SBRs in some facilities may not indicate better care but reflect their focus on low-risk patients. We could not adjust for patient characteristics or referral patterns, making it difficult to isolate the impact of care quality from differences in patient populations. Our travel time estimates also assumed women sought care at the nearest fully functional CEmONC facility. However, evidence suggests that some women bypass closer facilities for others due to personal preferences or other factors, which may have influenced the accuracy of these estimates.[10 12] Being a descriptive and observational study, it reports associations rather than establishing causation, and the findings should be interpreted with this limitation in mind. The analysis relies on routinely collected data from 2013 to 2018, with rate estimations influenced by data quality and completeness. While the findings may not fully represent the situation in 2025, they offer valuable insights for tracking progress and identifying areas for improvement in maternal and newborn healthcare. The functionality of EmONC centres during the study period was determined using a national performance report conducted shortly before the study began. Although some CEmONC facilities improved human capacity, theatre infrastructure and equipment during the 5-year study, a subsequent performance audit (January 2017–December 2019) revealed no change in their overall EmONC functionality. This is notable given that EmONC status is ideally reviewed every 3 months. Many delivery registers were incomplete or in poor condition, and the lack of archived monthly delivery statistics in the Health Information Management System made it impossible to quantify the extent of missing data. To address this, we accounted for data gaps in our statistical analyses. Timing of death and the death-to-delivery interval were inferred using fetal appearance, an imprecise proxy for intrapartum demise.[27] Additionally, the absence of gestational age data required reclassification of stillbirths using a 500 g birth weight cut-off, aligned with older ICD definitions. These limitations highlight the need for routine FHR monitoring on admission and standardised recording of gestational age to improve the accuracy of stillbirth classification and timing. Strengthening routinely collected health facility data is crucial for generating reliable evidence to guide interventions and improve maternal and newborn outcomes. It is concerning that nearly half of the reported stillbirths were antepartum and classified as 'macerated, often linked to maternal conditions like infections, hypertension, diabetes or placental insufficiency. Despite receiving less attention than intrapartum stillbirths, they require targeted strategies, including strengthened antenatal care, to address underlying risks and improve outcomes.

Our study findings have important implications for maternal and newborn healthcare policy and practice, emphasising the need for a well-connected, strategically located network of fully operational EmONC facilities and an efficient referral system to minimise travel times and reduce delays in accessing care. Obstetric emergencies, such as antepartum haemorrhage, can have devastating consequences for the fetus and mother within a short time frame, with stillbirth being particularly vulnerable to delays in treatment.[55] While WHO guidelines recommend access to an EmONC facility within 2 hours,[56] this time frame may be insufficient to prevent stillbirths and neonatal deaths, as many occur within minutes.[57 58] Evidence further shows that the risk of stillbirths, especially of intrapartum stillbirths, remains high even when travel times to facilities are 30 min or less.[10 11] These findings underscore the critical importance of timely emergency obstetric care and the urgent need to address delays to improve mother and newborn outcomes. Although facility-based deliveries have increased, many public health facilities in SSA with high maternal and perinatal mortality rates lack adequate coverage and readiness to deliver optimal EmONC services.[59 60] While the number of CEmONC facilities often meets the recommended minimum for the population, the quantity and geographical distribution of BEmONC facilities remain insufficient.[60–62] Furthermore, many facilities provide only partial interventions, limiting their ability to address maternal and newborn healthcare needs. Policy-makers must prioritise meeting the recommended number of EmONC facilities to adequately serve the population while ensuring these facilities are fully operational and equipped with sufficient human resources and essential equipment. Strengthening these facilities will reduce unnecessary referrals and delays in providing

critical care. One approach to achieve this is appointing a dedicated coordinator to oversee and monitor the implementation of a national EmONC action plan. This coordinator would ensure that EmONC facilities function optimally, identify service delivery gaps and address improvement areas. Establishing a formal communication and feedback system between referring and receiving facilities is crucial. Such a system would facilitate timely referrals, ensure the sharing of patient information and promote accurate documentation. It would also allow receiving facilities to prepare adequately, ensuring they are equipped and staffed to provide emergency interventions. These measures will strengthen coordination, streamline the referral process and enhance communication, improving the effectiveness of EmONC services and ultimately reducing maternal and perinatal mortality rates.

Health systems research on mechanisms to improve the management and stabilisation of pregnant women with obstetric emergencies before transferring them to the national teaching hospital is a top priority for maternal and newborn health in The Gambia.[63] Future implementation research should focus on developing a national dashboard integrating health facility assessments, geospatial information and real-time health data.[64 65] This dashboard should provide updates on the EmONC status of facilities, including readiness, service quality and travel times from communities to facilities, while highlighting disparities in access to care. By incorporating features like real-time travel data from platforms such as Google Maps, the dashboard could account for factors like traffic, adverse weather and other conditions that impact access, particularly during the rainy season.[66] This tool would enable healthcare workers and programme managers to assess the availability of skilled staff, equipment and supplies, supporting effective planning and advocacy efforts.[64] Further research should focus on refining the dashboard's functionality to enhance its accuracy and practicality for improving maternal and newborn healthcare.

CONCLUSIONS

In conclusion, our analysis highlights a concerning SBR of 51.3 per 1000 births in The Gambia, which far exceeds both national and Sustainable Development Goal (SDG) targets. The burden is particularly high in the limited number of operational CEmONC facilities, especially among women undergoing vaginal breech deliveries or caesarean sections. As we approach 2030, achieving the SDG target of reducing SBRs to 12 or fewer per 1000 births necessitates a dual strategy: expanding and maintaining an adequate number of fully functional BEmONC and CEmONC facilities, alongside improving the quality of care. This encompasses timely referrals, strengthened infrastructure, optimised clinical protocols, enhanced staff training and better preparedness for high-risk cases. Implementing these measures is critical to accelerating progress towards reducing stillbirths and improving maternal, fetal and newborn outcomes in high-burden areas.

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Contributors OW developed the draft manuscript. OW and WD-G conducted the geospatial analyses. SCA performed the statistical analysis. UO conceptualised the study, supervised data collection in 9 of the 10 study facilities, and critically reviewed the data analysis and results. HJ oversaw data collection in Farafenni. BFJ, MB, MTN, MM, MC and SS provided technical support from the Ministry of Health. MJ offered technical support from UNICEF The Gambia Country Office. BK, AB-T and JEL critically reviewed the data analysis and results. All authors reviewed the manuscript and took responsibility for its final version. UO is the guarantor of the manuscript paper.

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