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The trend and distribution of stillbirth in the Eastern Region of Ghana

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Abstract

Introduction: The trend of stillbirth in Ghana is on a slow decline from 22.5/1,000 total births in 2018 to 21.4/1,000 total births in 2021, and has not met its target. After many interventions implemented in the Eastern Region to reduce stillbirth, little is known about the trend of stillbirth rates in the region. This study determined the trend and distribution of stillbirths in the Eastern Region.

Methods: We employed a secondary data analysis on stillbirth in the Eastern Region, 2014-2022. The data source was from the District Health Information Management System. We calculated the stillbirth rate per 1,000 deliveries at the district and regional level. The stillbirth rates were presented as a trend line graph. We tested for the consistency of the trend using the Mann-Kendall trend analysis test on STATA 13.1. We used QGIS software version 3.30 to draw choropleth maps to depict the distribution of the stillbirth rate in the region.

Results: Over the nine-year period from 2014 to 2022, a total of 8,587 stillbirths were recorded out of 580, 653 total births. The highest number of stillbirths was reported in 2014, with 1,102 stillbirths, out of which macerated stillbirths accounted for 701 and a stillbirth rate of 18.0 per 1,000 total births. Across all years, macerated stillbirths outnumbered fresh stillbirths. Stillbirth rate declined from 18.0 per 1,000 total births in 2014 to 12.4 per 1,000 total births in 2022. Mann-Kendall trend analysis showed a significant decline in the total stillbirth trend over time ($p < 0.05$). Over the nine-year period, districts with a high incidence of stillbirth (19.9-34.5/1,000 total births) were Kwahu Afram Plains North, Kwahu West, New Juaben South and Denkyembour.

Conclusions: The stillbirth rate is on a decline, and there are specific districts which have a high incidence of stillbirth. We recommend that interventions for stillbirths should be strengthened to meet the SDG target of 12/1,000 total births by 2030.

Keywords: Stillbirth, Macerated Stillbirth, Fresh Stillbirth, Stillbirth rate, Total birth, Trend, Distribution, Eastern Region

Citation

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Introduction

Stillbirths are a major problem in many countries that have generally received little attention [1]. According to the World Health Organization (WHO), stillbirth occurs when a baby is born after 28 weeks of pregnancy and exhibits no signs of life [2]. Approximately one in every 160 to 200 deliveries in the United States of America result in stillbirth, a common pregnancy complication despite advancements in obstetric care [3] and of the estimated 2.6 million stillbirths that occur globally each year, 98% are believed to occur in low and middle income nations, with South Asia and Sub-Saharan Africa accounting for 78% of these cases [1,4,5].

At the 67th World Health Assembly, the WHO created the Every Newborn Child Action Plan (ENAP) campaign to promote the Global Strategy for Women's and Children's Health in 2014, which redoubled efforts to lower stillbirths globally by highlighting access to high-quality maternal services as a key component of reaching national objectives [6,7]. By 2030, the WHO's Every Newborn Child Action Plan: An action plan to end preventable deaths campaign seeks to lower the global stillbirth rate to no more than 12 per 1,000 total births [8]. Although stillbirth rates are declining internationally, they have not yet attained their goal. Between 2010 and 2016, the global rate decreased by 3.0% yearly, from 31.7 per 1,000 total births to 26.4 per 1,000 total births [4].

Between 2018 and 2021, Africa's stillbirth rate gradually decreased from 21.41 per 1,000 total births to 20.65 per 1,000 total births[9]. In 2019, the stillbirth rate per 1,000 total births differed significantly by region, ranging from 2.9 (2.7–3.0) in Western Europe to 22.8 per 1,000 total births in West and Central Africa. The second and third greatest stillbirth rates were seen in South Asia, East and South Africa, and West and Central Africa, respectively [10]. In the Sub-Saharan African region, the prevalence of stillbirths rose from 0.77 million in 2000 to 0.82 million in 2019, accounting for 27% of all stillbirths globally [6,11].

In Ghana, stillbirths accounted for 1.7% of the 650,000 births recorded annually in public health facilities, with 40% occurring during labour [12]. Ghana's stillbirth rate per 1,000 total births was 22.5 in 2018, 22.17 in 2019, 21.75 in 2020, and 21.4 in 2021. But even if it has improved from previous years, it is still high in comparison to the regional average for Sub-Saharan Africa [6,9]. In September 2013, PATH and Kybele Inc., two non-governmental organizations, worked with the Ghana Health Service (GHS) and received funding from the Children's Investment Fund Foundation to undertake a five-year Making Every Baby Count Initiative (MEBCI). Enhancing national leadership in newborn health and building regional and district-level newborn care capability were the main goals of the effort in four areas, including the Eastern Region. [13]. With many other interventions implemented in the Eastern Region and after the development of ENAP by the WHO in 2014 to reduce stillbirth and improve newborn care, little is known about the trend of stillbirth rates in the region. The study determined the trend and distribution of stillbirth in the Eastern Region, 2014 to 2022, to inform planning for safe pregnancies and births in the region.

Methods

Study design and area

This study was a secondary data analysis conducted in the Eastern Region of Ghana. The study used stillbirth data over a nine-year period from January 1 2014, to December 31 2022. The Eastern Region is one of the administrative regions in Ghana. The regional capital is Koforidua, which is in the New Juaben South Municipality. The region shares boundaries with six other regions, which are Bono East, Ashanti, Central, Greater Accra, Volta, and Oti Region. The region consists of 33 districts and municipalities. The region has a projected population of 3,049,821 in 2020 and is the third highest in Ghana, of which 51% of the population are females, among whom 731,957 are of the fertility age.

The region has a total of 1,226 health facilities comprising 903 CHPS facilities, 97 clinics, 29 maternity homes, 148 health centres, 5 polyclinics, 18 district hospitals, 25 other general hospitals and a regional hospital. Among these facility types, only 26.9% of CHPS and 20.6% of clinics offered delivery services, 48.3 % of maternity homes conducted deliveries, indicating limited delivery services. Delivery services were most widely available at higher–level primary care facilities, with 89.9% of health centres offering delivery services. Among secondary-level facilities, 83.3% of polyclinics provided delivery services, and 100% of the hospitals conducted delivery services [14]. All these facilities are reported on the DHIMS II platform. The region has 158 medical officers, 19 obstetricians and 1,811 midwives. Below is the map of the Eastern Region (Figure 1):

Data source

The study utilised secondary data from the District Health Information Management System (DHIMS II). The DHIMS II is a nationwide integrated electronic database accessible over the internet that compiles data from health facilities [15]. Stillbirths and the number of deliveries are manually recorded in facility registers at all healthcare facilities and are subsequently summarised monthly onto the Monthly Midwives' Return Form A in the DHIMS2 database at the district or sub-district level

Data extraction

Data were abstracted from the DHIMS2. The data were abstracted over a nine-year span from 2014 to 2022. The

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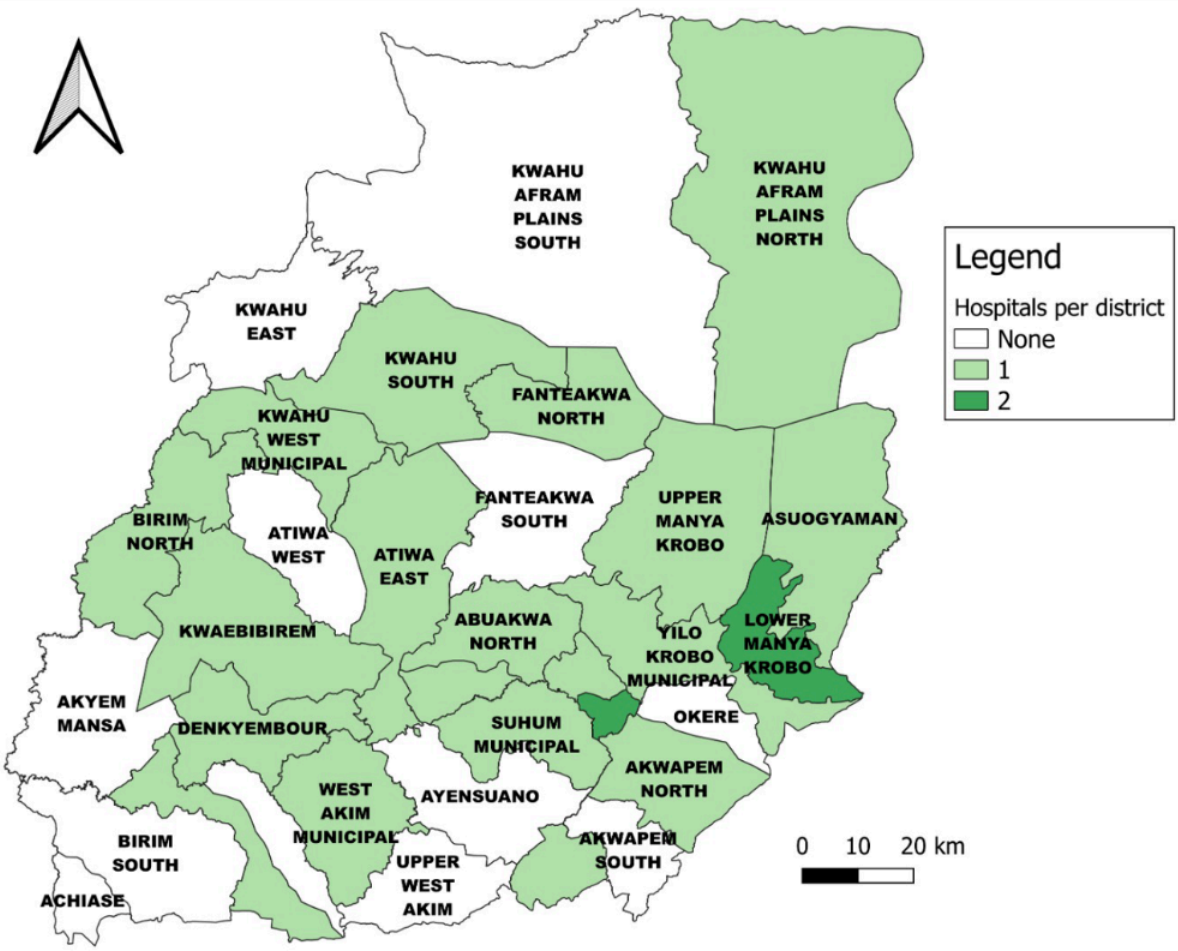

Figure 1. Map of the Eastern Region

data were abstracted using DHIMS2 pivot tables and exported into Microsoft Excel 365. Data abstracted included fresh stillbirths, macerated stillbirths, total births and reporting rate of stillbirth at the regional and district level from 2014 to 2022. There was availability of data for all years from 2014 to 2022, indicating a high level of completeness, although there were variations in the reporting rate across the districts. The data captured facility-based births and stillbirths at both public and private health facilities. Therefore, stillbirths occurring outside health facilities, such as home births or unreported community events, were not captured.

Data analysis

Data cleaning was done using Microsoft Excel 365. After the data were cleaned, they were imported into STATA version 13.1 (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP) for statistical analysis and Quantum Geographic Information System software version (QGIS) version 3.30 for spatial analysis.

We determined the total stillbirths by adding the fresh and macerated stillbirths. Proportions were calculated from absolute counts of the data abstracted. We calculated the fresh stillbirth rate, macerated stillbirth rate and total stillbirth rate by dividing the fresh stillbirth, macerated stillbirth and total stillbirth by total births, multiplied by 1,000 from 2014 and 2022, respectively. According to the WHO, stillbirth rate is defined as the number of babies born with no signs of life at 28 weeks or more of gestation, per 1,000 total births. The stillbirth rate is calculated as:

$$\text{Stillbirth Rate} = \frac{\text{Stillbirth}}{\text{Total births}} \times 1{,}000$$

[9]. Data on the reporting rate of stillbirth were abstracted to determine data completeness from 2014 to 2022. The annual total stillbirth rates, fresh stillbirth rates, macerated stillbirth rates and reporting rates were presented as line graph to determine the trend from 2014 to 2022.

Mann-Kendall trend analysis test was done to determine if there were statistically significant trends existing in the total stillbirth rate over time using STATA version 13.1 (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP). Under the null hypothesis, it was assumed that there was no trend in the total stillbirth rate over time, whereas the alternative hypothesis was that there was an increasing or decreasing

Table 1. Stillbirth rate, macerated stillbirth rate, fresh stillbirth rate from 2014 to 2022

Year	Total Births	Stillbirth	Total Stillbirth Rate	Macerated Stillbirth	Macerated Stillbirth Rate	Fresh Stillbirth	Fresh Stillbirth Rate
2014	61,349	1,102	18.0	701	11.4	401	6.5
2015	59,644	1,060	17.8	668	11.2	392	6.6
2016	60,995	985	16.1	616	10.1	369	6.0
2017	60,281	872	14.5	554	9.2	318	5.3
2018	63,842	898	14.1	562	8.8	336	5.3
2019	65,283	910	13.9	542	8.3	368	5.6
2020	67,489	912	13.5	543	8.0	369	5.5
2021	71,162	970	13.6	595	8.4	375	5.3
2022	70,608	878	12.4	562	8.0	316	4.5

Source: Ghana DHIMS II

trend in the total stillbirth rate over time. We assumed a p-value ($p < 0.05$) to be statistically significant.

Quantum Geographic Information System software version (QGIS) version 3.30 was used to draw choropleth maps depicting the distribution of the stillbirth rate among the districts in the region between 2014 and 2022. Data on fresh and macerated stillbirth rates among districts were also imported into QGIS version 3.30 from Microsoft Excel 365 to draw choropleth maps to depict the distribution of the fresh and macerated stillbirth rates among the districts in the region for the year 2022.

Ethical considerations

Permission for this study was approved by the management of the Eastern Regional Health Directorate. The aggregate data abstracted did not have any personal identifiers. Secondary data abstracted were kept in a folder with a protected password on a computer and shared with only the investigation team.

Results

The regional stillbirth trend

There is a decline in the total stillbirth rate from 18.0 per 1,000 total births in 2014 to 12.4 per 1,000 total births in 2022. The highest total stillbirth rate was recorded in 2014, while the lowest was recorded in 2022. The average decline in the annual total stillbirth rate was 4.1%. The macerated stillbirth was more than the fresh stillbirth over the nine-year period (Figure 2). From 2018 to 2021, the reporting rate remained constant at 100%, but for the other years, it was lower than 100%. Between 2014 and 2022, a total of 8,578 stillbirths were recorded (Table 1). The annual number of stillbirths declined over the study period, decreasing from 1,102 in 2014 to 878 in 2022 despite an overall increase in total births. Across all years, macerated stillbirths were consistently more common than fresh stillbirths. The highest number of both macerated (701 cases) and fresh stillbirths (401 cases) was observed in 2014, whereas the lowest number of fresh stillbirths occurred in 2022 (316 cases). Overall, the findings indicate a progressive reduction in total stillbirths over time, with macerated stillbirths constituting the larger proportion of stillbirths in every year of the study period (Table 2).

Kendall's tau-a and Kendall's tau-b were both -0.9444, which depicts a decreasing trend. The Kendall's score was -34 with a standard error of 9.592. The p-value, adjusted with continuity correction, was 0.0006, which indicates that the trend was statistically significant ($p < 0.05$).

Geo-spatial distribution of stillbirth in the Eastern Region

There is a high incidence of stillbirth from 2014 to 2016 among districts in the Eastern Region. About 8-14 districts recorded a stillbirth rate of a range of 19.9 to 34.5 per 1,000 total births from 2014 to 2016. Apart from 7 districts that recorded a stillbirth rate of 19.9 to 34.5 per 1,000 total births in 2017, 4 or fewer districts recorded a stillbirth rate range of 19.9 to 34.5 per 1000 total births from 2018 to 2022. Districts that had a persistent stillbirth rate of range 19.9 to 34.5 per 1,000 total births from 2014 to 2022 are the Kwahu Afram Plains North district, Kwahu West District, New Juaben South Municipal and Denkyembour district. Districts that had a persistent stillbirth rate of range 0.0 to 4.7 per 1,000 total births from 2014 to 2022 are Akyemansa, Ayensuano, Okere and Yilo Krobo (Figure 3) (Table 2).

Geo-spatial distribution of fresh and macerated stillbirth in the Eastern Region

Atiwa East, Kwahu Afram Plains North District and New Juaben South Municipal had a macerated stillbirth rate of 12.9 to 19.0 per 1,000 total births in 2022. New Juaben South Municipal had a fresh stillbirth rate of 10.5 per 1,000 total births (Figure 4) (Table 3).

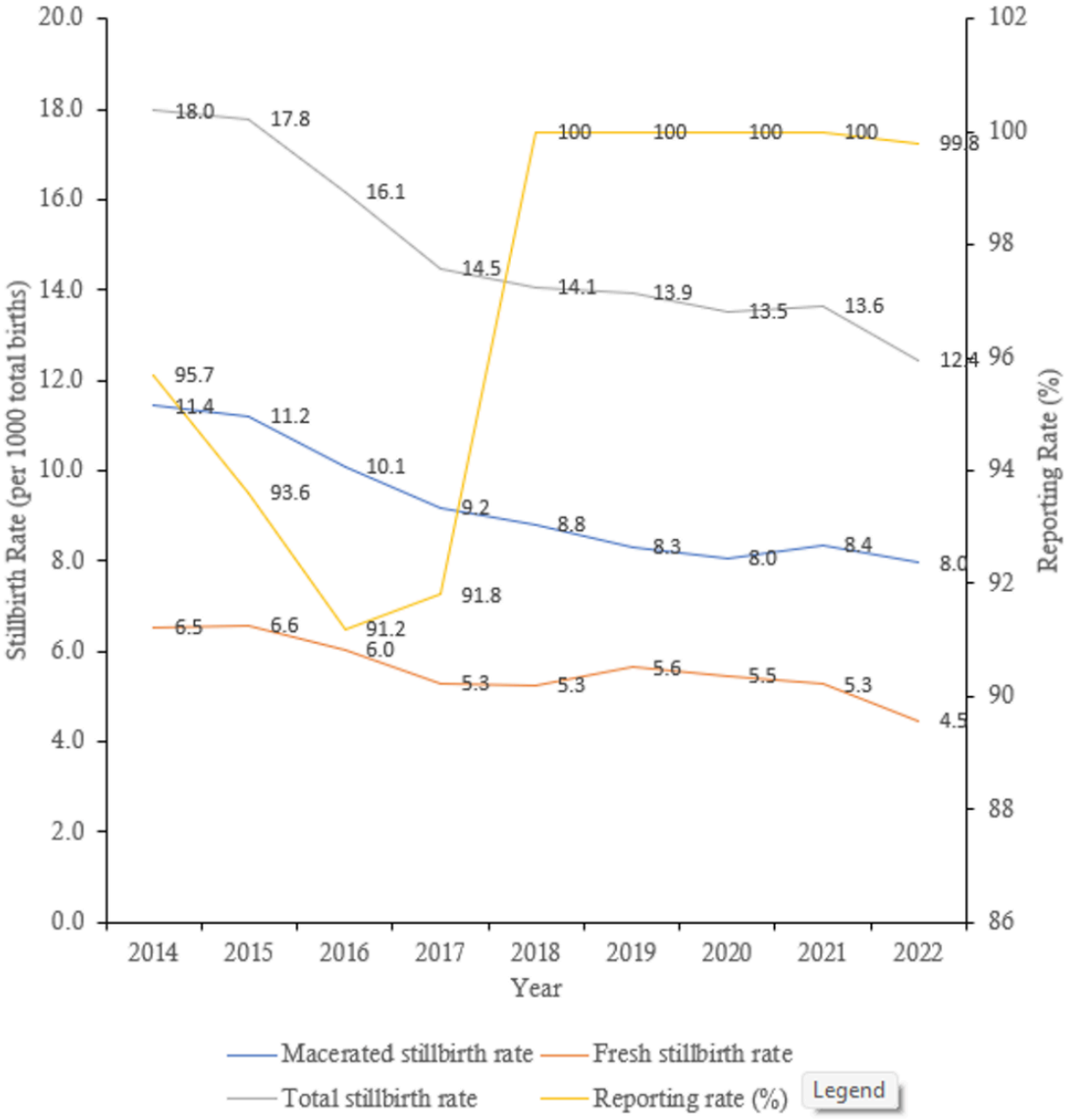

Figure 2. Trend of total stillbirth rate, macerated stillbirth rate, fresh stillbirth rate and reporting rate in the Eastern Region 2014-2022.

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Table 2. Stillbirth Rates for Districts in the Eastern Region, Ghana (2014–2022)

District	2014			2015			2016			2017			2018			2019			2020			2021			2022		
	Births	Still	Rate	Births	Still	Rate	Births	Still	Rate	Births	Still	Rate	Births	Still	Rate	Births	Still	Rate	Births	Still	Rate	Births	Still	Rate	Births	Still	Rate
Abuakwa North	1975	24	12.2	1892	38	20.1	1891	38	20.1	1906	34	17.8	2063	42	20.4	2278	41	18.0	2103	30	14.3	2578	50	19.4	2437	24	9.8
Abuakwa South	1642	39	23.8	1441	30	20.8	1524	17	11.2	1451	8	5.5	1399	3	2.1	1380	1	0.7	1630	14	8.6	1737	24	13.8	1697	5	2.9
Achiase	523	11	11.9	398	0	0.0	504	36	6.0	496	36	6.0	606	0	0.0	650	0	0.0	678	0	0.0	705	0	0.0	649	0	0.0
Akuapem North	2611	18	6.9	2295	24	10.5	1901	21	11.0	1952	11	5.6	2298	6	2.6	2277	6	2.6	2573	14	5.4	2471	5	2.0	2582	13	5.0
Akuapem South	381	3	7.9	427	4	7.5	522	0	0.0	547	11	1.8	508	23	3.9	478	0	0.0	478	24	2.7	700	22	2.9	724	11	1.4
Akyemansa	1289	64	4.7	1049	43	3.8	1170	43	3.4	1201	10	0.8	1088	43	3.7	987	0	0.0	956	33	1.1	1004	0	0.0	1309	21	1.5
Asene Manso Akroso	450	48	8.9	507	12	2.0	636	96	9.4	676	89	8.9	591	85	5.8	614	65	6.5	689	102	10.2	707	22	2.8	774	52	5.2
Asuogyaman	2348	45	19.2	2159	28	13.0	2234	31	13.9	1958	30	15.3	1953	34	17.4	2090	27	12.9	1861	22	11.8	1955	16	8.2	1991	27	13.6
Atiwa East	1516	31	20.4	1433	46	32.1	1469	54	36.8	1570	33	21.0	1526	27	17.7	1589	28	17.6	1725	25	14.5	1849	36	19.5	2020	44	21.8
Atiwa West	715	79	9.8	754	81	10.6	795	33	3.8	742	0	0.0	726	11	1.4	647	0	0.0	800	0	0.0	823	24	2.4	798	11	1.3
Ayensuano	997	11	1.0	1034	21	1.9	1039	0	0.0	965	0	0.0	894	22	2.2	984	44	1.1	1138	21	1.8	1384	10	0.7	1268	21	1.6
Birim Central	3709	128	34.5	3642	115	31.6	3773	110	29.2	3686	106	28.8	3845	75	19.5	3923	75	19.1	4068	72	17.7	4133	67	16.2	3903	62	15.9
Birim North	1408	22	15.6	1534	32	20.9	1574	26	16.5	1584	26	16.4	1691	28	16.6	1902	36	18.9	1973	32	16.2	2197	39	17.8	2103	29	13.8
Birim South	473	19		434	61	3.8	423	12	2.4	505	47	9.5	500	12	2.4	426	24	4.7	358	51	4.0	388	0	0.0	428	37	7.0
Dekyembour	3129	89	28.4	2696	66	24.5	2702	55	20.4	2601	60	23.1	2769	69	24.9	2861	76	26.6	2906	77	26.5	2802	46	16.4	2808	44	15.7
Fante Akwa North	1110	31	27.9	1119	27	24.1	1086	29	26.7	1182	14	11.8	1311	25	19.1	1128	24	21.3	1185	23	19.4	1217	18	14.8	1186	20	16.9
Fante Akwa South	468		0.0	434	24	6.5	456	24	4.6	511	35	5.9	543	0	0.0	435	12	3.4	431	12	3.4	445	0	0.0	533	0	0.0
Kwaebibrim	2045	20	9.8	2030	28	13.8	2001	10	5.0	1841	16	8.7	2048	13	6.3	2048	16	7.8	2133	18	8.4	2223	11	4.9	2224	16	7.2
Kwahu Afram Plain North	1120	35	31.3	1098	26	23.7	1086	21	19.3	1378	28	20.3	1479	20	13.5	1384	33	23.8	1525	37	24.3	1540	33	21.4	1503	35	23.3
Kwahu Afram Plain South	898	12	13.4	856	67	7.0	723	45	5.5	777	11	14.2	920	66	6.5	1027	32	2.9	1076	43	3.7	1083	87	7.4	1047	13	12.4
Kwahu East	1288	43	4.1	1198	10	8.3	1256	21	1.6	1260	21	1.6	1183	43	3.4	1253	32	2.4	1412	0	0.0	1396	10	0.7	1352	10	0.7
Kwahu South	2968	41	13.8	2748	73	26.6	2635	47	17.8	2720	49	18.0	2789	53	19.0	2790	47	16.8	2944	49	16.6	3000	64	21.3	2799	43	15.4
Kwahu West	3860	100	25.9	3808	96	25.2	4010	86	21.4	3776	60	15.9	3961	65	16.4	3962	67	16.9	4041	64	15.8	4052	81	20.0	4342	65	15.0
Lower Manya Krobo	3562	71	19.9	3297	42	12.7	3139	46	14.7	3247	22	6.8	3391	21	6.2	3438	33	9.6	3644	34	9.3	4193	39	9.3	3716	23	6.2
New Juaben North	263	13	3.8	343	0	0.0	427	37	5.3	531	59	9.4	576	61	10.4	665	101	15.0	800	91	11.3	923	121	13.0	888	131	14.6
New Juaben South	6294	212	33.7	6260	166	26.5	6324	195	30.8	5950	165	27.7	6386	198	31.0	6472	184	28.4	6582	163	24.8	6556	203	31.0	6596	191	29.0
Nsawam-Adoagyiri	6026	75	12.4	6438	77	12.0	7238	67	9.3	7206	92	12.8	8015	86	10.7	8142	109	13.4	8069	120	14.9	8427	119	14.1	7825	101	12.9
Okere	477	12	1.2	536	11	1.9	543	0	0.0	454	0	0.0	611	11	1.6	566	0	0.0	605	0	0.0	660	34	4.5	653	0	0.0
Suhum	2648	37	14.0	2511	26	10.4	2439	20	8.2	2360	26	11.0	2375	28	11.8	2553	38	14.9	2929	39	13.3	3072	38	12.4	3326	38	11.4
Upper Manya Krobo	1076	18	16.7	1189	21	17.7	1107	32	28.9	1095	25	22.8	1272	22	17.3	1323	12	19.1	1226	15	12.2	1320	13	9.8	1307	22	16.8
Upper West Akim	826	22	2.4	787	11	1.3	832	33	3.6	872	22	2.3	1062	32	2.8	1349	43	3.0	1149	0	0.0	1387	0	0.0	1342	75	5.2
West Akim	2417	44	18.2	2290	53	23.1	2296	48	20.9	2201	26	11.8	2215	40	18.1	2190	22	10.0	2359	29	12.3	2613	35	13.4	2751	28	10.2
Yilo Krobo	880	11	1.1	1007	33	3.0	1234	10	0.8	1080	32	2.8	1248	21	1.6	1463	42	2.7	1403	21	1.4	1622	21	1.2	1733	31	1.7

Source: Ghana DHIMS II, Births = Total Births, Still = Stillbirths, Rate = Stillbirth rate

Discussion

Stillbirth is one of the worst outcomes pregnant women and their families can experience [16]. The stillbirth rate is declining globally, but has not reached its target yet [4]. In the Eastern Region, there was a decline of stillbirth rate from 2014 to 2022, even though it is slow. The slow progress in preventing stillbirths emphasises the inadequate effort and investments by governments in terminating preventable stillbirths [17,18]. The highest stillbirth rate recorded was in 2014, with the lowest in 2022. This decline of stillbirth rate over the past years could be due to general improvements in the health care delivery over the past years. An increase in human resources and infrastructure, such as health facilities and midwives, could account for the decline in the stillbirth rate over the period. Improvements in Community Health Planning Services (CHPS) have increased access to the health facilities at the community level, especially in hard-to-reach communities. This has helped midwives and Community Health Nurses (CHNs) detect emergency cases in communities and refer them to higher facilities early to prevent mortalities.

One of the key actions proposed to improve quality maternal care during the ENAP in 2014 was that every country was to ensure that all facilities have adequate staff with multidisciplinary teams and have basic ideal infrastructure to prevent maternal and newborn deaths and stillbirth [8]. It was also suggested in the Every Newborn Action Plan (ENAP) that, where access to health services is inequitable or limited, governments should consider empowering community health workers as a key resource for improving maternal and newborn care, especially in hard-to-reach communities [8]. Another contributing factor to the decline in stillbirths could also be attributed to higher maternal education and media exposure [19]. However, the slow pace of the decline in stillbirth could be attributed to factors such as low attention to stillbirth-related issues in the region and late arrival of pregnant mothers who need emergency care. This is similar to a study done in Ghana, where factors contributing to stillbirths were attributed to poor monitoring, delayed arrival, inadequate attention to stillbirth matters, and intake of local herbs [6].

The rate of macerated stillbirth is more than that of fresh stillbirth. This current result differs from other studies that found that more than half of the stillbirths were fresh stillbirths [20,21] but is similar to a study in South Africa that found that several of the stillbirths were macerated[22]. Atiwa East, Kwahu Afram Plains North District and New Juaben South Municipal have very high rates of macerated stillbirths, which could be due to poor ANC attendance by pregnant women. A study found that mothers who did not receive antenatal care had a higher likelihood of macerated stillbirths. Antenatal care is essential for women and maternal health services [23]. Poor quality ANC is more likely to overlook medical/obstetric problems and other risk factors connected with stillbirth, leading to stillbirth [24]. Antenatal services at the community level have a positive impact on reducing macerated stillbirths [25]. Most of these stillbirth cases could be coming from neighbouring districts that do not have hospitals, but the pregnant women from the neighbouring districts accessed health care service at the Atiwa East, Kwahu Afram Plains North District and New Juaben South Municipal districts, which have hospitals. Moreover, New Juaben South Municipal is recording a high incidence of fresh stillbirth, which could be due to a gap during labour. Macerated stillbirths are mostly linked to problems before birth throughout the antenatal period, whereas fresh stillbirths are linked to gaps in treatment during labour and upon delivery [26].

The reporting rate target for stillbirth in the region is 100%. However, from 2014 to 2017 and 2022, the target for reporting rate on stillbirth was not achieved. This may affect the actual representation of the burden of stillbirth in the region, hence underestimating the stillbirth figures in these years, respectively. This is similar to a study conducted in Uganda, where the rates of reporting on stillbirths were also lower than their national target (80%) for each of the years and affected the representation of the genuine burden of stillbirths. The low reporting rate confirms an under-estimate of the stillbirths in Uganda [26].

The Mann-Kendall trend analysis showed a statistically significant downward trend of stillbirth rate over time. This implies that there are many interventions on maternal and newborn health services in the region and more philanthropic exercises such as health screening and health education in communities, influencing the decline of the stillbirth rate yearly. Intrapartum management strategies which include a four-hourly review of all cases in labour by obstetrician-led teams of doctors, strict labour monitoring with partographs, cardiotocograph monitoring of high-risk pregnancies in labour, and regular in-service training of midwives and doctors on cardiotocograph interpretation could result in quick detection of compromised fetuses and timely interventions, with emergency cesarean sections performed within 15-30 minutes of diagnosis to avoid stillbirth [27]. Continuation of these interventions could help the region achieve the SDG target of a stillbirth rate of 12 or less per 1,000 total births by 2030 in Ghana [28].

Most of the districts from 2014-2022, which have a stillbirth rate range 13.4 to 34.5 per 1,000 total births, have at least one primary or secondary health facility that is either a regional hospital, district hospital or a CHAG hospital or both. However, all districts below a stillbirth rate range of 0.0 to 4.7 per 1,000 total births have no primary hospital or CHAG hospital. Hence, districts without a primary hospital or CHAG hospital mostly refer maternal emergency cases to these hospitals, where there may be delays which could lead to a stillbirth. Thaddeus

Table 3. Macerated and Fresh Stillbirth Rate for Districts in the Eastern Region, 2022

District	Total Births	Macerated Stillbirth	Macerated Stillbirth Rate	Fresh Stillbirth	Fresh Stillbirth Rate
Abuakwa North	2437	16	6.6	8	3.3
Abuakwa South	1697	0	0.0	5	2.9
Achiase	649	0	0.0	0	0.0
Akuapem North	2582	10	3.9	3	1.2
Akuapem South	724	0	0.0	1	1.4
Akyemansa	1309	0	0.0	2	1.5
Asene Manso Akroso	774	2	2.6	2	2.6
Asuogyaman	1991	18	9.0	9	4.5
Atiwa East	2020	33	16.3	9	4.5
Atiwa West	798	0	0.0	1	1.3
Ayensuano	1268	1	0.8	1	0.8
Birim Central	3903	43	11.0	19	4.9
Birim North	2103	11	5.2	18	8.6
Birim South	428	1	2.3	2	4.7
Dekyembour	2808	23	8.2	21	7.5
Fante Akwa North	1186	14	11.8	6	5.1
Fante Akwa South	533	0	0.0	0	0.0
Kwaebibrim	2224	10	4.5	6	2.7
Kwahu Afram Plain North	1503	24	16.0	11	7.3
Kwahu Afram Plain South	1047	6	5.7	7	6.7
Kwahu East	1352	0	0.0	1	0.7
Kwahu South	2799	36	12.9	7	2.5
Kwahu West	4342	46	10.6	19	4.4
Lower Manya Krobo	3716	16	4.3	7	1.9
New Juaben North	888	10	11.3	3	3.4
New Juaben South	6596	122	18.5	69	10.5
Nsawam-Adoagyiri	7825	61	7.8	40	5.1
Okere	653	0	0.0	0	0.0
Suhum	3326	25	7.5	13	3.9
Upper Manya Krobo	1307	11	8.4	11	8.4
Upper West Akim	1342	7	5.2	0	0.0
West Akim	2751	13	4.7	15	5.5
Yilo Krobo	1733	2	1.2	1	0.6

Source: Ghana DHIMS II

and Maine established the 'three delays' conceptual framework, which highlights three types of impediments or delays that can limit access to maternal health services and lead to death. These problems include delaying the decision to seek care, arriving at a well-equipped health facility, and receiving adequate care. These delays may raise the risk of maternal and neonatal problems, including stillbirths [29,30].

Districts with a high incidence of stillbirth were Kwahu Afram Plain North, Kwahu West, New Juaben South and Denkyembour. New Juaben South Municipal, which has the regional hospital and a CHAG health facility, had a stillbirth rate range of 19.9 to 34.5 per 1,000 total births from 2014 to 2022. This is because most critical maternal cases are referred from the district hospitals and CHAG hospitals (primary) to the regional hospital (secondary). In Ghana, the referral system enables patients who access care at primary (lower) level health facilities to be referred to secondary or tertiary level to receive emergency care [31]. This may increase the burden on the hospital staff at the regional hospital, and more stillbirths can occur.

Study limitations

The study utilised secondary data, which is limited in terms of variables, to understand the burden of stillbirth in the Eastern Region. The rate of reporting of stillbirth in the DHIMS2 was less than the 100% target for most of the years, which limited the study of the actual representation of stillbirth in the region. The numbers reported are lower. This, however, did not restrict us from determining the trend and distribution of stillbirth in the region.

Conclusions

The stillbirth rate in the Eastern region is on a decline and is still above the regional target, and Kwahu Afram Plain North district, Kwahu West District, New Juaben South Municipal and Denkyembour district have a high incidence of stillbirth rate from 2014 to 2022. The stillbirth target may not be achieved by 2030. Since most stillbirths are preventable, our healthcare professionals need to be trained on how to educate mothers to live healthy lifestyles for safe deliveries, on the dangers of pregnancy-related diseases,

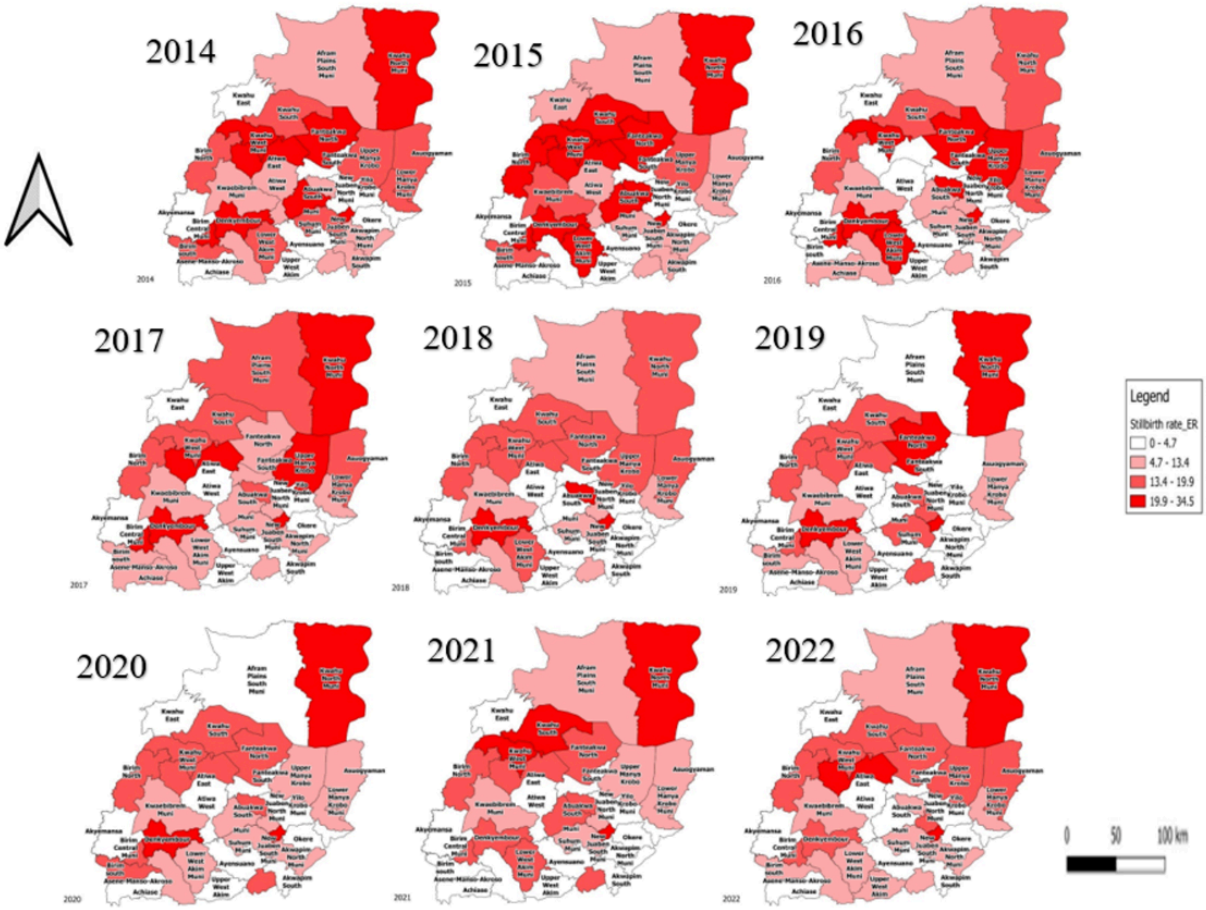

Figure 3. Distribution of stillbirths among 33 districts in the Eastern Region from 2014 to 2022.

and trained on how to screen for and manage hypertension, diabetes, malaria and other diseases that pose risk to safe delivery. Community durbars and radio talks need to be organised to sensitise the public on danger signs and symptoms in pregnancy and healthy nutrition and lifestyle during pregnancy. We highly recommend that our community health workers be trained to conduct more home visits, provide basic health education to pregnant mothers and their families. Referral systems must be strengthened and health workers must be trained adequately to ensure mothers deliver safely. We recommend that there should be capacity building to manage maternal cases in the New Juaben South Municipal. We recommend that the Ghana Health Service strengthen interventions for stillbirth to meet the SDG target of a stillbirth rate of 12 per 1,000 total births by 2030. The Eastern Regional Health Directorate should ensure that data validation is done extensively, especially at the facility level, to ensure data completeness.

What is already known about this topic

- Most stillbirths occur in South Asia and Sub-Saharan Africa.
- Stillbirth is on a decline in Ghana, but has not met its target.

What This Study Adds

- The study determined the trend of stillbirth in the Eastern Region of Ghana, and it is on a decline, but slowly.
- Specific districts in the Eastern Region had a high incidence of stillbirth from 2014 to 2022.

Conflict of Interest

The authors of this work declare no competing interests.

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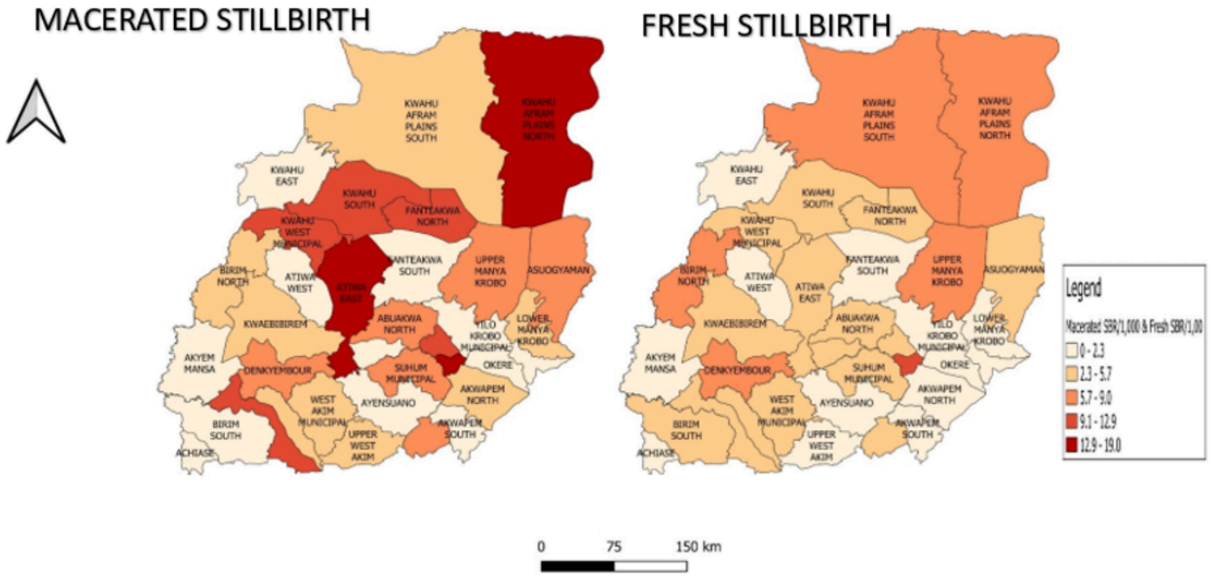

Figure 4. Distribution of Macerated and Fresh Stillbirth in the Eastern Region, 2022

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Authors' contributions

FAY, WO, JEO, SAP, DAB and MOT were involved in the conceptualization of the work; FAY, EBO were involved in the acquisition of data. FAY, SA, DAB, were involved in the analysis of the data. FAY. SA, SAP, DAB, WO, JF were involved in the interpretation of the data. FAY, EBO, MOT were involved in the drafting of the work; FAY, DAB, JEO, WO, SA, SAP and JF were involved in the critical review of the work. All authors gave the final approval of the work to be published and agreed to be accountable for all aspects of the work.

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