



## ORIGINAL ARTICLE

## Birth and Death Rates, and Causes of Death among the General Population in Kono District, Sierra Leone, 2020-2021

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### Abstract

**Background:** Civil registration is the most effective way to keep track of all births and deaths. Despite the existence of the Birth and Death Act (1983), Sierra Leone registers 93% of births and only 57% of deaths annually. To provide more accurate inter-census population estimates, we estimated the birth and death rates, registration distribution, and causes of death for Kono District population in Sierra Leone.

**Methods:** We conducted a retrospective secondary data analysis of National Civil Registration Authority (NCRA) data in Kono District from January 2020 to December 2021. Causes of death were determined by physicians in health facilities and cause of death in the community were determined by verbal autopsies. Causes of death were documented based on the NCRA system. The frequency, proportions, rates, and distribution of birth and death registration were calculated.

**Results:** A total of 16,684 births and 415 deaths were recorded during the study period. The birth rate increased from 14.1 in 2020 to 16.2 per 1000 people in 2021. However, the death rate fell from 12.7 in 2020 to 7.5 per 1000 people in 2021. The median age of delivered mothers was 25 years (9-52 years), and the median age of death was 62 years (1 day to 120 years). Eighty-four percent of deaths were registered and 71% were certified in 2020 while 66% of death registered and 64% were certified in 2021. The natural cause of death accounted for 94% of all deaths, followed by accident (4%), homicide (1%), and undetermined cases (1%).

**Conclusion:** We observed an increase in death in 2020 and a decrease in 2021. An increase in the birth rate was observed. Most deaths occurred due to natural causes followed by accidents. We recommended the NCRA improve the registration system to overcome underreporting of births and misclassification of deaths.

### Keywords

Death, Birth, National civil registration authority, Sierra Leone

### Introduction

Vital statistics are essential for tracking population dynamics, assessing health risks, and evaluating health programs [1]. In Sierra Leone, the Civil Registration and Vital Statistics (CRVS) system called the National Civil Registration Authority (NCRA) is responsible for the registration of vital events. Compulsory registration of birth and death was enacted by the parliament in 2016, before this time birth and death registration deadline was between 30 days (Act No.11 1983 but now repealed) to 90 days (CRVS - Birth, Marriage and Death Registration in Sierra Leone, 2017). The current NCRA is under the Ministry of Internal Affairs. Sierra Leone practices passive birth and death registration that is birth and death events are reported by healthcare workers to the district birth and death registrar before they are registered and certified. The system's accuracy,



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particularly in terms of the cause of death, is limited because deaths from hospitalized patients and violent deaths are certified by Medical Doctors. The majority of deaths in Sierra Leone occur in the community and are determined by verbal autopsy.

A well-functioning CRVS provides government with critical information about the population on which to develop policies and planned services. Good public health policy decision-making relies on timely, reliable, and actionable data on births and deaths including the cause of death. A good CRVS system is the best source of data for measuring 67 out of the 231 Sustainable Development Goal (SDG) indicators including the health-related SDG3 [2]. Globally the main challenge of the CRVS system is 2/3 of the 55 million annual deaths every year are either not assigned cause of death or misclassified cause of death and also 1 in 4 children under five years do not officially exist annually which are of limited public health value [3].

In Sierra Leone, 93% of births and 57% of deaths were recorded annually in 2021 [4]. The outbreak of emerging diseases like Ebola and the COVID-19 pandemic has discovered the urgent need for timely, reliable, and actionable CRVS data to guide emergency response both nationally and globally to monitor fatality trends. Despite the operations of NCRA in the Kono district, there is low registration of births and deaths and misclassification of death. We aimed to determine the birth and death rates and causes of death among the general population in Kono district 2020-2021.

## Materials and Method

### Study design

The descriptive secondary data analysis was conducted in Kono District, Eastern Sierra Leone, 2020-2021.

### Study area

Kono is a district in Eastern, Sierra Leone with an estimated population of 621,703 [5]. The district has a government referral hospital, 17 Community Health Centers (CHCs), 21 Community Health Posts (CHPs), and 62 Maternal Health Posts (MCHPs) in the 14 chiefdoms.

### Data collection and analysis

Secondary data on demographics, birth, and death registration was extracted from the Kono District National Civil Registration Authority's database from January 2020 to December 2021. The data were processed using Microsoft Excel version 2016.

Analysis was done to produce frequencies, proportions, rates, mean, median, and range. The independent variables were the registration of births and deaths by chiefdoms, causes of death, and distribution of births, and by chiefdoms.

$$\text{Crude birth rate} = \frac{\text{Total resident Live births}}{\text{Total population}} \times 1,000$$

$$\text{Crude death rate} = \frac{\text{Total Number of deaths}}{\text{Total population}} \times 1,000$$

In Sierra Leone, facility-based cause of death is determined by physicians and community death is determined through verbal autopsy by the 117 routine death reporting platform, cause of death is documented through the NCRA system. The death records were reviewed and the manner of deaths was classified into Natural, Accidental, Homicidal/Suicidal, and undetermined.

### Definition of terms

- Current registration of births and deaths is when a birth or death is registered within three months.
- Delayed births and deaths registration is when a birth or death is registered after three months to twelve months.
- Late registration of birth and death is when a birth or death is registered after one year.

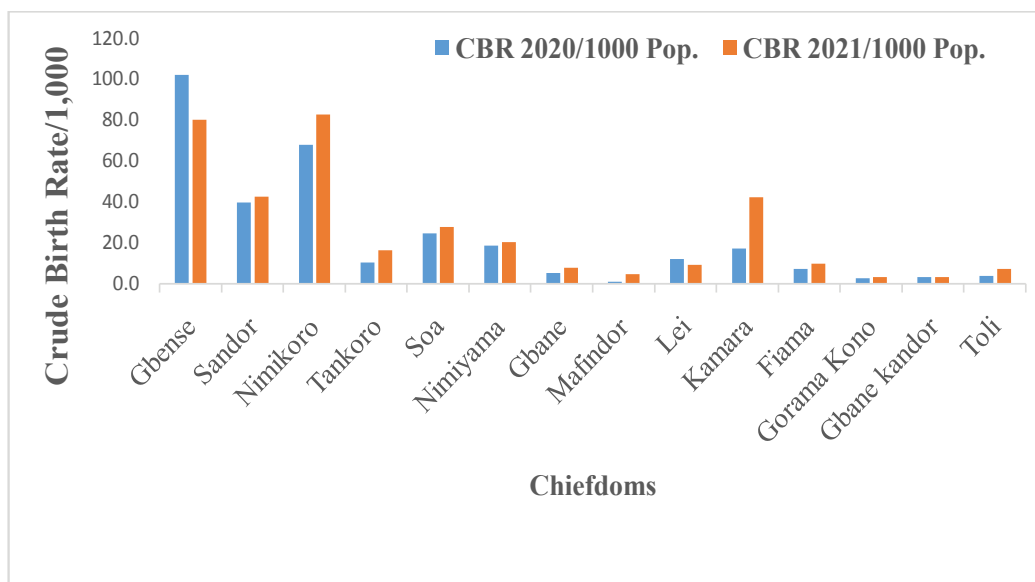
## Results

From January 2020 to December 2021, the National Civil Registration Office in Kono District, Sierra Leone, registered a total of 16,684 births and 415 deaths. In 2020 and 2021, the crude death rate was 6.7/1000 and 9/1000 inhabitants, respectively. The median age of women giving birth ranged from 9 to 52 years, and the median age of death in both sexes was 62 years (age range 1 day-120 years). Males account for 57% of deaths (237/415), while females account for 55% of live births (9,176/16,684).

In 2020, Mafindor chiefdom had the lowest crude birth rate (4.7/1,000 live births), while Gbense chiefdom had the highest (25.9/1,000 live births). Gbane Kandor had the lowest crude birth rate (8.2/1,000 live births) in 2021, while Mafindor chiefdom had the highest (Figure 1. Birth registration by chiefdoms in Kono District, 2020-2021).

Gbense chiefdom had the highest death registered in 2020 and 2021. Fiama, Gbane kandor and Toli chiefdom death events were not registered in 2020. Ten (10) chiefdoms death events were not registered in 2021 (Fiama, Gbane Kandor, Gorama Kono, Kamara, Tankoro, Nimiyama, Toli, Sandor, Soa and Mafindor) (Table 1).

Of the 415 deaths, males accounted for 240, with a median age of 62, and their ages ranged from 1-120 years, Four hundred and nine (98.5%) of the groups studied were Negroid, with 6 (1.5%) being Caucasian. Natural deaths accounted for 389 (93.7%) of all deaths, followed by accidental deaths 15 (3.6%), homicidal deaths 4 (1.0%), sudden undetermined deaths 4 (1.0%), and suicide 3 (0.7%) (Table 2).



**Figure 1:** Birth registration by chiefdoms in Kono District, 2020-2021.

**Table 1:** Death registration by chiefdoms in Kono District, 2020-2021.

Chiefdom	Chiefdom Pop 2020	Chiefdom Pop 2021	2020 Death	2021 Death
Fiama	19800	20216	0	0
Gbane	31716	32382	13	3
GbaneKandor	15572	15899	0	0
Gbense	77825	79459	192	121
Gorama Kono	20854	21292	7	0
Kamara	23141	23627	1	0
Tankoro	58832	60067	6	0
Nimikoro	74610	76177	18	9
Nimiyyama	36172	36931	8	0
Toli	7756	7919	0	0
Lei	33922	34635	4	2
Sandor	88181	90033	13	0
Soa	42360	43249	14	0
Mafindor	15283	15604	4	0
<b>Total</b>	<b>546024</b>	<b>557490</b>	<b>280</b>	<b>135</b>

**Table 2:** Manner of death distribution in Kono district eastern Sierra Leone, 2020-2021.

Events	Male	Female	% Male	% Female	Total (N = 415)
Natural	223	166	53.7	40	93.7
Accidental	10	5	2.4	1.2	3.6
Homicide	3	1	0.7	0.2	1
Suicide	3	0	0.7	0	0.7
Undetermined	1	3	0.2	0.7	1
<b>Total</b>	<b>240</b>	<b>175</b>	<b>57.8</b>	<b>42.2</b>	<b>100</b>

Cardiovascular disease is the leading cause of death (53.0%), in which myocardial infarction and hypertensive heart failure are the most documented cardiovascular deaths. In addition, liver pathology 117(30%), and

maternal deaths 31(8%). Sudden natural death due to renal-related pathology accounted for 22(5.7%), AIDS-related deaths accounted for 12(3.1%), and bacterial meningitis accounted for 1(0.1%) (Table 3).

**Table 3:** Causes of sudden natural deaths.

Events	Male	Female	Total	%
Cardiovascular Disease	138	68	206	53
Hepatic Pathology	70	47	117	30.1
AIDS-Related	5	7	12	3.1
Renal Pathology	10	12	22	5.7
Maternal Death	0	31	31	8
Bacterial Meningitis	0	1	1	0.1
<b>Total</b>	<b>223</b>	<b>166</b>	<b>389</b>	<b>100</b>

## Discussion

The analysis of this study indicated that the annual crude death rates were 16.17/1000 live births and 14.01/1000 live births in 2020 and 2021 respectively. Also, the crude death rate was 6.7/1000 people and 9/1000 people in 2020 and 2021 respectively. These rates are substantially lower than the annual NCRA demographic data of Sierra Leone for a crude birth rate of 32.35/1000 live birth and 31.83/1000 live birth, and also 11.3/1000 people and 11/1000 people in 2020 and 2021 respectively. This study was consistent with the NCRA annual 2021 data quality for the misclassification of cause of death data by the International Classification of Death.

There are high crude birth rates in the urban settlements in the Kono district compared to the rural settlements. This may be due to the remoteness or low level of awareness among the rural communities on the CRVS system in Sierra Leone. A similar finding was reported in a study conducted in Nigeria [6]. In comparing cities to rural areas birth and death registration, rural areas have low birth and death registration, cities typically have a higher population density, a greater concentration of formal employment and social security agencies, and the district referral hospital, which treats critically ill patients from all over the district, this result confirms a study done in sub-Saharan African countries by [7].

Additionally, sudden natural deaths, accidental and homicide were the most common deaths reported in Kono district 2020-2021. This finding was inconsistent with a study conducted in Nigeria [8]. The high registration of sudden natural deaths might be due to the high prevalence of communicable diseases, poor sanitation, lifestyles, exposure to hazardous chemicals, or dust and fumes from mining environments.

This study had three limitations; first, the data collected from the NCRA office in the Kono district was not representative of the birth and death events in the Kono district due to underreporting. Three chiefdoms in 2020 and ten chiefdoms in 2021 did not report their death events. Secondly, there was a misclassification of causes of death by diseases or natural reasons. Lastly, the study was unable to identify factors responsible for the low registration of birth and death in the Kono

district. Lastly, this is due to the limited number of certified registered Medical Doctors to ascertain the cause of death.

Based on our results, we recommend that the NCRA strengthens the passive registration system by training and providing reporting tools to healthcare workers in different facilities and community health workers to report all birth and death events in their communities which will help to improve the coverage in births and deaths registration. Furthermore, we urge the NCRA to enforce the June 2016 NCRA Act on the compulsory registration of birth and death events in the Kono District. Also, more research is needed to understand the linkage between health and the CRVS systems in the Kono district.

There should be an increased awareness of people in the Kono district by NCRA for the importance of the CRVS system to improve the registration of birth and death.

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