

# Accuracy of Death Certification of Cause of Death in Home Deaths by Grama Niladhari in Selected Divisional Secretariat Areas of Sri Lanka

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## Abstract

**Introduction:** Accurate and complete medical data on the cause of death are critically important for designing and evaluating health programs and policies. Mortality medical data on deaths that occur inside a healthcare facility are certified by medical officers and therefore they are considered to be reliable and accurate. However, approximately one-half of the 130,000 deaths which occur each year in Sri Lanka take place outside a healthcare facility. There are several death certification systems existing for getting a death registered after determining the cause of death and obtaining the death certificate in home deaths in Sri Lanka without the involvement of a medical officer. Those systems involve either Inquire into Sudden Death, Grama Niladhari, Police Officer, or Estate Superintendent as the individual responsible for stating the cause of death. Few studies have analysed the causes of death stated by the ISD however, there are no published studies that have analysed the cause of death stated by Grama Niladharies on home deaths in Sri Lanka.

**Methods:** This retrospective cross-sectional descriptive study was carried out on home deaths that occurred between September 2021 and September 2022 in the Matale and Ukuwela divisional secretariat areas of Sri Lanka using secondary data collected from B 24 forms which were filled by Grama Niladhari of respective divisions.

**Results:** The study included 230 home deaths. 72% of medical records were of poor quality to assign a cause of death. In all these death certificates, the cause of death was not stated according to the WHO format of the cause of death. Fifty-four percent used an ill-defined condition as the underlying cause of death. Cancer was the cause of death in 11% of adults and accounted for the highest number of cases.

**Conclusions:** Grama Niladhari in Sri Lanka has difficulties in completing the cause of death accurately. They routinely made errors in death certification because of these inaccurate causes of death. This situation needs rectifiable measures as home death data is very vital for certain healthcare decisions.

**Keywords:** Cause of death, home deaths, Grama Niladhari, B-24 form, death certification of Sri Lanka, medical data, vital registration system, medical audit, health policy

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## Introduction

The death certificate is also a legal document used for legal, family, and insurance purposes. It is also admissible as a proof of death. There are several death certification systems existing for getting a

death registered after determining the cause of death and obtaining the death certificate in home deaths in Sri Lanka without the involvement of a medical officer. Those systems involve either Inquire into Sudden Death (ISD), Grama Niladhari (GN), Police

Officer, or Estate Superintendent as the individual responsible for stating the cause of death. Approximately one-half of the 130,000 deaths which occur each year in Sri Lanka take place outside a healthcare facility. [1]

The next of kin gets a B 24 form which is filled by the GN. The birth and death registrar of the region issues the death certificate based on B 24 form.

In the process where GN is involved, The GN, who is the village-level administrative agent of the government and who does not have any formal medical training, assigns a cause of death to an individual who died at home by referring his available medical records and filling a brief questionnaire with the help of relatives of the deceased. The next of kin then get a B-24 form which is filled out by the GN. The birth and death registrar of the region issues the death certificate based on this B-24 form.

The death certificate provides relations of the deceased with an explanation of how and why the person died. It also gives a permanent record of information about the medical history, which may be important for the next of kin of the deceased and of future generations. For all these reasons it is extremely important to have accurate and complete information on the diseases or conditions that caused a person's death.

Moreover, accurate and complete cause-of-death data is an essential component of a proper civil registration system, vital statistics system for disease surveillance, designing public health and medical interventions, and for research and development. Also, accurate cause-of-death data allows health decision-makers to direct resources toward locally-specific health problems. [2] Incorrect or incomplete death certificates can lead to inaccurate cause of death data and that in turn leads to erroneous conclusions being drawn for time-sensitive health issues. There are no published studies that have analysed the causes of death given by GN in Sri Lanka.

The present retrospective data analysis evaluated the cause of deaths stated in B 24 forms by GN. The demographic profile of the decedents is also analysed. Another objective of this study is to highlight the changes that are needed to improve the accuracy of causes of death that is stated in death certificates.

## Methodology

This was a retrospective cross-sectional descriptive study conducted on secondary data in selected divisional secretariat areas in the Matale district of Sri Lanka on home deaths that occurred between September 2021 and September 2022. All home death certifications done by GN in the study period in the selected divisional secretariat areas and for which B 24 forms were available were included. Matale district was selected in our study as the data collection was conducted by one of the authors who was a Consultant Judicial medical officer in this area during the study period. Out of all the divisional secretariat areas in Matale district, Matale and Ukuwela were included in the study as they are highly populated divisional secretariat areas. Data in this study are based on information extracted from B 24 forms on home deaths which were filled by GN. A home death B-24 form which is filled by the GN is handed over to the next of kin of the deceased which in turn is forwarded to the birth and death Registrar of the area to get the death certificate. This form is sent to the relevant divisional secretariat office for storage.

The anonymity of the descendants and the GN were protected in this paper. The data that has been collected were analyzed by the SPSS software program version 16. Written approval for the study was also obtained by the Birth and Death Register of Matale, and the Divisional Secretariat of the above areas. Ethical approval was not needed as the secondary data were analysed in the study. Data were anonymized and irreversibly de-identified.

## Results

According to the study, the total number of home deaths where GN was involved in death certification was  $N = 230$  during the one year from 2021 September comprising 14 % of the total number of deaths reported in Matale and Ukuwela divisional Secretariat areas (1550). 40 % of deaths occurred in the Matale divisional secretariat area and 60% occurred in the Ukuwela divisional secretariat area. The Study population comprised 54% females ( $n=124$ ) and the remaining 46% males ( $n= 106$ ). Ninety-four GNs were involved in the death certification of these two divisional secretariat areas. The highest number of death certifications done by a single GN during this study period was 17 and the lowest number of death certifications was 1.

## Age ranges and number of deaths in each category by gender

The Majority (37%,  $n=82$ ) of the descendants were between 71 years to 80 years of age. Between the ages of 71 to 90 comprised 74%,  $n=168$ . The

minimum age at death is 41 years and the maximum age at death was 101 years. The mean age at death was 79 years. The Standard deviation was 10. The Distribution of age of the descendants with gender were shown in Table 1.

**Table 1, Age at death of the descendants by gender**

| <b>Age of the decedents</b> | <b>Female<br/>N=124<br/>n (%)</b> | <b>Male<br/>N=106<br/>n (%)</b> | <b>Total<br/>N=230<br/>n (%)</b> |
|-----------------------------|-----------------------------------|---------------------------------|----------------------------------|
| <b>Less than 60</b>         | 05 (04)                           | 07 (07)                         | 12 (05)                          |
| <b>61-70</b>                | 14 (11)                           | 11 (10)                         | 25 (11)                          |
| <b>71-80</b>                | 41 (33)                           | 45 (42)                         | 86 (37)                          |
| <b>81-90</b>                | 49 (40)                           | 35 (33)                         | 82 (37)                          |
| <b>Above 90</b>             | 15 (12)                           | 08 (08)                         | 23 (10)                          |

#### Cause of death

There was more than one cause included per line in a death certificate in all B 24 forms. All GN did not indicate the time interval between the onset of the disease and death. All the causes of death were not according to the WHO format.

#### Categories of the cause of death given

The majority of causes of death (54%, n=125) were ill-defined causes such as aging, long-term illness, malnutrition, body weakness, or combinations of these causes. Aging was given as the cause of death in 46 subjects (20%). The medical condition which leads to malnutrition was included only in 9 (26%) of the total 35 (15%) deaths due to malnutrition. "Long-term illness" was the cause of death in 56 cases (24%). The categories of cause of death stated are shown in Table 2.

**Table 2. Categories the of cause of death**

| <b>Cause of death stated in B 24 form</b>                 | <b>N = 230<br/>n %</b> |
|---|------------------------|
| <b>Ill-defined cause of death</b>                         | 125 (54)               |
| <b>A medical disease was stated as the cause of death</b> | 105 (46)               |

#### Categories of the cause of death by age

Majority of the descendants (61%, n= 75) with proper medical disease as the cause of death were less than 80 years old. Majority of the descendants (72%, n= 77) with ill-defined causes of death above the age of 80 years. The category of cause of death according to age is shown in Table 3.

**Table 3. Category of the cause of death by age**

| <b>Category of cause of death</b>            | <b>&lt;80 years<br/>N=123<br/>n (%)</b> | <b>&gt; 80 years<br/>N=107<br/>n (%)</b> | <b>N=230<br/>n (%)</b> |
|--|---|--|------------------------|
| <b>A medical disease as a cause of death</b> | 75 (61)                                 | 30 (28)                                  | 105 (46)               |
| <b>Ill-defined cause of death</b>            | 48 (39)                                 | 77 (72)                                  | 125 (54)               |

#### Categories of the cause of death by gender

The majority of the descendants (63% n= 79) with ill-defined causes of death were female. The majority of the descendants (57% n = 60) with a medical disease were male. The category of cause of death according to gender is shown in Table 4.

**Table 4. Category of cause of death according to gender**

| <b>Category of cause of death</b>              | <b>Male<br/>N=106<br/>n (%)</b> | <b>Female<br/>N=124<br/>n (%)</b> | <b>N=230<br/>n (%)</b> |
|--|---------------------------------|-----------------------------------|------------------------|
| <b>A medical disease was stated as the COD</b> | 60 (57)                         | 45 (36)                           | 105 (46)               |
| <b>Ill-defined COD</b>                         | 46 (43)                         | 79 (63)                           | 125 (54)               |

#### Leading causes of death.

The top two causes of death were cancer (11%) and Stroke (8% ). Out of the 26 deaths due to cancer only in 3 subjects the primary site of cancer was included. They were the liver, breast, and larynx. The risk factors for the stroke were included only in two cases. They are hypertension and dyslipidemia. The contributory cause of death for chronic kidney disease was included in two cases. They are hypertension and diabetes. The specific name of the disease was not identified in the seven subjects of chronic respiratory disease.

Out of the three cases of liver disease, the specific name of the liver disease was not included in the two cases. There was a relatively large proportion of deaths that were "impossible to specify". The specific medical cause of death is given in Table 5.

**Table 5. The specific medical cause of deaths**

| <b>The specific COD</b>     | <b>N=230<br/>n (%)</b> |
|-----------------------------|------------------------|
| <b>Cancer</b>               | 26 (11)                |
| <b>Respiratory disease</b>  | 07 (03)                |
| <b>Liver disease</b>        | 03 (01)                |
| <b>Stroke</b>               | 19 (08)                |
| <b>Kidney disease</b>       | 09 (04)                |
| <b>Heart disease</b>        | 06 (03)                |
| <b>Neurological disease</b> | 03 (01)                |
| <b>Diabetes</b>             | 21 (09)                |
| <b>Hypertension</b>         | 21 (09)                |

## Discussion

The Primary objective of this study was to obtain evidence on the accuracy of causes of death stated by GN who is not a medically trained officer to arrive at a cause of death based on medical documents.

The common errors in death certificates according to WHO death certificate guidelines are shown in Table 6.[3]

**Table 6. Common death certificate errors**

1. Multiple causes per line
2. Incorrect/clinically improbable sequence of events leading to death
3. The interval between onset and death is not shown
4. Abbreviations used in certifying death
5. Illegible handwriting
6. Leaving blanks between lines in part 1
7. Ill-defined condition entered as the underlying cause of death
8. Intentions of injuries and poisonings not included
9. Details of neoplasms not included

Nearly all death certificates had some sort of error. These errors not only make it difficult for coders to record the information but also render the information meaningless for public health programs. The World Health Organization (WHO) has released guidelines for the Medical Certificate of Cause of Death.[3] The cause of death has two parts: Part 1 is used for diseases or conditions that lead directly to death and Part 2 is for the pre-existing or co-existing condition that contributes to death but did not result in the underlying cause of death. The first line of part 1 is the immediate cause of death. The lowest line is the underlying cause of death. In this study, all the cause of death was not written according to the WHO format.

Moreover, the current B-24 form in Sri Lanka has only one line dedicated to the cause of death.[4] More than one cause written on that line can make it difficult to establish the sequence of events. Further, the current format does not comply with WHO guidelines and complicates efforts to improve the policy value of cause of death data.

According to the present study, the total number of ill-defined causes of death was N= 125 (54%) which is similar to other studies. Studies have shown that in low-income countries, where most people die at home, the proportion of unusable codes which are also called "garbage codes" often exceeds 50%, implying that half of all cause-specific mortality data collected is of no use.[5]

"Aging" was a cause of death in forty-six (20%) cases in the present study. For vital statistics, aging as a cause of death is misleading because diagnoses are not definitive. The recent guidance from the Office for National Statistics in the United Kingdom discourages using 'old age' as the sole cause of death, unless only in very limited circumstances.[6] But a review of autopsy findings in 200 persons older than 85 years yielded a very similar pattern to our study in that no acceptable cause of death, other than complications of the aging syndrome, was identified in at least 30% of the cases. [7]

While limited data exist for causes of home deaths in Sri Lanka, the leading causes of death in this study did not follow the similar study using the Smart verbal autopsy technique on 2610 home deaths in 22 health unit areas clustered in six districts by trained community health workers and supervisory-staffs. [8]. This could be explained by the presence of a large proportion of deaths that were impossible to specify. The GN's opinion on the cause of death is based upon his/her training, knowledge of medicine, available medical history, and symptoms of the deceased as described by the relatives. As all the medical records are written in English, identification of the disease written in the medical record can vary with the literacy of English, and work experience among GN. As the medical records are handwritten, the legibility of medical records plays a role.

Previous research has shown that education programs that train physicians in correctly filling death certificates can improve the quality of death certificates. [9] Training GN in this regard can improve the mortality statistics.

Not all errors in mortality data on death certificates are detrimental to the value of the death certificate, but they can still compromise the accuracy of public health surveillance. For example, the time interval between the onset of the condition and death is not the most important part of the death certificate, it offers valuable insight into the likely sequence of causes leading to death in public health surveillance. Even if physicians are unable to determine a time interval, indicating "unknown" is an acceptable answer.

As per the existing practice and laws of the country, GN states the cause of death based on the information provided by the next of kin of the deceased. This system ensures completeness of vital registration than the diagnostic quality of mortality data.

The quality of death certificates can vary among the medical officers, inquire into sudden death, and GN. But death certificates must be completed to a minimum standard.

Physician-certified death certificates implicitly serve as the gold standard in assigning the cause of death. [10] Optimally, a Medical Officer will be able to provide a simple description of the process leading to death that is etiologically clear and be confident that this is the correct sequence of causes. The GN lacks medical knowledge on how to write a cause of death and about the medical disease that could cause the death. [10] Moreover, GN is unable to interpret medical findings in the diagnosis card or the clinic record of the deceased given from the hospital as GN does not have medical training. It seems the GN would not be the best decision-maker on the cause of death. This is one of the reasons for inaccurate death certificates in B 24 forms. In the form "O" the name of the last medical practitioner and the cause of death had to be included in the initial Birth and Death Registration Act of Sri Lanka which was originally formulated. [4] But in the latest form B 24 the name of the last medical practitioner is omitted. If the GN can do the death certification in collaboration with the medical officer of health (MOH) of the area, some of the issues can be rectified as there is a need for considerable medical knowledge for this process.

### Recommendations and conclusions

The GN in Sri Lanka has difficulties in completing the cause of death correctly. The GN routinely made errors in death certification practices. There is an urgent need to improve death certification practices and the quality of mortality data on home deaths in Sri Lanka. General practitioners should be encouraged to give medical causes of death to enhance much more reliable and standardized information on the causes of home deaths, than GN. The GN needs proper medical training on the cause of death. The GN needs practical feedback mechanisms to continue quality assurance and develop an understanding of the construction of mortality data. As the current format of the B 24 form has limited space, it is suggested that additional space for the underlying cause of death, the immediate cause of death, the contributory cause of death, and the time interval between the onset of the condition and the date of death.

### Limitations

The main limitation of this study is that it used data only from two divisional secretariat areas of Matale, thereby restricting our capacity to generalize the findings to Sri Lanka. Recommend further studies in this regard.

### Ethics statement

Ethical approval was not obtained as secondary data were analyzed in this study. Data were anonymized and irreversibly de-identified. Written approval for the study was also obtained by the Birth and Death Register of Matale, and the Divisional Secretariat of the above areas.

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### Disclosure statement

**Conflicts of interests:** The author declares that he has no conflicts of interest.

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