THE UNIVERSITY OF MELBOURNE

Bloomberg Philanthropies

DATA FOR HEALTH INITIATIVE

CRVS Fellowship report

Assessing the quality of medical certification in Bangladesh – findings from introducing the International Form of Medical Certificate of Cause of Death in four pilot hospitals

January 2019

Resources available from the University of Melbourne, Bloomberg Philanthropies Data for Health Initiative

CRVS course prospectuses
These resources outline the context, training approach, course content and course objectives for the suite of CRVS trainings delivered through the Bloomberg Philanthropies Data for Health Initiative. Each course focuses on a specific CRVS intervention or concept, and is designed to support countries to strengthen their CRVS systems and data.

CRVS Fellowship reports and profiles
The CRVS Fellowship Program aims to build technical capacity in both individuals and institutions to enhance the quality, sustainability and health policy utility of CRVS systems in Fellows' home countries. *Fellowship reports* are written by Fellows as a component of the program, and document, in detail, the research outcomes of their Fellowship. *Fellowship profiles* provide a summary of Fellows' country context in relation to CRVS, an overview of the Fellowship experiences, the research topic and the projected impact of findings.

CRVS analyses and evaluations
These analytical and evaluative resources, generated through the Initiative, form a concise and accessible knowledge-base of outcomes and lessons learnt from CRVS initiatives and interventions. They report on works in progress, particularly for large or complex technical initiatives, and on specific components of projects that may be of more immediate relevance to stakeholders. These resources have a strong empirical focus, and are intended to provide evidence to assist planning and monitoring of in-country CRVS technical initiatives and other projects

CRVS best-practice and advocacy
Generated through the Initiative, CRVS best-practice and advocacy resources are based on a combination of technical knowledge, country experiences and scientific literature. These resources are intended to stimulate debate and ideas for in-country CRVS policy, planning, and capacity building, and promote the adoption of best-practice to strengthen CRVS systems worldwide.

CRVS country reports
CRVS country reports describe the capacity-building experiences and successes of strengthening CRVS systems in partner countries. These resources describe the state of CRVS systems-improvement and lessons learnt, and provide a baseline for comparison over time and between countries.

CRVS technical guides
Specific, technical and instructive resources in the form of *quick reference guides, user guides* and *action guides*. These guides provide a succinct overview and/or instructions for the implementation or operation of a specific CRVS-related intervention or tool.

CRVS tools
Interactive and practical resources designed to influence and align CRVS processes with established international or best-practice standards. These resources, which are used extensively in the Initiative's training courses, aim to change practice and ensure countries benefit from such changes by developing critical CRVS capacity among technical officers and ministries.

Published by the University of Melbourne, Civil Registration and Vital Statistics Improvement, Bloomberg Philanthropies Data for Health Initiative.

Melbourne School of Population and Global Health
Building 379
207 Bouverie Street
Carlton, VIC 3053
Australia

CRVS-info@unimelb.edu.au
www.mspgh.unimelb.edu.au/dataforhealth

Made possible through funding from Bloomberg Philanthropies
www.bloomberg.org

Suggested citation

Khan, MA. Fellowship report: Assessing the quality of medical certification in Bangladesh – findings from introducing the International Form of Medical Certificate of Cause of Death in four pilot hospitals. CRVS Fellowship reports and profiles. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, University of Melbourne; 2019.

Author

Dr Mohammad Adnan Khan, Directorate General of Health Services, Bangladesh.

Contents

Acronyms and abbreviations **4**

Acknowledgements **5**

Summary **6**

Introduction **7**

Bangladesh reform 8

Bangladesh International Form of Medical Certificate of Cause of Death 8

Startup Mortality List 9

Methods **9**

Selection of hospitals 10

Staff training 10

Sample size and selection of death certificates 10

Data management and analysis 11

Results **11**

Data quality 11

Data completeness 12

Cause of death 13

Discussion **19**

Quality assessment 19

Completeness assessment 20

Leading causes of death 20

Study limitations 22

Recommendations 22

Annex 1 International Form of Medical Certificate of Cause of Death **24**

Annex 2 Medical certificate of cause of death assessment tool **25**

Annex 3 Frequency of Frame A errors by hospital and error type **26**

Annex 4 Frequency of gaps in recording fields of death certificates by hospital **27**

Annex 5 Deaths by age group and hospital **28**

Related resources and products **29**

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Library 29

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Learning Centre 29

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Courses 29

Acronyms and abbreviations

COD	cause of death
CRVS	civil registration and vital statistics
DGHS	Directorate General of Health Services
DHIS2	District Health Information Software
GBD	Global Burden of Disease
ICD	International Classification of Diseases
KUHC	Kaliganj Upazila Health Complex
SMoL	Startup Mortality List
SSMCaMH	Sir Salimullah Medical College and Mitford Hospital
SSMCH	Shahid Suhrawardy Medical College Hospital
STAMCH	Shahid Tazuddin Ahmed Medical College Hospital
WHO	World Health Organization

Acknowledgements

This fellowship program was supported by the Global Burden of Disease Group, Melbourne School of Population and Global Health, University of Melbourne, Australia, with financial support from the Bloomberg Philanthropies Data for Health Initiative. They provide support to the Ministry of Health and Family Welfare, Health Services Division, Directorate General of Health Services (DGHS). I gratefully acknowledge Laureate Professor Alan Lopez AC, Director, and Associate Professor Deirdre McLaughlin, Deputy Director of the CRVS program.

I would like to express my gratitude to Dr Tim Adair, Associate Professor Hafizur Rahman Chowdhury, and Dr Gulshan Ara Khanom for their tremendous support, and their commitment to improving the Bangladesh health system by implementing and improving medical certification of cause of death in the hospitals.

I would also like to express my heartfelt gratitude to Mr Mohammad Shafiul Alam, Cabinet Secretary; Mr Serajul Huq Khan, Secretary, Health Services Division, Ministry of Health and Family Welfare; Mr NM Zeaul Alam, Secretary, Coordination and Reforms, Cabinet Division; Professor Abul Kalam Azad, Director General, DGHS; Mr AK Mohiuddin Ahmad, Additional Secretary and Project Director, Technical Support for CRVS System Improvement in Bangladesh, Cabinet Division; Dr Ashish Kumar Saha, Director, Management Information system, DGHS; Mr Ashfaqul Amin Mukut, Deputy Secretary and Deputy Project Director, Technical Support for CRVS System Improvement in Bangladesh, Cabinet Division; Mr Anir Chowdhury, Policy Advisor, a2i Programme; Mr Moyeen Uddin and Dr Shah Ali Akbar Ashrafi, Country Coordinators, Bloomberg Data for Health Initiative, Bangladesh; and all directors, Upazila health and family planning officers, doctors and other hospital staff, for their tremendous support and help during the study.

Summary

A death certificate is a permanent legal record of an individual's death. Information about the underlying cause of death (COD) provides vital data for statistical comparison and public health use, and the medical certification of COD provides this data. Detailed and accurate hospital death certificates are therefore a key component of a strong civil registration and vital statistics (CRVS) system.

Out of 0.9 million deaths in Bangladesh each year, only around 0.1 million are reported to the Directorate General of Health Services through the health management information system. Bangladesh has also been using a nonstandard form for medical certification of COD. In 2017, as part of the Bloomberg Data for Health Initiative, Bangladesh introduced the International Form of Medical Certificate of COD and the WHO Startup Mortality List (SMoL).

This study assessed the impact of these changes in four pilot hospitals. It assessed the quality of medical certification of COD using a standard checklist of errors, how well doctors completed all fields of the death certificate form, and the patterns of COD. The study selected 1104 death certificates from the four hospitals for quality checking. Of these, 150 were selected for completeness checking. For COD, data from 3193 death certificates were downloaded from the District Health Information Software database.

The study found that 31% of the death certificates had one or more errors in data quality (25% had one error and 6% had two or more errors). All certificates had completeness errors. For example, only 10.7% of certificates had national identity numbers recorded and only 62.7% had occupation recorded.

The three most common causes of death for the 0–1 year age group were 'low birth weight' (35.6%), 'birth asphyxia' (21.2%) and 'other peri natal conditions' (7.2%). For the 1–14 years age group, the most common causes were 'other diseases of the nervous system' (14.0%), 'leukaemia', 'pneumonia' 'meningitis' and 'other and unspecified infectious diseases' (each 8.8%). For adults (15 years and above), the most common causes were 'hypertensive heart diseases' (15.2%), 'ischaemic heart diseases' (14%) and 'cerebrovascular diseases' (10%).

This study found that, although physicians had completed death certification reasonably well in these four pilot hospitals, errors in data quality and completeness were present. Refresher training is essential for all doctors involved in certification. There is also an urgent need to regularly assess the quality of medical certificates (either on a sample or on all certifications) within each hospital. Periodic research should be carried out to evaluate the training and audit systems in order to generate high-quality COD data.

Fellowship report: Assessing the quality of medical certification in Bangladesh – findings from introducing the International Form of Medical Certificate of Cause of Death in four pilot hospitals

Introduction

Mortality statistics are an integral part of civil registration and vital statistics (CRVS) systems, and cause-specific mortality rates are key indicators of the health trends in a population.[1]

Bangladesh first established a CRVS system on 2 July 1873.[2] In 1967, the World Health Organization (WHO) implemented the International Form of Medical Certificate of Cause of Death (COD; Annex 1) in their member countries. Each year, 0.9 million deaths occur in Bangladesh, of which about 15% occur in health facilities.[3]

Although death certification is critical for CRVS systems, hospital death certificates are often of poor quality.

Detailed and accurate hospital death certificates are a key component of a strong CRVS system.[4] Although the diagnostic capabilities of health facilities vary, it is important that medical death certificates are completed to a minimum standard, and WHO has released guidelines for the International Form of Medical Certificate of COD.[5] Even though physician-certified death certificates serve as the gold standard in determining CODs, hospital death certificates have been shown to be poor quality in various countries.[6, 7, 8] The quality of death certifications is influenced by several factors, including the form used for medical certification of COD, medical education and training on how to complete the death certificate, the age distribution of death cases, and hospital resources and monitoring systems.[9]

Bangladesh reform

Bangladesh uses a nonstandard form for certifying COD which does not comply with WHO standards.

Although around 0.1 million deaths are reported annually to the Bangladesh Directorate General of Health Services (DGHS) through the health management information system, the causes of these deaths are not recorded using the WHO/International Classification of Diseases (ICD) standards. Bangladesh uses a nonstandard form (#804) to certify the COD. This form has only basic demographic information and limited space to write the COD. It does not comply with WHO guidelines, and does not help to improve the medical certification of COD.[10]

1 Office of the registrar general. *Physicians' manual on medical certification of cause of death.* 5th ed. New Delhi, India: Ministry of home affairs; 2012.

2 Office of the Registrar General, Birth & Death Registration. Available at: br.lgd.gov.bd/english.html (accessed 10 December 2018).

3 Abouzahr et al. Towards full accomplishment of CRVS in Bangladesh: contribution of the health system (in preparation).

4 Mikkelsen et al. A global assessment of civil registration and vital statistics systems: monitoring data quality and progress. *The Lancet.* 2015;386:1395-1406.

5 World Health Organization. International Statistical Classification of Diseases and Related Health Problems, 10th revision, vol. 2. Geneva, Switzerland: WHO; 2016.

6 Rampatige et al. Systemic review of statistics on cause of deaths in hospitals: strengthening the evidence for policy-makers. *Bulletin of the World Health Organization.* 2014;92:807 816.

7 Maharjan et al. Errors in cause-of-death statement on death certificates in intensive care unit of Kathmandu, Nepal. *BMC Health Service Research*. 2015;15:507.

8 Haque et al. Death certificate completion skills of hospital physicians in a developing country. *BMC Health Service Research*. 2013;13:205.

9 Sibai AM. Mortality certification and cause-of-death reporting in developing countries. *Bulletin of the World Health Organization.* 2004;82(2):83.

10 Hazard et al. The quality of medical death certification of cause of death in hospitals in rural Bangladesh: impact of introducing the International Form of Medical Certificate of Cause of Death. *BMC Health Service Research.* 2017;17:688.

A high proportion of ill-defined CODs means that Bangladesh lacks valid national COD data.

The current certification practices generate a high proportion of ill-defined CODs, which include 'heart failure', 'brain death' and 'cardio-respiratory arrest'. Effectively, Bangladesh has no valid, national-level COD data at this moment.[3]

Recognising this issue, the government of Bangladesh established:

- a CRVS Secretariat in the Cabinet Division
- an interagency steering committee with 22 members from many sectoral agencies, headed by the Cabinet Secretary
- a CRVS implementation committee with 14 members, headed by the Secretary (Coordination and Reforms)
- a National Mortality Technical Working Group with 17 members (including directors of DGHS, professors from multiple hospitals and representatives from the Ministry of Health & Family Welfare), headed by the Director, DGHS Management Information System.

The Cabinet Division, DGHS, and two country coordinators monitor medical certification.

Medical certification of CODs is now monitored by the Cabinet Division with the help of the Director General of Health Services and two country coordinators supported by the Bloomberg Data for Health Initiative.

Bangladesh International Form of Medical Certificate of Cause of Death

The WHO International Form of Medical Certificate of COD was customised and approved by Ministry of Health and Family Welfare and introduced for the first time in Bangladesh in January 2017.[3]

The new death certificate collects detailed information about the deceased person and the COD, comprising:

- Frame A, administrative data
  - hospital name and code number
  - admission registration number
  - name of the deceased
  - name of the mother and father
  - address
  - sex
  - religion
  - occupation
  - date of birth
  - date and time of admission
  - date and time of death
  - national identity number
  - family cell phone number

- Frame A, COD data
  - immediate (direct) COD
  - up to three underlying causes
  - other diseases or conditions whose presence contributed to death
  - time interval between onset of a condition and death
- Frame B, other medical data required in some cases, depending on the COD and the deceased person
  - other medical data
  - manner of death
  - place of occurrence of the external COD
  - whether the death is a fetal or infant death or a woman of reproductive age.

In writing the death certificate, doctors must always use consecutive lines and never leave blank lines within the sequence of events. In recording the COD and underlying causes (in Frame A), each condition should be a cause of the condition above it (ie it is an antecedent cause).

Startup Mortality List

A simplified version of the ICD is used for coding the underlying COD.

The Startup Mortality List (SMoL) is abstracted from the ICD and is designed to be the first step towards standardised COD reporting. Because the ICD rules are very detailed, a set of simplified rules (based on the ICD rules) has been developed to be followed when the SMoL is used for coding the underlying COD. Following these rules will enable data to be compared internationally and locally.[11]

A module in the DHIS2 software facilitates the use of SMoL.

In addition, WHO and the University of Oslo have developed a module in the District Health Information Software (DHIS2) software to facilitate the use of SMoL. With this system, all death certificates are assessed by staff trained on SMoL rules, who find the gaps in certification, enter all data into the DHIS2 module and select an underlying COD. Each month, the Mortality Technical Working Group of each hospital reviews the certificates for quality and tries to mitigate any gaps in information.

11 World Health Organization. *Application of ICD-10 for low-resource settings initial cause of death collection – the startup mortality list. Training manual for data input and coding.* Available at: https://www.who.int/healthinfo/civil_registration/ICD_10_SMoL.pdf.

Methods

The effort to strengthen the Bangladesh CRVS system started with a pilot project to use the new International Form of Medical Certificate of COD and SMoL in four hospitals.

This assessment study had three aims:

- to assess how well the certifying doctors adhere to the guidelines for certification while completing the International Form of Medical Certificate of COD
- to review a sample of completed forms and assess whether doctors and nurses are filling in all the fields in the certificate
- to describe the patterns of COD by hospital and stratified by age group and sex of the deceased.

Selection of hospitals

The four hospitals were selected as pilot sites based on the level of care provided and the size of the hospitals (Table 1).

Table 1 Characteristics of pilot hospitals

Hospital name	District	Care level	Beds	Physicians	Master trainers	Trained physicians
Kaliganj Upazila Health Complex	Gazipur	Primary	50	23	3	23
Shahid Tazuddin Ahmed Medical College Hospital	Gazipur	Secondary	500	116	4	95
Shahid Suhrawardy Medical College Hospital	Dhaka	Tertiary	850	176	5	295
Sir Salimullah Medical College and Mitford Hospital	Dhaka	Tertiary	900	274	5	390

Staff training

Master trainers from four hospitals were trained in certification.

A technical team from the University of Melbourne trained 'master trainers' from the four hospitals on medical certification of COD in accordance with international standards. In turn, the master trainers trained doctors, nurses and interns within the hospitals.

Sample size and selection of death certificates

A total of 1104 death certificates, filled in between January 2017 and February 2018, were randomly obtained from the four pilot hospitals:

- 13 from Kaliganj Upazila Health Complex (KUHC)
- 153 from Shahid Tazuddin Ahmed Medical College Hospital (STAMCH)
- 438 from Shahid Suhrawardy Medical College Hospital (SSMCH)
- 500 from Sir Salimullah Medical College and Mitford Hospital (SSMCaMH).

With permission from hospital authority, these 1104 certificates were photocopied for assessment. All 1104 certificates were assessed for data quality, and 150 certificates were assessed for data completeness (13 from KUHC, 31 from STAMCH, and 53 each from SSMCH and SSMCaMH).

All the death certificates entered into DHIS2 from these four hospitals during 2017 (3193 certificates) were downloaded from the DHIS2 module to assess the patterns of underlying CODs (13 from KUHC, 140 from STAMCH, 1325 from SSMCH and 1715 from SSMCaMH).

Data management and analysis

The data quality was assessed using the checklist of errors (Annex 3) developed by the technical team at the University of Melbourne.[12] Death certificates were assessed for completeness and the data entered into Excel. The frequency of errors and completeness or gaps in fields in the death certificate were assessed for each hospital (Annex 4), and the most common causes of death were found for each hospital and age group (Annex 5). Data were analysed with Excel and Stata software.

12 University of Melbourne. *Assessing the quality of death certificates: guidance for the rapid tool. CRVS resources and tools.* Melbourne, Australia: University of Melbourne, Civil Registration and Vital Statistics Improvement, and Bloomberg Philanthropies Data for Health Initiative; 2018.

Results

Data quality

Overall, 30.8% of the certificates had one or more errors (Table 2); 24.6% of certificates had at least one error and 6.1% certificates had two or more errors.

Table 2 Death certificates with errors by hospital

Location	Death certificates	Death certificates with errors*	
	n	n	%
Kaliganj Upazila Health Complex	13	6	46.2
Shahid Tazuddin Ahmed Medical College Hospital	153	28	18.3
Shahid Suhrawardy Medical College Hospital	438	211	48.2
Sir Salimullah Medical College and Mitford Hospital	500	95	19.0
Total	1104	340	30.8

*A death certificate may contain more than one error

Types of errors

Common errors included abbreviations, illegible handwriting, and listing multiple causes per line.

A variety of errors was found in the 1104 death certificates (Table 3). The most common data entry error was the use of abbreviations (found on 10.8% of certificates), followed by illegible handwriting (5.8%) and listing multiple causes per line (3.4%). The other major category of errors was 'additional errors' (11.5%), which included insufficient details for injuries or neoplasms, alterations made, and no unit provided for the age. Ill-defined conditions were entered as the underlying COD on 4.4% of certificates.

Table 3 Frequency of error types, all hospitals

Error type	Death certificates (N = 1104)	
	n	%
Multiple causes per line	37	3.4
Use of nonconsecutive lines (appearance of blank lines)	15	1.4
Illegible handwriting	64	5.8
Use of abbreviations	119	10.8
Clinically improbable sequence of events leading to death	31	2.8
Ill-defined condition entered as UCOD	49	4.4
Organ failure	*15*	*30.6*
Signs or symptoms	*13*	*26.5*
Mode of dying	*19*	*38.8*
Patho-physiological finding	*2*	*4.1*
Time interval between onset and death not shown	24	2.2

Additional errors	127	11.5
Injuries and poisonings	*16*	*12.6*
Neoplasms	*38*	*29.9*
Changes/alterations made by any means	*43*	*33.9*
No units specified for the age	*30*	*23.6*
Total number of death certificates with errors*	**340**	**30.8**
At least one error	272	24.6
More than one error	68	6.2

UCOD = underlying cause of death

*A death certificate may contain more than one error

Errors per hospital

KUHC had errors in 46.15% of their certificates, though the total number of certificates was small. The most common error was 'interval between onset of diseases and date of death not shown' (46.2%) followed by 'clinically improbable sequence of events leading to death' (15.4%), 'too many abbreviations' (15.4%) and 'ill-defined condition entered as underlying COD' (15.4%).

STAMCH had errors in 18.3% of their certificates. The most common errors were 'clinically improbable sequence of events leading to death' and 'additional error' (6.5%) followed by 'illegible handwriting' and 'ill-defined condition entered as underlying cause of death' (3.3%).

SSMCH had errors in 48.17% of their certificates. The most common error was 'too many abbreviations' (19.6%) followed by 'additional error' (18.5%) and 'illegible handwriting' (12.6%).

SSMCaMH had errors in 19% of their certificates. The most common error was 'additional error' (7%) followed by 'too many abbreviations' (6%) and 'multiple causes per line' (2.4%).

Data completeness

Some fields on the death certificates were left empty more often than others (Table 4).

The highest rate of missing information was for 'national ID of deceased, spouse or parents' (only 10.7% complete), 'occupation' (62.7% complete), mother's name (73.3% complete). By contrast, almost all certificates recorded 'name of the deceased', 'address', and 'admission registration number'.

Table 4 Frequency of fields in death certificates recorded during completion of certificate

Certificate fields, Frame A	**Death certificates (N = 150)**	
	n	**%**
Hospital name	150	100.0
Hospital code	142	94.7
Admission registration number	148	98.7
Name of the deceased	149	99.3

Father's name	138	92.0
Mother's name	110	73.3
Address	147	98.0
Sex	146	97.3
Religion	130	86.7
Occupation	94	62.7
Date of birth	145	96.7
Date of admission	149	99.3
Time of admission	145	96.7
Date of death	149	99.3
Time of death	145	96.7
National ID number of deceased, spouse, or parents	16	10.7
Family cell number	120	80.0
Manner of death	132	88.0

In cases where additional fields needed to be filled out, these data were often missing (Table 5). Of the 150 certificates assessed for completeness:

- 5 cases required 'other medical data' but it was given in only 2 of them
- 4 cases required 'place of occurrence of external cause' but only 3 gave it
- 12 cases were 'fetal or infant deaths' but only 3 of these recorded the required additional information
- 1 case was a woman of reproductive age and the additional information was omitted.

The missing fields also varied by hospital (Annex 4).

Table 5 Completeness of additional information

Additional information required (Frame B)	Death certificates		
	N	n	%
Other medical data	5	2	40.0
Place of occurrence of the external cause	4	3	75.0
Fetal/infant death	12	3	25.0
Women of reproductive age	1	0	0.0

N = number of certificates requiring additional information; n = number of certificates correctly filled out

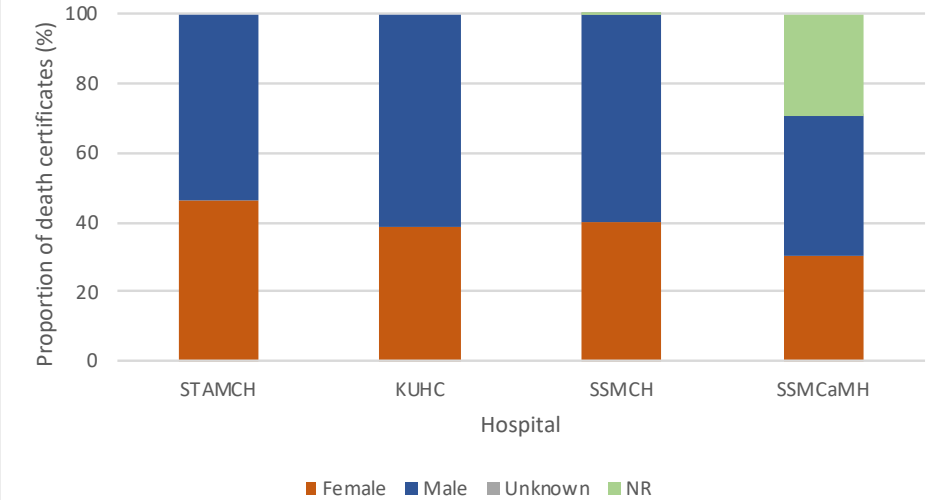
Cause of death

Leading causes of death by sex

Incomplete sex data in certificates means that there are technical problems in DHIS2.

Most of the hospitals showed higher death rates for males than for females (**Figure 1**). However, sex data were missing in 15.7% of certificates, indicating some technical problems in the DHIS2 module. Most of the missing data were in certificates from SSMCaMH.

Figure 1 Distribution of death certificates by gender of deceased and hospital



KUHC = Kaliganj Upazila Health Complex; NR = not recorded; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

The five most common CODs for males were 'hypertensive heart diseases' (14.7%), 'ischaemic heart diseases' (14.2%), 'cerebrovascular diseases' (12.6%), 'diabetes mellitus' (10.0%), and 'chronic lower respiratory diseases' (9.8%) (Table 6).

Table 6 Leading causes of death, males, 15+ years

Underlying cause of death	SMoL code	n	%
Hypertensive heart diseases	5-61	178	14.7
Ischaemic heart diseases	5-62	172	14.2
Cerebrovascular diseases	5-64	152	12.6
Diabetes mellitus	5-49	121	10.0
Chronic lower respiratory diseases	5-69	118	9.8
Other diseases of the digestive system	5-74	61	5.0
Glomerular and renal tubulo-interstitial diseases	5-77	61	5.0
Road traffic accidents	5-96	31	2.6
Other heart diseases	5-63	29	2.4
Pneumonia	5-67	20	1.7
Other and unspecified external cause	5-106	18	1.5
Other viral hepatitis	5-19.8	18	1.5
Other and unspecified diseases of the respiratory system	5-70	17	1.4
Malignant neoplasm of trachea, bronchus and lung	5-33	16	1.3
Other diseases of the nervous system	5-57	15	1.2
Other and unspecified infectious diseases	5-25	13	1.1
Other and unspecified diseases of the genitourinary system	5-78	12	1.0
Other and unspecified diarrhoeal diseases	5-3	12	1.0
Respiratory tuberculosis, confirmed	5-4.1	12	1.0
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	5-95	12	1.0

SMoL = Startup Mortality List

Hypertensive heart diseases were the most common COD for adults.

The four most common CODs for females were the same as for males: 'hypertensive heart diseases' (17.5%), 'ischaemic heart diseases' (13.0%), 'diabetes mellitus' (12.4%), and 'cerebrovascular diseases' (11.6%) (Table 7). The fifth cause for females was 'other diseases of digestive system' (5.8%), instead of 'chronic lower respiratory diseases' for males.

Table 7 Leading causes of death, females, 15+ years

Underlying cause of death	SMoL code	n	%
Hypertensive heart diseases	5-61	151	17.5
Ischaemic heart diseases	5-62	112	13.0
Diabetes mellitus	5-49	107	12.4
Cerebrovascular diseases	5-64	100	11.6
Other diseases of the digestive system	5-74	50	5.8
Glomerular and renal tubulo-interstitial diseases	5-77	46	5.3
Chronic lower respiratory diseases	5-69	32	3.7
Pneumonia	5-67	20	2.3
Other tuberculosis	5-4.9	20	2.3
Other heart diseases	5-63	19	2.2

Other and unspecified diseases of the genitourinary system	5-78	17	2.0
Other and unspecified diseases of the respiratory system	5-70	13	1.5
Other and unspecified infectious diseases	5-25	12	1.4
Respiratory tuberculosis, confirmed	5-4.1	10	1.2
Other and unspecified diarrhoeal diseases	5-3	9	1.0
Other and unspecified external cause	5-106	8	0.9
Other viral hepatitis	5-19.8	8	0.9
Malignant neoplasm of trachea, bronchus and lung	5-33	6	0.7
Other diseases of the nervous system	5-57	6	0.7
Road traffic accidents	5-96	5	0.6

SMoL = Startup Mortality List

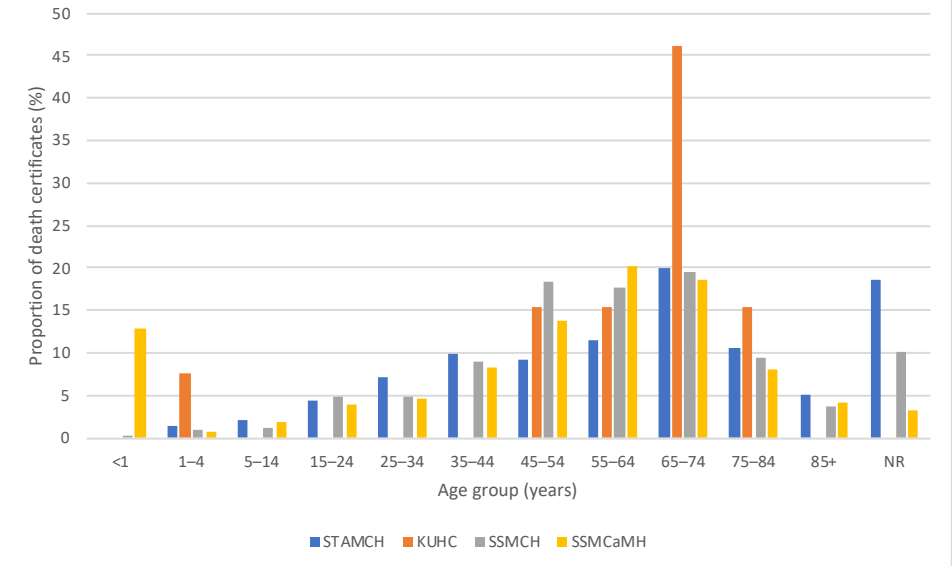
Leading causes of death by age group

Of the 3193 death records downloaded from DHIS2, most of the deaths were of people aged between 45 and 74 years (Figure 2), and the largest category was the 65–74 years age group.

The distribution of age of death varied between hospitals. For example, deaths in the 0–1-year age group were far more common at SSMCH, and deaths in the 65–74-year age group were more common at KUHC.

Age data were missing from 6.8% of death certificates. STAMCH had the highest rate of missing age data (18.6%), followed by SSMCH (10.2%) and 3.2% in SSMCaMH.

Figure 2 Distribution of death certificates by age group of deceased, for each hospital



KUHC = Kaliganj Upazila Health Complex; NR = not recorded; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

The leading cause of death for infants was low birth weight.

The 0–1 year age group represented 7% of deaths. The three most common underlying CODs in this age group were 'low birth weight' (35.58%), 'intrauterine hypoxia and birth asphyxia' (21.17%) and 'other and unspecified perinatal conditions' (7.2%) (Table 8). COD data were missing for 12.16% of the certificates in this age group, which may indicate some problems in choosing an underlying COD from the drop-down list of medical terms and diseases.

Table 8 Underlying cause of death, <1 year, both sexes

Underlying cause of death	SMoL code	SSMCaMH	SSMCH	Total (%)
Low birth weight	5-87.2	79	0	79 (35.6)
Intrauterine hypoxia and birth asphyxia	5-89	46	1	47 (21.2)
Other and unspecified perinatal conditions	5-90	16	0	16 (7.2)
Pneumonia	5-67	12	0	12 (5.4)
Septicaemia	5-11	8	0	8 (3.6)
Protein-energy malnutrition	5-50	6	0	6 (2.7)
Other mental and behavioural disorders	5-55	5	0	5 (2.3)
Prematurity	5-87.1	5	0	5 (2.3)
Other direct obstetric deaths	5-84	3	0	3 (1.4)
Hypertensive heart diseases	5-61	2	0	2 (0.9)
Other diseases of the digestive system	5-74	2	0	2 (0.9)
Diseases of the skin and subcutaneous tissue	5-75	2	0	2 (0.9)
Other and unspecified diarrhoeal diseases	5-3	1	0	1 (0.5)
Other diseases of the blood and blood-forming				
organs and certain disorders involving the immune mechanism	5-48	1	0	1 (0.5)
Other diseases of the nervous system	5-57	1	0	1 (0.5)
Ischaemic heart diseases	5-62	1	0	1 (0.5)
Chronic lower respiratory diseases	5-69	1	0	1 (0.5)
Obstructed labour	5-81	1	0	1 (0.5)
Congenital malformations of the heart	5-92	1	0	1 (0.5)
Missing	na	26	1	27 (12.2)
Total	**-**	**220**	**2**	**222 (100.0)**

na = not available; SMoL = Startup Mortality List; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital

One-fifth of child deaths were missing the COD, indicating a data quality issue.

The 1–14-year age group represented 1.8% of deaths (Table 9). The most common underlying CODs for this age group were 'other diseases of the nervous system' (14.03%), and 'leukaemia', 'pneumonia' 'meningitis' and 'other and unspecified infectious diseases' (each 8.77%). COD data were missing for 22.8% of the certificates in this age group, which may indicate some problems in choosing an underlying COD from the drop-down list of medical terms and diseases or technical problems with the DHIS2 module.

Table 9 Underlying cause of death by hospital, 1–14 years, both sexes

Underlying cause of death	SMoL code	KUHC	SSMCaMH	SSMCH	STAMCH	Total (%)
Other diseases of the nervous system	5-57	0	7	1	0	8 (14.0)
Leukaemia	5-44	0	3	2	0	5 (8.8)
pneumonia	5-67	1	2	1	1	5 (8.8)
Meningitis	5-55	0	4	1	0	5 (8.8)
Other and unspecified infectious diseases	5-25	0	3	2	0	5 (8.8)
Glomerular and renal tubulo-interstitial diseases	5-77	0	2	2	0	4 (7.0)
Other unspecified external cause	5-106	0	0	2	1	3 (5.3)
Other and unspecified diarrheal diseases	5-3	0	1	2	0	3 (5.3)
Protein-energy malnutrition	5-50	0	2	1	0	3 (5.3)
Septicaemia	5-11	0	2	1	0	3 (5.3)
Missing	na	0	7	5	1	13 (22.8)
Total	**-**	**1**	**33**	**20**	**3**	**57 (100)**

na = not available; SMoL = Startup Mortality List; KUHC = Kaliganj Upazila Health Complex; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

Most deaths occurred in the above 15 years age group (Table 10). The five most common causes were 'hypertensive heart diseases' (15.2%), 'ischaemic heart disease' (14.0%), 'cerebrovascular disease' (10.0%), 'diabetes melitus' (9.9%) and 'chronic lower respiratory disease' (7.4%). These were the five most common causes at all four hospitals.

Table 10 Underlying cause of death by hospital, 15+ years, both sexes

Underlying cause of death	SMoL code	KUHC (%, n=12)	SSMCaMH (%, n=1395)	SSMCH (%, n=1158)	STAMCH (%, n=109)	Total (%, n=2674)
Hypertensive heart diseases	5-61	0.0	15.7	15.5	7.3	15.2
Ischaemic heart diseases	5-62	0.0	21.1	5.4	16.5	14.0
Cerebrovascular diseases	5-64	8.3	4.6	16.5	10.1	10.0
Diabetes mellitus	5-49	8.3	8.2	12.3	5.5	9.9
Chronic lower respiratory diseases	5-69	50.0	8.7	5.2	11.0	7.4
Other diseases of the digestive system	5-74	0.0	5.6	4.3	7.3	5.1
Glomerular and renal tubulo-interstitial diseases	5-77	0.0	1.6	7.7	0.0	4.2
Other heart diseases	5-63	0.0	2.4	2.2	0.9	2.2
Pneumonia	5-67	8.3	1.9	1.6	1.8	1.8
Road traffic accidents	5-96	0.0	0.4	2.0	9.2	1.4
Other tuberculosis	5-4.9	0.0	0.9	2.0	0.0	1.3
Other and unspecified diseases of the respiratory system	5-70	0.0	1.1	1.6	0.9	1.3
Other and unspecified diseases of the genitourinary system	5-78	16.7	1.0	1.4	0.9	1.2
Other viral hepatitis	5-19.8	0.0	1.5	0.9	0.0	1.2
Other and unspecified external causes	5-106	0.0	0.6	1.6	2.8	1.1
Other and unspecified diarrhoeal diseases	5-3	0.0	1.0	1.2	0.9	1.1
Respiratory tuberculosis, confirmed	5-4.1	0.0	1.1	0.9	0.9	1.0
Other and unspecified infectious diseases	5-25	8.3	0.6	1.4	0.0	1.0
Malignant neoplasm of trachea, bronchus and lung	5-33	0.0	1.3	0.6	0.9	1.0
Other diseases of the nervous system	5-57	0.0	1.1	0.8	0.9	0.9

SMoL = Startup Mortality List; KUHC = Kaliganj Upazila Health Complex; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

Discussion

Medical certification is crucial for accurate COD data for health policy and planning decisions.

COD data are critically important for health policy planners, program managers, public health researchers and epidemiologists. The absence of reliable data on causes of death impedes the structuring of health-related activities and results in misleading appraisals of research and improper decisions about healthcare policies.[13] Medical students and interns all over the world are taught about the importance of accurate medical certification of COD for generating high-quality COD data.[14] Despite this, the error rate in medical certification is high globally.[7]

Quality assessment

This study found a lower rate in death certification errors compared to other, similar studies.

The rate of errors in death certification was significantly lower in this study compared with other studies in Bangladesh and other countries. Although not all errors in completing death certificates are detrimental to the value of the death certificate, they can still compromise the accuracy of public health surveillance.

In this study, 340 (30.79%) of the death certificates had some sort of error. The rate of errors in death certificates varies around the world. A 2017 study by Hazard et al in Bangladesh found that 99.1% of death certificates had at least one error.[10] Raje in India[15] and Haque et al in Pakistan found errors in 99% of death certificates;[13] Maharjan et al found errors in 78.4% of death certificates in Kathmandu, Nepal;[7] Miki et al found errors in 56.7% of death certificates in Peru;[16] and Pritt et al. found errors in 34% of death certificates in the United States.[17] In other countries, the error rate has ranged from 24% to 37%[18, 19, 20, 21]

The most common errors found:

- in this study
  - 'additional error' (11.5%)
  - 'too many abbreviations' (10.8%)
  - 'illegible handwriting' (5.8%)
  - 'ill-defined condition entered as underlying cause of death' (4.4%)
  - 'multiple causes per line' (3.4%)
  - 'clinically improbable sequence of events leading to death' (2.8%)
  - 'interval between onset of causes and death not shown' (2.2%)
  - 'appearance of blank lines' (1.4%)

13 Haque et al. *BMC Health Service Research.* 2013;13:205.

14 Smith Sehdev AE, Hutchins GM. Problems with proper completion and accuracy of the cause-of-death statement. *Archives of Internal Medicine.* 2001;161 (2):277-284.

15 Raje MG. Evaluation of errors and its etiological relevance with variables associated with death certificate. *Journal of the Indian Academy of Forensic Medicine.* 2011:33(1):50 56.

16 Miki et al. Saving lives through certifying deaths: assessing the impact of two interventions to improve cause of death data in Perú. *BMC Public Health.* 2018;18:1329.

17 Pritt et al. Death certification errors at an academic institution. *Archives of Pathology: Laboratory Medicine.* 2005;129(11):1476 1479.

18 Jordan JM, Bass MJ. Errors in death certificate completion in a teaching hospital. *Clinical and Investigative Medicine.* 1993;16(4):249 255.

19 Myers KA, Farquhar DRE. Improving the accuracy of death certification. *CMAJ.* 1998;158(10):1317 23.

20 Smith Sehdev AE, Hutchins GM. Problems with proper completion and accuracy of the cause-of-death statement. *Archives of Internal Medicine.* 2001;161(2):277-284.

21 Cina et al. Accuracy of death certification in two tertiary care military hospitals. *Military Medicine.* 1999;164(12):897 899.

- by Hazard et al[10]
  - 'interval between onset of causes and death not shown' (95.6%)
  - too many abbreviations' (50.7%)
  - 'multiple causes per line' (41.5%)
  - 'ill-defined condition entered as underlying cause of death' (33.2%)
  - change in sequence necessary' (31.6%)
  - 'appearance of blank lines' (7.2%)
- by Miki et al[16]
  - 'ill-defined conditions entered as an underlying cause of death' (38.9%)
  - 'absence of disease time interval' (30.0%)
  - 'additional error' (21%)
  - 'incorrect sequence of events leading to death' (17.9%)
  - 'abbreviations used in certifying the death' (4.1%)
  - 'multiple cause per line' (0.6%)
  - 'presence of blank lines within the sequence of events' (0.3%).

Completeness assessment

Nearly all death certificates in this study were incomplete, most with missing national identity numbers.

As the new International Form for Medical Certificate of COD has several sections and numerous fields, this study assessed whether all fields were being completed. Our study found that almost all death certificates were incomplete. In particular, only 10.7% of certificates recorded the national identity number. This gap indicates that people are often seeking hospital care without showing their national identity card or number.

There were also specific gaps when additional information was required, for example the place of occurrence of external causes, and whether the death was a fetal or infant death. This gap may indicate that doctors do not feel they should fill out these sections because they are not mandatory.

In Atlanta, Hanzlick found that 47% of the errors on death certificates were omissions, incomplete or incorrect information.[22] In Taiwan, Lu et al found that 61% of death certificates were fully completed.[23]

Given the lack of data on completeness, this study can be used as a baseline.

Bangladesh introduced the new International Form of Medical Certificate of COD in January 2017. There are therefore no previous data on completeness available to compare with these findings. This study could be used as the baseline study for future comparison.

22 Hanzlick R. Quality assurance review of death certificates: a pilot study. *American Journal of Forensic Medicine and Pathology*. 2005;26(1):63 65.

23 Lu et al. Factors associated with errors in death certificate completion. *Journal of Clinical Epidemiology.* 2001;54(3):232 238.

Leading causes of death

There are some differences in the leading CODs found in this study and the other study done in Bangladesh (Table 11).

Table 11 Leading causes of death by age group, both sexes

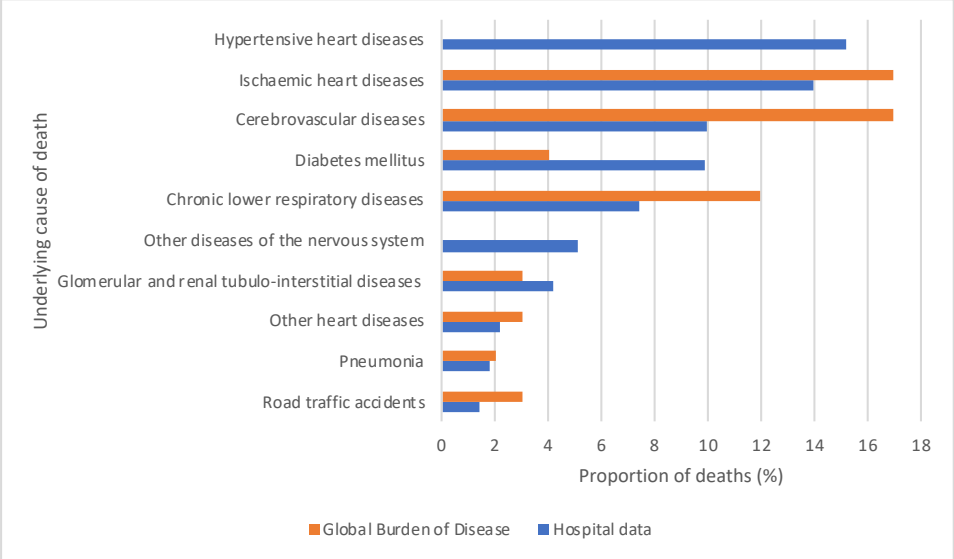
Age group	Hospital data		Hazard et al[24]	
<1 year	1	Low birth weight (35.6%)	1	Intrauterine hypoxia and birth asphyxia (52.8%)
	2	Intrauterine hypoxia and birth asphyxia (21.2%)	2	Low birth weight (15.2%)
	3	Other and unspecified perinatal conditions (7.2%)	3	Septicaemia (10.4%)
	4	Pneumonia	4	Not applicable
	5	Septicaemia	5	Not applicable
1–14 years	1	Other diseases of the nervous system (14.0%)	1	Pneumonia (37.7%)
	2	Leukaemia (8.8%)	2	Septicaemia (10.4%)
	3	Pneumonia (8.8%)	3	Gastroenteritis and colitis (7.6%)
	4	Meningitis (8.8%)	4	Not applicable
	5	Other and unspecified infectious diseases (8.8%)	5	Not applicable
15+ years	1	Hypertensive heart diseases (15.2%)	1	Stroke (15.8%)
	2	Ischaemic heart diseases (14.0%)	2	Acute myocardial infarction (14.4%)
	3	Cerebrovascular diseases (10.0%)	3	Other cardiovascular diseases (5.9%)
	4	Diabetes mellitus	4	Not applicable
	5	Chronic lower respiratory diseases	5	Not applicable

Some of the leading CODs found in this study differ from those in GBD data.

There are also some differences between the leadings CODs found in this study and in Global Burden of Disease (GBD) data (Figure 3). The Bangladesh data show that the three most common CODs for adults are 'hypertensive diseases' (15.2%), 'ischaemic heart diseases' (14.0%) and 'cerebrovascular diseases' (10%). GBD data show that the three most common CODs are 'ischaemic heart diseases' (17%), 'cerebrovascular diseases' (17%) and 'chronic respiratory diseases' (12%). The far higher rate for 'hypertensive heart disease' in Bangladesh compared with GBD data may be because doctors are selecting hypertension as an underlying COD for some diseases such as stroke.

24 Hazard et al. The quality of medical death certification of cause of death in hospitals in rural Bangladesh: impact of introducing the International Form of Medical Certificate of Cause of Death. *BMC Health Service Research.* 2017;17:688.

Figure 3 Comparison of adult deaths from Bangladesh hospital data and the Global Burden of Disease data



Study limitations

Limitations included time constraints, missing age and sex data, and difficulties analysing COD data for certain age groups.

The study had several limitations that may influence the validity of the study. These include:

- time constraints, which meant that analysis was limited to 1104 certificates for quality checking and 150 certificates for completeness checking
- missing age and sex data for a significant proportion of cases
- difficulties in analysing COD data for neonates and those aged 29 days to <1 year.

Recommendations

- The Hospital Mortality Technical Working Group should set up a team of doctors with a focal person to assess the quality and completeness of medical certificates at regular intervals. The focal person and team would carry out the assessment and discuss the findings in monthly meetings, and when appropriate they would share findings with the head of the clinical unit in each hospital.
- A follow-up assessment should be conducted in the same hospitals after 6–8 months to see if the rate of errors has improved.
- A 17-digit registration number should be in common between the DHIS2 module and the Office of the Registrar General.
- Doctors should write their full name and provider code number on the form, and use their name seal at the place of signature.
- The national identity number should be mandatory in the Bangladesh International Form of Medical Certificate of COD.
- Each hospital should conduct training in the use of the International Form of Medical Certificate of COD, including comprehensive training for new doctors and regular refresher training for all other doctors.

Annex 1 International Form of Medical Certificate of Cause of Death

Administrative Data (can be further specified by country)																
Sex	☐ Female							☐ Male		☐ Unknown						
Date of birth	D	D	M	M	Y	Y	Y	Y	Date of death	D	D	M	M	Y	Y	Y	Y

Frame A: Medical data: Part 1 and 2			
1 Report disease or condition directly leading to death on line a Report chain of events in due to order (if applicable) State the underlying cause on the lowest used line		Cause of death	Time interval from onset to death
	a		
	b	Due to:	
	c	Due to:	
	d	Due to:	
2 Other significant conditions contributing to death (time intervals can be included in brackets after the condition)			

Frame B: Other medical data											
Was surgery performed within the last 4 weeks?	☐ Yes	☐ No	☐ Unknown								
If yes please specify date of surgery	D	D	M	M	Y	Y	Y	Y			
If yes please specify reason for surgery (disease or condition)											
Was an autopsy requested?	☐ Yes	☐ No	☐ Unknown								
If yes were the findings used in the certification?	☐ Yes	☐ No	☐ Unknown								
Manner of death:											
☐ Disease	☐ Assault	☐ Could not be determined									
☐ Accident	☐ Legal intervention	☐ Pending investigation									
☐ Intentional self harm	☐ War	☐ Unknown									
If external cause or poisoning:	Date of injury	D	D	M	M	Y	Y	Y	Y		
Please describe how external cause occurred (If poisoning please specify poisoning agent)											
Place of occurrence of the external cause:											
☐ At home	☐ Residential institution	☐ School, other institution, public administrative area	☐ Sports and athletics area								
☐ Street and highway	☐ Trade and service area	☐ Industrial and construction area	☐ Farm								
☐ Other place (please specify):			☐ Unknown								
Fetal or infant Death											
Multiple pregnancy	☐ Yes	☐ No	☐ Unknown								
Stillborn?	☐ Yes	☐ No	☐ Unknown								
If death within 24h specify number of hours survived			Birth weight (in grams)								
Number of completed weeks of pregnancy			Age of mother (years)								
If death was perinatal, please state conditions of mother that affected the fetus and newborn											
For women, was the deceased pregnant?	☐ Yes	☐ No	☐ Unknown								
At time of death	☐ Within 42 days before the death										
Between 43 days up to 1 year before death	☐ Unknown										
Did the pregnancy contribute to the death?	☐ Yes	☐ No	☐ Unknown								

Annex 2 Medical certificate of cause of death assessment tool

A correctly filled-in death certificate has none of the following errors. Did the certificate have:

Error type	Yes	No	Unsure because of illegible handwriting
1. Multiple causes of death per line			
2. Missing time interval from onset to death			
3. Blank lines within the sequence of events			
4. Abbreviations used in certifying the cause of death			
5. Illegible hand writing			
6. Incorrect or clinically improbable sequence of events leading to death			
7. Ill-defined condition(s) entered as the underlying cause of death			
■ If yes, was the ill-defined condition:			
– Impossible underlying cause (ie signs and symptoms)			
– Intermediate cause			
– Mode of dying (ie respiratory arrest)			
– Unspecified causes within a larger death category (ie unspecified accident)			
– Other – **specify:**			
8. Were there additional errors on the certificate?			
■ If yes, select all those that apply:			
– For deaths from external causes, additional details were missing			
– For deaths from neoplasms, additional details were missing			
– Changes/alterations made by any means other than drawing a line through the original text (ie using correction fluid)			
– No units specified for the age			
– Other – **specify:**			

Annex 3 Frequency of Frame A errors by hospital and error type

Error type (Frame A)	KUHC certificates *(N = 13)*		STAMCH certificates *(N = 153)*		SSMCH certificates *(N = 438)*		SSMCaMH certificates *(N = 500)*		All certificates *(N = 1104)*	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Multiple causes per line	0	0.0	0	0.0	25	5.7	12	2.4	37	3.4
Use of nonconsecutive lines (appearance of blank lines)	0	0.0	1	0.7	11	2.5	3	0.6	15	1.4
Illegible handwriting	1	7.7	5	5.3	55	12.6	3	0.6	64	5.8
Use of abbreviations	2	15.4	1	0.7	86	19.6	30	6.0	119	10.8
Clinically improbable sequence of events leading to death	2	15.4	10	6.5	13	3.0	6	1.2	31	2.8
Ill-defined condition entered as underlying COD	2	15.4	5	3.3	21	4.8	21	4.2	49	4.4
Organ failure	*1*	*50.0*	*0*	*0.0*	*8*	*38.1*	*6*	*28.6*	*15*	*30.6*
Signs or symptoms	*0*	*0.0*	*2*	*40.0*	*6*	*28.6*	*5*	*23.8*	*13*	*26.5*
Mode of dying	*1*	*0.0*	*3*	*60.0*	*6*	*28.6*	*9*	*42.9*	*19*	*38.8*
Patho-physiological finding	*0*	*0.0*	*0*	*0.0*	*1*	*4.8*	*1*	*4.8*	*2*	*4.1*
Time interval between onset and death not shown	6	46.2	1	0.7	12	2.7	5	1.0	24	2.2
Additional errors	1	7.7	10	6.5	81	18.5	35	7.0	127	11.5
Injuries and poisonings	*0*	*0.0*	*6*	*60.0*	*10*	*12.3*	*0*	*0.0*	*16*	*12.6*
Neoplasms	*0*	*0.0*	*2*	*20.0*	*21*	*25.9*	*15*	*42.9*	*38*	*29.9*
Changes/alterations made by any means	*0*	*0.0*	*1*	*10.0*	*35*	*43.2*	*7*	*20.0*	*43*	*33.9*
No units specified for the age	*1*	*100.0*	*1*	*10.0*	*15*	*18.5*	*13*	*37.1*	*30*	*23.6*
Total number of death certificates with errors*	**6**	**46.2**	**28**	**18.3**	**211**	**48.2**	**95**	**19**	**340**	**30.8**

KUHC = Kaliganj Upazila Health Complex; N = total number of certificates; n = number of certificates showing that error; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

*Death certificates can have more than one error

Annex 4 Frequency of gaps in recording fields of death certificates by hospital

General information required in administrative data section of certificate	KUHC certificates (N = 13)		STAMCH certificates (N = 31)		SSMCH certificates (N = 53)		SSMCaMH certificates (N = 53)		All certificates (N = 150)	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Hospital name	13	100.0	31	100.0	53	100.0	53	100.0	150	100.0
Hospital code	10	76.9	31	100.0	49	92.5	52	98.1	142	94.7
Admission registration number	11	84.6	31	100.0	53	100.0	53	100.0	148	98.7
Name of the deceased	13	100.0	31	100.0	52	98.7	53	100.0	149	99.3
Father's name	12	92.3	20	64.5	53	100.0	53	100.0	138	92.0
Mother's name	3	23.1	15	48.4	48	90.6	44	83.0	110	73.3
Address	13	100.0	29	93.5	53	100.0	52	98.1	147	98.0
Sex	13	100.0	29	93.5	53	100.0	51	96.2	146	97.3
Religion	9	69.2	26	83.9	50	94.3	45	84.9	130	86.7
Occupation	6	46.2	7	22.6	47	88.7	34	62.4	94	62.7
Date of birth	12	92.3	30	96.8	51	96.2	52	98.1	145	96.7
Date of admission	13	100.0	30	96.8	53	100.0	53	100.0	149	99.3
Time of admission	10	76.9	30	96.8	53	100.0	52	98.1	145	96.7
Date of death	13	100.0	30	96.8	53	100.0	53	100.0	149	99.3
Time of death	10	76.9	29	93.5	53	100.0	53	100.0	145	96.7
National identity number of deceased, spouse, or parents	0	0.0	2	6.5	12	22.6	2	3.8	16	10.7
Family cell number	6	46.2	21	67.7	46	86.8	47	88.7	120	80.0

KUHC = Kaliganj Upazila Health Complex; N = total number of certificates; n = number of certificates meeting that requirement; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

General information required in Frame B of the death certificate	KUHC certificates			STAMCH certificates			SSMCH certificates			SSMCaMH certificates			All certificates		
	N	*n*	*%*	*N*	*n*	*%*	*N*	*n*	*%*	*N*	*n*	*%*	*N*	*n*	*%*
Manner of death	13	11	84.6	31	26	83.9	53	50	94.3	53	45	84.9	150	132	88.0
Other medical data	0	-	-	2	1	50.0	3	1	33.3	0	-	-	5	2	40.0
Place of occurrence of the external cause	0	-	-	4	3	75.0	0	-	-	0	-	-	4	3	75.0
Fetal or infant death	0	-	-	2	0	0.0	3	1	33.3	7	2	28.6	12	3	25.0
Woman of reproductive age	0	-	-	0	-	0	0	-	-	1	0	0.0	1	0	0.0

KUHC = Kaliganj Upazila Health Complex; N = total number of certificates; n = number of certificates meeting that requirement; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

Annex 5 Deaths by age group and hospital

Age group (years)	STAMCH		KUHC		SSMCH		SSMCaMH		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
<1	0	0.0	0	0.0	2	0.2	220	12.8	222	7.0
1–4	2	1.4	1	7.7	13	1.0	12	0.7	28	0.9
5–14	3	2.1	0	0.0	17	1.3	33	1.9	53	1.7
15–24	6	4.3	0	0.0	63	4.8	68	4.0	137	4.3
25–34	10	7.1	0	0.0	65	4.9	79	4.6	154	4.8
35–44	14	10.0	0	0.0	119	9.0	141	8.2	274	8.6
45–54	13	9.3	2	15.4	244	18.4	235	13.7	494	15.5
55–64	16	11.4	2	15.4	233	17.6	344	20.1	595	18.6
65–74	28	20.0	6	46.2	259	19.5	318	18.5	611	19.1
75–84	15	10.7	2	15.4	126	9.5	138	8.0	281	8.8
85+	7	5.0	0	0.0	49	3.7	72	4.2	128	4.0
Not recorded	26	18.6	0	0.0	135	10.2	55	3.2	216	6.8
Total	**140**	**100.0**	**13**	**100.0**	**1,325**	**100.0**	**1,715**	**100.0**	**3,193**	**100.0**

KUHC = Kaliganj Upazila Health Complex; n = number of deaths in that age group; SSMCaMH = Sir Salimullah Medical College and Mitford Hospital; SSMCH = Shahid Suhrawardy Medical College Hospital; STAMCH = Shahid Tazuddin Ahmed Medical College Hospital

Related resources and products

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Library

https://crvsgateway.info/library

Assessing the quality of death certification: Guidance for the rapid tool. CRVS resources and tools.

CRVS country overview: Bangladesh. CRVS summaries.

Handbook for physicians on cause of death certification. CRVS resources and tools.

Improving vital statistics for informed policy: The importance of data quality. CRVS development series.

Intervention: Medical certification of cause of death. CRVS summaries.

Intervention: Mortality coding. CRVS summaries.

Medical certification of cause of death: Quick reference guide. CRVS summaries.

Strategies for improving the quality of cause of death data in hospitals. CRVS development series.

Training and education on medical certification of cause of death: Effective strategies and approaches. CRVS development series.

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Learning Centre

https://crvsgateway.info/learningcentre

Topic 4: Cause of death in CRVS.

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Courses

https://crvsgateway.info/courses

Analysis of Causes of (National) Deaths for Action.

Estimating the completeness of birth and death registration.

Medical certification of cause of death.

Bloomberg Philanthropies DATA FOR HEALTH INITIATIVE

Australian Government
Department of Foreign Affairs and Trade

The program partners on this initiative include: The University of Melbourne, Australia; CDC Foundation, USA; Vital Strategies, USA; Johns Hopkins Bloomberg School of Public Health, USA; World Health Organization, Switzerland.

Civil Registration and Vital Statistics partners:

Vital Strategies

CDC Foundation
Together our impact is greater

THE UNIVERSITY OF MELBOURNE

For more information contact:

CRVS-info@unimelb.edu.au
crvsgateway.info

CRICOS Provider Code: 00116K

Version: 0119-02