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Fragmentation of mortality information systems in Lao PDR

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Abstract

Introduction: Civil registration and vital statistics (CRVS) systems in low-middle-income countries (LMICs) are not performing as expected in terms of completeness and quality of data. The primary obstacles identified were the lack of clarity on roles and duties within organizations, redundancy of some activities, and complex coordination between involved ministries. This led to a fragmented and non-integrated system with various inefficiencies and duplication in the documentation of the fact and the cause of death in the country. This study aimed to assess the information architecture for the recording and reporting of death events through the health sector in Lao PDR.

Method: We conducted a cross-sectional study to collect information from the existing mortality information systems in Lao PDR. A purposive sample was selected to collect data with relevant characteristics for the study in Vientiane Capital. We conducted informal interviews with key actors from the system to understand the architecture of each information system. Bizagi Modeller was used to visualize the flow of activities and stakeholders involved throughout the entire system.

Result: We discovered that there were multiple information subsystems in which death details were documented, such as health sectors, administrative offices, and others among them. The mortality information architecture was fragmented with a multiplicity of unconnected data silos. There is no mortality information sharing across the sectors. Lack of information sharing leads to duplication in the database as there is no single database containing all deaths in the country.

Conclusion: Lao PDR continues to struggle with integrating systems based on multiple government departments, which limits the capacity of statistical systems to provide timely and accurate mortality data. Our study demonstrates the significant potential to improve mortality information and further strengthen CRVS data by integrating existing subsystems that capture information about deaths, which presently function independently.

Introduction

Having accurate and up-to-date national vital statistics is essential for all countries as they form the foundation of population and socioeconomic policies. In the healthcare sector, reliable data on the number of births, deaths, and their causes is critical for decision-making, resource allocation, planning of health systems, and improving child welfare [1]. Functioning Civil Registration and Vital Statistics (CRVS) systems provide continuous, universal, and near real-time information about vital events such as births and deaths[2]. These systems also contribute to public administration and governance by offering individuals legal identity and civil status, allowing them access to basic services, entitlements, and opportunities[3]. Many countries in the Asia Pacific Region have incomplete or underdeveloped CRVS systems, which means that large portions of their populations are not included in official statistics. This is particularly true for marginalized populations, such as those living in poverty, rural areas, or conflict-affected areas[4]. They face a range of challenges, including inadequate funding, limited infrastructure, weak legal frameworks, lack of skilled human resources, and low public awareness of the importance of CRVS. These challenges often lead to incomplete or inaccurate data, which can undermine the ability of governments to plan and implement effective policies and programs[5].

To enhance mortality information systems, it is vital to have a comprehensive understanding of the distinctive characteristics, structure, and progression of the CRVS system in each country. It is crucial to comprehend the implementation and design of the CRVS system, as well as its interaction with the broader ecosystem[6]. Although all CRVS systems are connected to broader political, economic, social, health, and information systems, they are also integrated within sub-systems that focus on specific areas such as legal identity, civil registries, vital statistics, information technologies, and other related areas[7]. The CRVS system spans multiple sectors, which are frequently uncoordinated, resulting in isolated information systems and hindrances in data flow between them. As a result, vital events, including deaths, are not reliably recorded across various public and private institutions and databases, causing a vague comprehension of the mortality situation in the country[8].

To begin the process of integrating all sources of mortality data, it is necessary for countries to compile a comprehensive list of all potential sources of mortality information and to analyse how they relate to and interact with one another[9]. This study assessed the information architecture of the mortality information system recording death events information in the health sector in Lao PDR.

Methods

Study design

We conducted a cross-sectional study to collect information from the existing mortality information systems in Vientiane Capital, Lao PDR. A purposive sample was selected to collect data with relevant characteristics for the study. This included document reviews and informal interviews with key actors in the health system to illuminate the finding. In these maps, the sequence of activities is required to record the fact or the cause of death in each of the systems described.

Study setting

The study was conducted in Vientiane Capital, the capital city of Lao PDR which is located in the central region of the country. The city has a population of approximately 820,000 people and is the largest city in the country. Lao PDR's civil registration system is governed by the Civil Registration Law, which mandates the registration of all births, deaths, and marriages in the country. The responsibility for the registration of vital events is with the Ministry of Home Affairs, which operates a central registration system for births and deaths.

The Lao People's Democratic Republic (PDR) 2016-2025 CRVS strategy was approved and promulgated in 2017, to strengthen a death registration system that was capturing only 36.1% in 2018 with 7% of annual deaths occurring in healthcare facilities[10]. The government has been working to harmonize and integrate different systems into a national population register to improve the quality and completeness of mortality data. However, the completeness of death registration in Lao PDR is still low, and data quality is often unknown.

The mortality information system (MIS) is responsible for collecting data on deaths from all sources, including hospitals, health centers, and other healthcare facilities, as well as deaths that occur outside of healthcare facilities. The MIS is managed by the Department of Planning and Cooperation (DPC) within the Ministry of Health and is responsible for ensuring the quality and timeliness of mortality data in the country.

The MIS in Lao PDR has undergone significant improvements in recent years, with the introduction of electronic reporting systems and the integration of the MIS with other health information systems in the country. However, there are still challenges in the completeness and accuracy of mortality data in Lao PDR, particularly in rural and remote areas of the country where health facilities may be limited.

Data collection

The study team conducted informal interviews to gain an understanding of the architecture of the mortality information system and the roles of the different actors involved. The team visited various health facilities that were responsible for death notification and management at different levels, including central hospitals, district hospitals, and health centres. During these visits, the team discussed the processes involved in the management of death, with a particular focus on information architecture. This included an exploration of the types of documents and registrations used and how information was shared between different actors involved in the system.

We conducted document reviews to gain an understanding of the architecture of the mortality information system in Lao PDR and the roles of different stakeholders, including scientific publications, reports, and the guidelines involved in the system. Documents and books used to register the deceased were recorded and a soft copy was collected if available. A Microsoft Excel®-based standard data collection tool was utilized to gather information for this study, which aimed to describe the design of the various mortality-related subsystems and collect information about the documents and forms used in these subsystems.

Data analysis

The visualization tool was used to synthesize and systematically display the information collected in Lao PDR. To synthesize and systematically display the information gathered in Lao PDR, a visualization tool was employed. Specifically, Bizagi Modeller was used to visualizing the various activities involved in the system, across all sub-systems. This allowed for the creation of a comprehensive country-specific map that captured all stakeholders and their interconnections. The visualizations were analyzed to gain insights into the integration of the different information subsystems, as well as the flow of information related to a death event.

The analysis of visualizations was focused on understanding the integration of the different information subsystems and the flow of information related to a death event.

Results

We distinguished between deaths that occurred in the community and those that happened in healthcare facilities for the mapping since the routes to the records differed, and some additional bottlenecks were noticed.

Death notification

When a patient dies in a health facility, the medical staff will first confirm the death and ensure that all necessary medical procedures have been completed. They will then inform the family members or next of kin about the death and provide emotional support and counseling. The medical staff will then issue a death certificate, which is an official record of the person's death. The death certificate typically includes the person's name, age, cause of death, and other relevant information. The medical staff may also complete other administrative procedures, such as arranging for the transfer of the body to a mortuary.

When compared to someone who dies in the community, the family members or friends of the deceased will first confirm the death and then notify the local authorities or village chief. The authorities may include the police, health workers, or other community leaders. They may come to the location of the death to issue a death certificate and provide guidance on the next steps. They will also offer emotional support and counseling to the family members and friends of the deceased. The village chief shall issue a death notification form within five days of notification of death. If the cause of the death is unclear or was from a communicable disease, the village chief shall notify a public health officer.

Relatives or friends have the option of arranging funeral services, which can involve customary traditions and rituals. Furthermore, they are responsible for completing the necessary forms and providing the death certificate to register the death with local authorities.

In both settings, it is important to follow local customs and traditions related to death and funeral services. In addition, there may be specific rules or regulations related to death notification and funeral services that vary by region or community. It is advisable to seek guidance from local authorities or community leaders to ensure that all necessary procedures are followed.

Death registration

The registration of a death is typically done at the district office of the Department of Civil Registration. In order to register a death, the family members are required to visit the office in person and provide a set of documents that not only confirm the occurrence of death but also their entitlement to register it. This is often necessary to avoid any disputes related to inheritance, as registering the death is considered a prerequisite for obtaining the death certificate that provides legal benefits. Therefore, the civil registration officers in Lao PDR may request proof of death, such as a document from the medical professionals if the death occurred in a health facility, a letter from the local clerk, as well as a letter from the family members confirming the person who is registering the death is entitled to do so.

Death certification

A death certificate is issued upon request by the family members. To obtain a death certificate, the family members will be required to pay a fee, which is determined by the Department of Civil Registration. Once the fee is paid, a civil registration officer will enter the details of the deceased into the system and generate a printed copy of the death certificate. However, the certificate needs to be signed by the registrar, who may not be available at all times, leading to potential delays before the certificate is issued to the family members.

The Fragmentation of mortality information systems in Lao PDR

In the health sector, mortality data are typically collected by hospitals and health centres, which are required to report deaths to the Ministry of Health. However, reporting rates can vary depending on factors such as the availability of resources and the capacity of health staff. In addition, some deaths may be missed or not reported due to factors such as deaths occurring outside of health facilities or incomplete documentation. For example, Mahosot hospital is one of the central hospitals in Vientiane Capital, but there are several databases in the hospital containing information about deaths and causes of death but they are not integrated. It contained of paper and electronic systems, which makes it difficult to integrate.

The hoc systems (e.g. ICU notebook) or program related systems (e.g. maternal or child) promote integration. Even though they have 6-7 databases, the top 10 causes of death in the hospital are unknown. These different systems have different purposes but they do not share the objective of contributing to the overall database with death events. The combination of individual level records (e.g. notebook in the emergency room for death on arrival) with aggregate reports (e.g. the shared excel file) that are not connected and probably are not consistent. The details are described in figure 1.

Figure 1 Mortality information system in Mahosot hospital

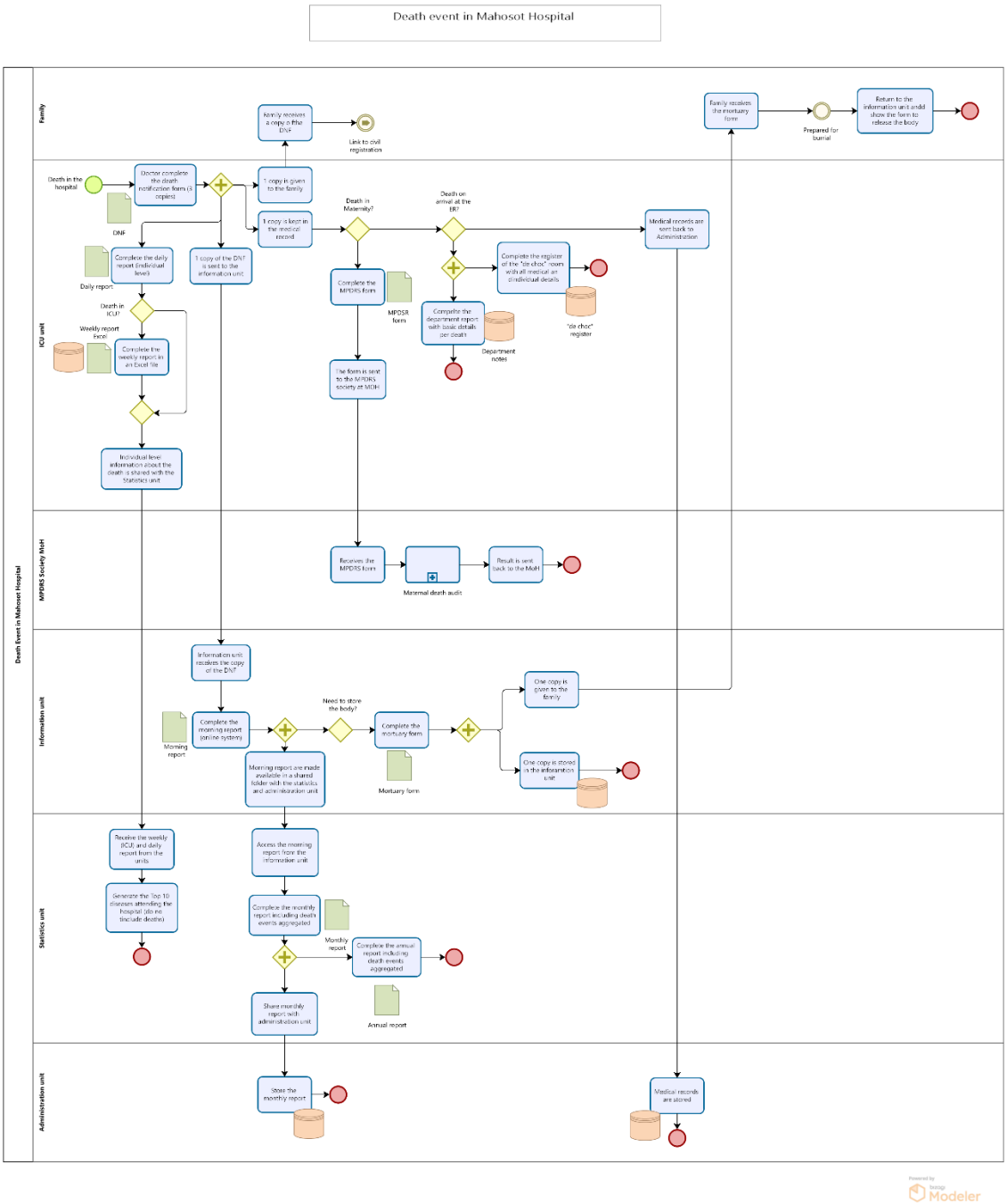
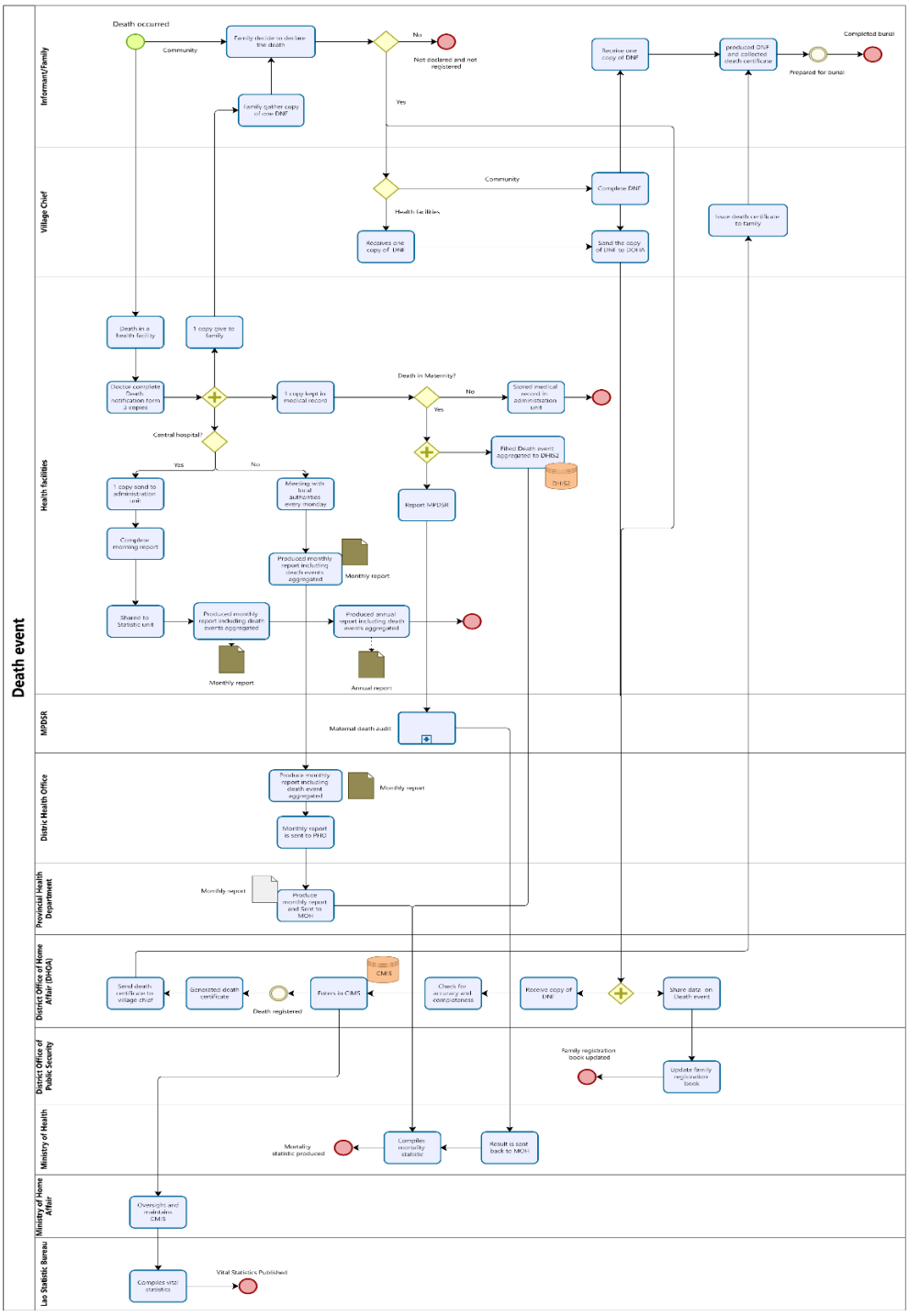


Figure 2 Mapping of mortality information in Lao PDR



We could not identify a single form of collecting information about the fact and the cause of death occurring in health facilities that followed international standards. Medical certification in hospitals and health centres is done using ad hoc forms and recording instruments specific to wards in the hospital (e.g., ICU death decertification form), health programs (e.g., maternal death forms), or purposes (e.g., death on arrival record in the emergency room).

Besides the Ministry of Health, the Ministries of Public Security and Home Affairs also compile statistics on mortality data. There is already considerable discord in the mortality information system due to the possibility that these organizations have varied reporting standards and do not always communicate their data with the Ministry of Health or other relevant authorities.

Discussion

Our study indicates that mortality information systems in Lao PDR are fragmented across various institutional silos and rely heavily on families to register death events. In the information ecosystem around mortality in Lao PDR, the family represents the central node, which acts as the main information hub. The lack of interoperability across subsystems forces the family to interact up to 3 times with the system to complete the registration of the death event.

Ineffective CRVS operations and passively awaiting completion of administrative procedures by families are two fundamental reasons for low vital event registration completion in low-middle income countries (LMICs). The lack of integration between these systems and their reliance on families to physically visit multiple times to register vital events has hindered efforts to improve the CRVS system. This results in bottlenecks as the responsibility for registering deaths partially remains on individuals and families who may be unable to complete the process. For example, during the COVID-19 pandemic, factors such as limited office hours and disruptions in rural outreach made it challenging for people to travel to offices and register vital events in multiple countries[11].

MCCDs provide information on the cause of death, which is necessary for identifying patterns and trends in mortality and for developing evidence-based health policies and programs. Standardized MCCD forms can help improve the quality and completeness of mortality data by ensuring that all relevant information is captured systematically and comprehensively[12]. This can be particularly important for ensuring that deaths due to preventable or treatable conditions are accurately recorded, which is essential for monitoring progress toward improving the health of populations. In addition, having an MCCD form that follows international standards can help to ensure that healthcare providers are trained in using a common approach to reporting deaths, which can help to reduce errors and increase the reliability of data.

The use of non-standard recording instruments to report deaths and causes of death, along with siloed mortality information systems and low-quality COD coding, poses a significant challenge to the mortality information system's ability to generate timely, accurate, and reliable evidence to support policy decision-making[13,14]. As a consequence, Lao PDR heavily relies on ad hoc household surveys to capture basic vital

statistics. The integration of different information systems within CRVS systems will not only be a technical challenge but systems one. However, the integration alone will not solve the challenge of increasing the completeness of mortality statistics. We believe it will be essential for countries to combine interventions and system redesign.

The Mortality Information System in Lao PDR needs to be integrated with the broader CRVS system to avoid negative consequences. These include inaccurate and incomplete vital statistics, inefficient data collection and management, limited data sharing and use, poor policy and program planning, and weakened institutional arrangements. To address these challenges, the government of Lao PDR, with support from development partners, is working to improve legal and regulatory frameworks, strengthen institutional arrangements, raise awareness and demand for registration, invest in infrastructure and technology, and improve service coverage. Implementing the Civil Registration and Vital Statistics Management Information System (CMIS) is also expected to address these challenges by modernizing and streamlining the registration and data collection process.

Conclusion/Recommendations

The fragmentation of the mortality information system in Lao PDR has significant implications for the quality and completeness of mortality data. Our study found that the system is fragmented, with multiple subsystems that operate independently, resulting in incomplete and inconsistent data. The lack of integration and coordination among stakeholders, including health facilities, the civil registration system, and the statistical office, further compounds the problem. The implementation of a unified and standardized mortality information system, along with improved coordination and communication among stakeholders, is recommended to address the fragmentation of mortality information in Lao PDR.

References

1. Mills S, Abouzahr C, Kim J, Rassekh BM, Sarpong D. *CIVIL REGISTRATION AND VITAL STATISTICS (CRVS) FOR MONITORING THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)*.

2. World Health Organization (WHO). Civil registration: why counting births and deaths is important. Published May 30, 2014. Accessed March 10, 2023. https://www.who.int/news-room/fact-sheets/detail/civil-registration-why-counting-births-and-deaths-is-important

3. Abouzahr C, Azimi SY, Bersales LGS, et al. Strengthening civil registration and vital statistics in the Asia-Pacific region: learning from country experiences. *Asia Pac Popul J*. 2012;29(1):39-73. doi:10.18356/a906ccf5-en

4. Economic and Social Commission for Asia and the Pacific (ESCAP). *Asia-Pacific Population Journal*. Vol 29. 1st ed.; 2014. www.unescap.org/appj.asp

5. Yokobori Y, Obara H, Sugiura Y, Kitamura T. Gaps in the civil registration and vital statistics systems of low- and middle-income countries and the health sector's role in improving the situation. *Glob Health Med*. 2021;3(4):2020.01103. doi:10.35772/ghm.2020.01103

6. World Health Organization. Regional Office for South-East Asia. SEA/RC67/9 - Covering every birth and death: improving civil registration and vital statistics (CRVS). WHO Regional Office for South-East Asia. Published online 2014. Accessed March 16, 2023. https://apps.who.int/iris/handle/10665/129387 Document number

7. de Savigny D, Riley I, Chandramohan D, et al. Integrating community-based verbal autopsy into civil registration and vital statistics (CRVS): system-level considerations. *Glob Health Action*. 2017;10(1):1272882. doi:10.1080/16549716.2017.1272882

8. Cobos Muñoz D, de Savigny D, Sorchik R, et al. Better data for better outcomes: the importance of process mapping and management in CRVS systems. *BMC Med*. 2020;18(1):67. doi:10.1186/s12916-020-01522-z

9. Carter KL, Rao C, Lopez AD, Taylor R. Mortality and cause-of-death reporting and analysis systems in seven pacific island countries. *BMC Public Health*. 2012;12(1):436. doi:10.1186/1471-2458-12-436

10. Đoković Z. Snapshot of civil registration and vital statistics systems of Laos. Published online 2021. https://idl-bnc-idrc.dspacedirect.org/handle/10625/60279

11. Cobos D. *WHO Verbal Autopsy Instrument Verbal Autopsy Implementation and Application*.; 2022.

12. Akhade SP, Dash SK, Akhade KS. The knowledge assessment and reducing the errors of medical certificate of cause of death with sensitization training of physicians: A quality improvement intervention study. *J Educ Health Promot*. 2022;11:19. doi:10.4103/jehp.jehp_502_21

13. Jeblee S, Gomes M, Jha P, Rudzicz F, Hirst G. Automatically determining cause of death from verbal autopsy narratives. *BMC Med Inform Decis Mak*. 2019;19(1):127. doi:10.1186/s12911-019-0841-9

14. Mikkelsen L, Moesgaard K, Hegnauer M, Lopez AD. ANACONDA: a new tool to improve mortality and cause of death data. *BMC Med*. 2020;18(1):61. doi:10.1186/s12916-020-01521-0