

IHME develops fast, affordable ways for countries to better identify causes of death in populations

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New research by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington shows that innovative and improved methods for analyzing verbal autopsies – a method of determining individuals' causes of death in countries without a complete vital registration system – are fast, effective, and inexpensive, and could be invaluable for countries struggling to understand disease trends.

While many high-income countries such as the United States, Canada, and Australia have death certification systems, many countries cannot afford these systems, which means causes of death are not officially recorded. As a result, these countries lack critical information about why people are dying and which risk factors contribute to those deaths, as they attempt to track and address [health](#) challenges.

Verbal autopsy (VA) consists of a trained interviewer using a questionnaire to collect information about the signs, symptoms, and demographic characteristics of a recently deceased person from an individual who knew them. Methods used to analyze interviews and assign a cause of death include physician certification, whereby physicians review each questionnaire to assign a cause, and new automated methods where the VA interview is conducted on a hand-held device and a cause of death is automatically generated at the end of the interview. Until now, there has been no clear evidence as to how accurate the methods were, and some methods such as the physician

review were costly and time consuming.

A new collection of research published in the *Population Health Metrics* thematic series, Verbal autopsy: innovations, applications, opportunities, provides the most up-to-date research in the field, including the use of a new automated tool to do the analysis instantaneously at the completion of the interview. Yielding fast and affordable results, this new automated method outperforms any other method to date.

"Accountability is becoming increasingly important to both governments and funders as they try to allocate resources and measure success," said Dr. Christopher Murray, Director of IHME and Professor of Global Health at the University of Washington. "With the new innovative methods outlined in our research, countries can now choose the best and most cost-effective verbal autopsy techniques to better monitor progress toward health and development goals."

The Random Forest method, developed by IHME, performed better than physician review, which traditionally has been seen as the gold standard, and is also cheaper and provides faster results.

The Random Forest method was more accurate than physicians in assigning the correct cause of death to individual VAs for adults and children older than 28 days. For VAs on adults, the Random Forest method performed 27% better than physicians when there is no accompanying medical information from those interviewed. In cases where there is additional information, the Random Forest method was better by 8%. For VAs on children older than 28 days, the Random Forest method performed 28% better than physicians with no additional medical information and 8% better for VAs including other information.

"While it may take days for a team of physicians to complete a VA survey analysis, requiring them to stop servicing health needs in a

population, a computer approach such as the Random Forest method requires only seconds of processing on hardware that is currently affordably available," said Dr. Abraham Flaxman, lead author of the Random Forest study and Assistant Professor of Global Health at IHME. The Random Forest method can be used on a hand-held device with the cause of death automatically generated at the conclusion of the interview.

"Understanding causes of deaths is a public health priority especially in low-resource settings such as Uganda where most deaths occur at home and no regular system for cause of death registration exists," said Dr. Peter Waiswa of the Department of Health Policy, Planning and Management at Makerere University School of Public Health in Uganda. "We have wanted to use verbal autopsy to bridge that gap. However, available methods are cumbersome, data collection is time consuming, and coding by physicians is not always done correctly, or there is no physician available, so these new automated methods are a real breakthrough."

"This is a major discovery and we are excited about the possibilities," said Dr. Palitha Mahipala, Additional Secretary, Medical Services at Sri Lanka's Ministry of Health. "Nothing can replace a complete and efficient vital registration system. But as countries work to implement or improve those systems, the new methods in verbal autopsy are ready now, at low cost, and with rapid results. This allows us to better understand cause of death trends and to measure program performance."

"Even in countries with vital registration systems, this is a tremendous benefit," said Jarbas Barbosa da Silva Jr., Secretary of Health Surveillance at Brazil's Ministry of Health. "This is a way to validate whether your death certification system is accurately classifying deaths."

The research published in the *Population Health Metrics* thematic series

emerged from the Global Congress on Verbal Autopsy: State of the Science, held in Bali, Indonesia, in February 2011. The conference was co-sponsored by IHME, the University of Queensland School of Population Health, and Population Health Metrics to discuss important aspects of instrument design, analysis methods, and the use of verbal autopsy in national health information systems, with the goal being to take VA methods from infancy to maturity, so that countries that needed them could start using them right away.

"This body of work is by far the biggest breakthrough in years in this field," said Alan Lopez, one of the Editors-in-Chief of Population Health Metrics. "For the first time, countries will be able to measure with confidence whether people are dying from HIV/AIDS, maternal causes, or from largely preventable noncommunicable diseases, which gained the world's attention at the recent United Nations meeting."

As part of this work, IHME researchers developed standardized metrics to compare the performance of all types of VA methods to help identify the best ways to estimate causes of death in a population. IHME researchers also helped to create the first strictly defined gold standard database of diagnoses for causes of death to test VA methods, validated over five years in four countries with large populations, including India, Mexico, the Philippines, and Tanzania.

Provided by Institute for Health Metrics and Evaluation

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