Systematic Review of eCRVS and mCRVS Interventions in Low and Middle Income Countries

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
APAI-CRVS	Africa Programme on Accelerated Improvement of CRVS
BIRDS	Birth and death registration system
BRIS	Birth registration information system
CAPMAS	Central Agency for Public Mobilization and Statistics
CDC	Centers for Disease Control and Prevention
COD	Cause(s) of death
CoIA	Commission of Information Accountability for Women's and Children's Health
CPR	Central Person Registry
CR	civil registration
CRO	civil registry office
CRS	civil registration system
CRVS	civil registration and vital statistics
CS	civil status
CSB	Citizen Service Bureau
eBDM	electronic birth death and marriage
eCRVS	electronic computer technologies for CRVS
eIMMR	electronic Indoor Morbidity and Mortality Reporting system
ERP	enterprise resource planning
HDSS	Health and Demographic Surveillance System
HIS	health information system(s)
HISP	Health Information Systems Programme
HMIS	health management information system(s)
HMN	Health Metrics Network
HRS	Household Registration System
ICD	International Classification of Diseases
ICT	information and communication technology
ID	identification number
INSTAT	Institute of Statistics
IS	information system(s)
IT	information technology
ITU	International Telecommunication Union
MBR	mobile birth registration
MCD	Municipal Corporation of Delhi
mCRVS	mobile phone technologies for CRVS
MCTS	Mother and Child Tracking System

MDR	maternal death review
MOVE IT	monitoring of vital events using information technology
MVG-Net	Millennium Villages Global Network
MVP	Millennium Village Project
NCR	National Civil Register
NDG	Nokia data gathering
NORAD	Norwegian Agency for Development Cooperation
NRHM	National Rural Health Mission
OLIR	online institutional registration
SAISE	State Automated Information System "Elections"
SRS	Sample Registration System
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
VA	verbal autopsy
VS	vital statistics
WHO	World Health Organization

SECTION 1. **BACKGROUND**

1.1 DESCRIPTION OF THE PROBLEM

The problem addressed in this systematic review is concerned with the broad domain of information systems (IS) for Civil Registration and Vital Statistics (CRVS), and how they have been influenced, or have the potential to be influenced, by information and communication technology (ICT)-based interventions. Civil Registration (CR) is defined by the United Nations as the universal, continuous, permanent and compulsory recording of vital events provided through decree or regulation in accordance with the legal requirements of each country *(1)*. Vital Statistics (VS) represents the statistical output of a well-functioning CR system *(2)*. CR includes births, deaths, marriage, divorce, fetal death, annulment, judicial separation, adoption, and through the registration process these events are made legitimate. The focus of this report is on births and deaths, their registration and generation of VS.

There are three broad parameters which define the scope of this study. One, we define ICT interventions as those based primarily on computer or mobile technologies, called **eCRVS** and **mCRVS** interventions respectively. Two, while CRVS includes systems for births, deaths, marriages, divorces and other events, in this review, the focus of this report is primarily on births and deaths. Three, the focus is primarily on low and middle income countries to study these interventions.

In the context of low and middle income countries, CRVS systems have traditionally been weak, in terms of both coverage and quality of data. This weakness has led to CRVS systems being described as a "scandal of invisibility" *(1)* adversely affecting both systems of mortality and more broadly of poverty reduction. It is further argued by Setel et al. *(1)* that various affordable remedies potentially exist for addressing the identified challenges, and these need to be urgently implemented. Amongst these identified remedies, are technology-based interventions for developing alternative registration systems and sources of data for vital events and causes of death (COD). As a result, globally, there have been various technology-based interventions that have been initiated seeking to strengthen CRVS systems. As an example, the Health Metrics Network (HMN) has initiated in 2008, a number of pilot projects under the framework of MOVE IT (Monitoring of Vital Events using Information Technology) to test the efficacy of strengthening CRVS using IT.

The problem addressed in this review is to specifically understand the potential and its materialization practically of applying eCRVS and mCRVS initiatives to strengthen CRVS

systems. This leads to understanding examples of innovations, what characterizes them as innovations, and the potential they have for being scaled from pilot to national systems, and further across countries.

1.2 DESCRIPTION OF THE INTERVENTION

eCRVS and **mCRVS** represent technology-based interventions seeking to improve the quality and coverage of CRVS systems. In understanding the scope of what eCRVS or mCRVS covers, two dimensions are important – technology and the domain of application. With respect to technology, the "e" refers broadly to electronic computer-based applications, but extended to also include digitization and scanning technologies. The "m" refers to mobile phone-based interventions. The distinction between eCRVS and mCRVS is important to understand, as the latter is a much more recent phenomenon, and thus our knowledge and experience in this domain are relatively limited compared with eCRVS. Often, eCRVS and mCRVS are spoken of in the same breath under the umbrella of "ICT-based systems". While computerization of CRVS has been around for years, even in the context of low and middle income countries, what is new today is how systems are becoming increasingly interlinked with databases that are able to speak to each other, for example in Albania where the population register and CR databases are linked. Such interlinking was not technically possible in the time of stand-alone systems. The possibility of server-based deployment and interlinking of databases also then allows national databases to connect with registration offices in districts and sub-districts, creating the technical ability for the sub-national offices to register and issue certificates. Furthermore, health institutions recording births can now potentially transmit the name-based records pertaining to a birth or a death electronically to the civil registry offices to register the event.

Mobile technology further brings in new possibilities in terms of extending the geographical and temporal access to databases, and enabling events taking place in remote areas to directly communicate with databases located elsewhere. The possibilities that are being created