



## Millennium Villages Project: ChildCount+ : A Community Health Events Reporting and Alerts System- A Concept Paper

"To make people count, we first need to be able to count people." -- Dr LEE Jong-wook, Former Director-General WHO (2004-2006)

### A. Background

Reducing child and maternal mortality, by 66% and 75% respectively, have been identified as core Millennium Development Goal (MDG) targets. In much of sub-Saharan Africa, 10 to 20 percent of children die before turning five, and the death of mothers during childbirth, a rare event in industrialized countries, occurs far too frequently.

There is substantial evidence documenting the positive effects of a range of simple and cost-effective interventions on maternal and child survival - including vaccinations, oral-rehydration therapy, insecticide-treated bednets alongside strengthening health systems to improve antenatal care, safe delivery and the integrated management of sick children [1-4]. However, their wide-scale application in areas of the world that need it most remains insufficient.

In the sub-Saharan African context, numerous challenges hamper progress towards rapid gains in maternal-child survival. First, weak and deeply under-financed health systems have been unable to introduce and sustain the delivery of critical interventions [4]. Second, factors such as user-fees, distance, and transport create significant access barriers. It is estimated that over a 100 million people fall into poverty each year due to out-of-pocket health expenses [5]. Finally, the limited availability of accurate and timely health information has made it difficult to track the progress of interventions and identify coverage gaps [6].

The Millennium Villages Project (MVP) seeks to address these limitations. MVP involves the coordinated delivery of a package of proven health and development interventions at the village-level among 14 diverse sites in 10 sub-Saharan African countries [7]. The aim of the project is to rapidly accelerate progress towards the MDG targets over a 5 to 10 year period. In the health sector, MVP emphasizes **integrated delivery of free minimum package** of maternal-newborn-child health services, with goal of achieving **universal coverage** through inputs to referral hospitals and primary care clinics, alongside providing direct support to households through a cadre of paid-professional community health workers.

CHWs are an important link between the health sector and the community [8], and there is substantial evidence suggesting they can be effective vehicles for reducing maternal and child mortality and improving health outcomes [3, 9, 10]. A randomized trial in the Gambia demonstrated a 61% reduction

in neonatal mortality after traditional birth attendants were trained [11]. Other more recent cluster randomized trials [2, 12-14] and controlled trials [15-17] have also documented pronounced benefits of CHW programs on reducing neonatal, perinatal and maternal mortality.

In the MVP context, CHWs are salaried secondary school graduates generally from the local community who are trained in a minimum set of core competencies. There are nearly 800 CHWs across the 14 MV sites. Depending on geography and population density, there is a ratio of approximately 1 CHW for every 100-200 households, with each household is visited at least on a quarterly basis. By taking health care from the clinics directly to vulnerable households, the project hopes to demonstrate improvements in disease prevention as well as in the early detection, treatment and referral of sick individuals.

While CHWs can play a critical role in facilitating coverage with life-saving interventions, they also have the potential to provide the vital feedback of household-level health information. As part of their household screening visits, CHWs have the potential to generate a host of program-relevant information including: the registration of community health events including recent births and deaths; the burden of illness such as acute malnutrition or malaria; and levels of coverage with essential interventions such as immunizations, antenatal care and skilled delivery.

This collection of household level information can be greatly facilitated by new advances in mobile communications technology. Within each MV site, each CHW is provided with a cell phone. Through a partnership with Ericsson, nearly all Millennium Villages have achieved high levels of cell phone coverage. The MVP has been piloting the use of electronic mobile phone-based systems for the collection of health related information in a number of sites. For example, in Sauri, Kenya the 'ChildCount System' has allowed over 90% of children under 5 years of age to be electronically registered and routinely monitored through an SMS (text message)-based reporting and monitoring system for nutrition, immunization, malaria, and other signs of childhood illness (See [www.ChildCount.org](http://www.ChildCount.org)).

The widespread use of CHWs to facilitating this 'real-time' collection of household level data in remote rural African settings has not been previously attempted. This proposal outlines a novel application of the mobile-technology to guide the targeting of public health interventions. The central *aim* of the proposed ***MVP-Community Health Events Registry and Alert (CHILDCOUNT+) System*** is to facilitate reductions in child and maternal deaths as well as early detection, referral, and treatment for target risk signs.

The *objectives* are as follows:

1. To develop and implement a community health events reporting and verbal autopsy system for CHWs
2. To develop and implement two-way mobile phone-based community health events reporting, feedback, and illness alert system to monitor and manage follow-up for births and deaths; pregnant women and newborns; children under 5 years; and adult illnesses such as HIV, TB, malaria, and other chronic non-communicable diseases.

3. To develop tools and reporting formats and structures to better enable the use of data for active case management and decision-making as well as performance monitoring of health workers

Potential outputs of this work include a scalable model for the delivery and monitoring of household level delivery of critical maternal-newborn-child health interventions that is appropriate and relevant to regions of the world where effective strategies to address health-related MDGs are urgently required.

## **B. Description of project objectives**

1. ***To develop and implement a community health events reporting and verbal autopsy system for CHWs***
2. ***To develop and implement two-way mobile phone-based community health events reporting, feedback, and illness alert system to monitor and manage follow-up for births and deaths; pregnant women and newborns; children under 5 years; and adult illnesses such as TB, malaria and non-communicable diseases***

Community health events monitoring, which would include a Verbal Autopsy system for all maternal-child deaths, has been put forth as a key strategy to address the information-intervention nexus within the Millennium Villages Project. The hypothesis is that timely information on the burden of disease alongside better understanding patterns of preventable mortality and challenges faced in accessing care has the potential to critically inform the targeting and delivery of interventions. By building upon existing site personnel and resources, a low-cost **MVP-CHILDCOUNT+ System** is being developed to test this hypothesis. The proposed system has a number of different components which will be outlined briefly below.

- i) Community Health Workers (CHWs) and CHW Coordinators: In all MVP sites, CHWs have been introduced to maximize the delivery of health information and services to households in the project clusters. There currently a ratio of 1 CHW to every 100-200 households, with household visits taking place at least quarterly. CHWs are supported by the CHW Coordinator who is in-turn supported by Health Coordinators (doctors or allied health professionals), and provide a spectrum of health interventions to target households.
  - The CHW Coordinator will be responsible for overall integration of the paper-based and electronic system into the CHW Program in each site as well as using the data generated to improve outreach activities in the communities.
  - The CHWs will be responsible for data capture and follow-up at the household level. As part of its overall Health Services Delivery Systems and Monitoring and Evaluation, the Millennium Villages Project is further developing the functionality and expanding ChildCount (see [www.childcount.or](http://www.childcount.or)) beyond children under 5. **ChildCount+: A Community Health Events Reporting and Alert System** will integrate with existing

information management systems and catalyze action around the following community health events:

- Births and Deaths
- Under 5 Child Health Events: newborn checks, nutritional Status, presence of diarrhea, immunizations and the presence of danger signs[MDG 4]
- Pregnancy-related events including antenatal care visits and institutional deliveries [MDG5]
- Presence of HIV, TB, malaria [MDG6] as well as other chronic conditions

ii) Mobile phone-based health information system: All CHWs in a cluster will have access to a mobile-phone based communication system for the reporting of community health events. This platform will allow reporting of events through SMS (RapidSMS) or structured questionnaire (JavaRosa) by a CHW to be transmitted instantly to a centralized database (MGV-Net), which will then through an algorithm-driven system provide feedback and/or guidance on appropriate action to be taken- whether to treat/monitor in the home, refer to a facility, and/or activate the emergency toll-free number. This system will be linked by client ID to the facility-based electronic medical record system-namely OpenMRS, so that all community-entered information will be available to care providers. While all sites will initially begin with paper-based data collection, it is the intention to implement this component as quickly as possible across all sites. eHealth Specialists, Database Managers, and a roaming team of technical support providers will be strategically engaged and deployed based on the needs and conditions of each site.

iii) OpenMRS and Unique ID system: It is important to be able to uniquely identify persons within the Millennium Villages as well as those who attend MVP clinics or otherwise use MVP services. Up to now, the only unique identifiers were those used by the research villages which were not available for public use. As part of the ChildCount+ and MGV-Net systems, OpenMRS will generate a unique 6 digit alpha-numeric ID which can be used throughout the villages. It was designed to be short enough to be entered using a mobile phone, yet produce enough unique numbers to cover the entire MVP cluster in each site. OpenMRS will also be used as the primary database for collecting all facility-based, person-specific data in the cluster, allowing for continuity of information from the community all the way up to the district health office and the Ministry of Health.

iv) Verbal autopsy specialist: When a death is alerted through the ChildCount+ system, the VA specialist, a non-clinical health worker specially trained in the VA methodology, will be deployed to conduct a verbal autopsy at the household level to collect information on the basic cause of death. Depending site capacity, VAs will either be conducted by a single VA Specialist or a by Senior CHWs (there is one Senior CHW for every 5 junior CHWs). It is anticipated that VAs will visit households within 2-6 weeks after a death has taken place. Standardized VAs have been

developed for use at all MVP sites, with separate forms for adults/maternal deaths and for children. These modified VAs (paper-based data capture) have two main components:

- Medical Cause of death: this has been derived from VA tools that have been previously validated to assess signs and symptoms experienced by the deceased in the time preceding death. The module consists of both close and open ended sections as per best-practice guidelines.
- Social autopsy: a specific module has been developed for the MVP sites, and included details regarding the social circumstances surrounding death. It includes information on health seeking behavior, access barriers to health care, communication, transport, and economics.

All VA forms will be entered into a computerized data base monthly, and subject to an algorithmic assessment of the medical cause of death as well as social circumstances surrounding the death. The medical cause of death algorithms are established, valid techniques for determining the probable cause of death and can be easily adapted or appended for local context. This innovation eliminates the need for dual physician-based assessments, which can be both expensive and create a long time delay in generating 'real time' information for program managers.

***3. To develop tools and reporting formats and structures to better enable the use of data for active case management and decision-making as well as performance monitoring of health workers***

The broad aim of this system is to improve the quality of care, and optimize the targeting and delivery of essential health services. The ChildCount+ system will provide the basis for longitudinal information tracking at an individual and household level within the Millennium Villages. Integrated with an existing platform known as the Millennium Global Village-Network (**MGV-Net**), ChildCount+ will take advantage of the multilingual, multinational, open source information system being implemented throughout MVP. Capturing information via paper, mobile phones and computers will bring together information from community, clinic and referral centers to provide an overarching view of health within the villages.

Three key components will allow this information to be used to inform decision making. These include an 'alert' system for critical events; the development of a platform for quarterly reporting of aggregate indicators, and; a process of using them to inform service delivery known as 'Community Morbidity and Mortality Rounds'.

- i) Alert system: As each individual has a unique identification number, the system has the capacity to facilitate 'alerts' which are text messages sent to CHWs to help target service delivery. For example, these might signal the need for follow-up of a severely malnourished child, that a clinic patient has a lab value that requires a return visit to the clinic, or that a recently delivery has taken place and a neonatal check is required. This will be an addition to log-books that have been developed to facilitate household and patient-based tracking.

- ii) Community-Based Reporting and Aggregate Indicators: It is critical that information collected in the community is available to local decision-makers to facilitate planning and service delivery. To achieve this goal, reporting and visualization tools will be provided as part of the ChildCount+ and MGVS-Net implementation. Using basic reporting tools such as MS Excel and Pivot tables, in addition to standard reports, the system will allow local users with appropriate privileges to view important information at the touch of a button. In addition, standard performance indicators that are reported to MVP on a quarterly basis will be automatically calculated for entry into the web-based centralized data system.
  
- iii) Community Morbidity & Mortality Rounds: the principle intent of the VA module within MVP-ChildCount+ system is to generate information on the cause and social circumstances surrounding treatment delays and death to inform and improve the delivery of health and development interventions on the ground. Monitoring information as well as data collected on cause of death will be compiled and form the basis of a community 'morbidity and mortality rounds' – which will be coordinated between the MVP Health Coordinators, CHW Coordinators, clinic staff, VAS, and the CHWs. These meetings will provide a forum for engaging with the medical and social autopsy data with appropriate recommendations being made regarding the introductions of new health programs, modifications in the delivery or targeting of existing health programs, or the need to liaise with other sectors such as infrastructure, education or nutrition to address other remediable concerns.

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