Online System Development and Maintenance of MCA-Indonesia's Sentinel Sites Monitoring for Health and Nutrition Project

FACT SHEET

BACKGROUND

Despite impressive economic growth in recent years, Indonesia has the fifth highest number of stunted children in the world (7.6 million), and millions more are underweight or wasted. The country is committed to addressing the poor nutrition situation, yet suffers from a lack of reliable and timely information from which decision makers can design effective policies and programs. The Indonesian Ministry of Health is committed to strengthening nutrition surveillance and is working to identify new tools and creative solutions to collect accurate and timely health information in order to improve health outcomes.

PROGRAMMATIC PURPOSE & APPLICATION

Under the current Compact between the Millennium Challenge Corporation of the United States and the Government of Indonesia, MCA-Indonesia is supporting the Community-Based Health and Nutrition Project (CBHN) with the goals of reducing childhood stunting and improving additional maternal and child health indicators. To ensure high-quality project assessments and supplement Nutrition Project implementer data with localized, real-time updates specific to project interventions, the MCA-Indonesia M&E Team committed to developing an all-inclusive monitoring program for sentinel sites, developed by University Research Co., LLC (URC), which would then be transferrable to national programming. Sentinel surveillance systems are an effective public health tool for monitoring diseases and health indicators, including nutrition; sentinel networks, linking participating sites to centralized data collection, are particularly helpful in monitoring health indicators.

Goals and Objectives

In 2016, MCA-I selected URC to develop a Sentinel Site Monitoring Program which was implemented in 100 sentinel sites in 11 provinces across the country. The overall goal of this project was to provide a comprehensive system for data management related to the first 1000-day life of a child; objectives included:

◆ Develop an online database system and semi-online desktop application that can generate relevant, reliable and real-time data

◆ Develop training modules for midwife data collectors

◆ Install the developed application onto MCA-I laptops for each midwife

◆ Migrate existing data from health facility records to the online system

◆ Maintain the database, manage the data, and assist users

◆ Generate data reports to MCA-I throughout the data collection period

SYSTEM CAPABILITIES

URC developed a web-based *Demographic Health Surveillance System* (DHSS) with offline capabilities which enhances accessibility of real-time data at all management levels, promotes data use for decision making, and invites coordination of health program activities. This system supports system managers to track critical indicators including provider compliance, patient adherence, and other indicators in the MCC-ITT and GOI health frameworks. Furthermore, using established client IDs facilitates stronger linkages with current health records and synchronization

Key System Design Considerations

1. Compatibility

Operates and communicates with other data collection and management systems utilized by the MOH

2. Extensibility

New capabilities can be added without major changes to the underlying architecture

3. Fault-tolerance

Resistant to and able to recover from component failure

4. Maintainability

Bug fixes and functional modifications can be easily accomplished; product of modularity and extensibility

5. Modularity

Comprises well defined, independent components to form a desired software system

6. Reliability

Consistently performs required functions under normal and stressful settings

7. Reusability

Applicable to other projects with no or slight modification

8. Robustness

Operates under stress or tolerate unpredictable or invalid input

9. Security

Withstands hostile acts and influences

10. Usability

User-friendly for MCA-I project managers as well as local health teams and midwives

11. Performance

Performs tasks within a user-acceptable time without consuming excessive memory

12. Portability

Can be installed on multiple platforms and used in on- and off-line settings

13. Scalability

Adapts well to increasing data or number of users

Under the Sentinel Site Monitoring Project, URC created an online Demographic Health Surveillance System for electronic data recording, monitoring, evaluation, and reporting. This tool provides a platform to collect multiple sources and types of data, improve health record keeping, easily access real-time data reports and dynamic visualization, and study indicators including prevalence/ incidence rates and longitudinal trends.

with other health and social monitoring systems. A flexible reporting module allows the program personnel to analyze data at any time using a user-friendly interface for data visualization and the system programming code, SQL, is open-source for managers to adapt the system to their needs.

Developing a Monitoring System

Since project inception, URC has worked closely with MCA-I and Ministry of Health counterparts to conceptualize and develop the DHSS database and application. The system applies a combination of two approaches: (1) moving the data input, process, and output to an online platform; and (2) making a direct link between target population data and the statistics of interest, such as services, demographic events, and health events. This direct link allows system managers to study rates and statistics of the focus population while the online platform ensures the generation of real-time data and capability to monitor longitudinal data trends. The application URC is hosted on a cloud server and entered data is automatically uploaded when an internet connection becomes available. Collected data is stored in a panel database to pull necessary indicators when queries are made, displaying the appropriate records and data through a user-friendly interface.

Data Collection

Data at the Sentinel Sites was collected at four levels: (1) Rapid census of households to construct a baseline for the target population; (2) Cyclical household visits to update community and population demographic data; (3) Routine statistics of health services; and (4) surveys of specific health topics of interest. Village midwives were recruited by MCA-I to collect routine data at health facilities and field facilitators were recruited to collect household data. URC installed the system application on Field Facilitators' and midwives' laptops and created user-friendly guides and installation software for further growth and system updates beyond the project.

In order to monitor changes in key health and nutrition program indicators, the system collects household and clinic data, including household level demographic characteristics and socio-economic status, demographic and health events, maternal and child nutritional anthropometric status, child morbidity, health and sanitation behavior, exposure to and source of health communication messages, and maternal, neonatal and child health services. With this system design, program managers can monitor nutrition-related behaviors as well as health services. A geo-tagging component allows program managers to monitor data collection activity and pinpoint locations suffering from increased health risks.

Rapid Census

In 2017, a rapid census of households was conducted to collect core data of households, including: Household and household members identification, household GPS location, Household member Name, Date of birth, Sex, Relation to Household Head, Relation to Family Head. This census allowed the team to build a cohort of individuals to track over time using unique IDs, leading to the construction of a target population and household database.

Cyclical Updates

The DHSS application incorporates cycles of demographic data after the first rapid census visit, with data collection conducted by field facilitators on indicators for demographic, socioeconomic, and sanitation/behavior data. Routine cyclical updates should be conducted every 90 to 180 days to account for key shifts in population changes, dependent on program capacity. The application includes questionnaires for data collectors

Illustrative CBHN Program Indicators

- ◆ Participation in nutrition SBCC activities at the village level
- ◆ Coverage of iron folic supplements among pregnant women
- ◆ Coverage of micronutrient supplements among children
- ◆ Household hygiene and sanitation behavior
- ◆ Immunization status for mothers and children
- ◆ Contraceptive use status among reproductive age women
- ◆ Maternal and child anthropometric status
- ◆ Prevalence/ incidence of childhood morbidity
- ◆ Maternal and early childhood mortality.

to enter information directly into the system and upload it as soon as there is an internet connection. A pre-defined set of algorithms then update the population and household databases by evaluating demographic events that occurred since the previous visit, including: marital change, pregnancy, pregnancy termination, death, and in- and out-migration.

Routine Health Service

The URC team, in coordination with MCA-I and a local partner, imported data from thousands of mother and child health cards from Sentinel Sites to transform health record keeping at these sites to the online system. Nearly 18,000 mother and child cards were uploaded to the DHSS server and the midwives can access this information to update mother and child health records. Through a semi-online desktop platform URC developed for midwives to input data on provided laptops. Midwives can record data both online and offline; any data collected offline is saved and uploaded to the database server when internet connection is re-established. Initially, URC provided a system administrator and data manager to manage data that is uploaded daily by midwives. Midwives retrieve client information for health visits using a household ID number, and the online system can recall the client's data using name and date of birth if the client does not have their ID.

Surveys

In designing the DHSS, URC built in a module to improve the capacity to conduct health surveys and receive data from several survey modules. The system application can facilitate selection of random sample of households or household members, and ease data collection by providing electronic questionnaires and linking data directly to the system database for recall and reporting needs. This has been used for multiple surveys on topics including exclusive breastfeeding, nutrition, and child morbidities.

Data Presentation

The URC team has worked to ensure the availability and appropriate presentation of population, household, survey, and individual health data through the DHSS. We developed an executive dashboard – accessible at http://dashboard.dhssproject.id – through which dynamic data visualizations and data reports are available. Pulling information from the panel databases, the system produces standard summary reports and dynamic data visualization as well as more specific information using querying functions. Data is generated and displayed for routine health program indicators, health care access and utilization, and demographic and socio-economic characteristics. Cohort data is captured and displayed longitudinally to better capture intervention impact.

TRANSITION TO GOVERNMENT INSTITUTION UTILIZATION

The DHSS is designed to function beyond the life of the project, addressing the larger gaps impacting local data monitoring, evaluation, and management to promote data-driven decision making. This system, built to adapt to other inputs and frameworks, is highly advantageous in multiple areas. Midwives trained under the project have been encouraged to utilize the system for their benefit as well as the benefits to the health system, and the current DHSS application is already providing real-time information helpful to community-based health programs. URC has provided all system hardware and software, including server management tools, to the MOH for ownership transition. The Ministry of Villages is also interested in adapting the DHSS to monitor local health financing expenditures and correlations to improved health outcomes.
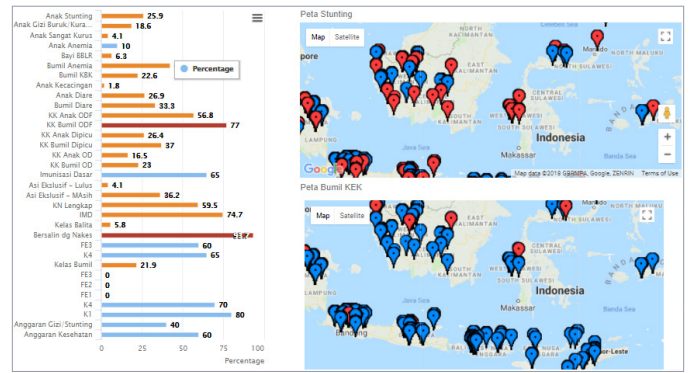
Figure 1: DHSS Presentation of National Level Data

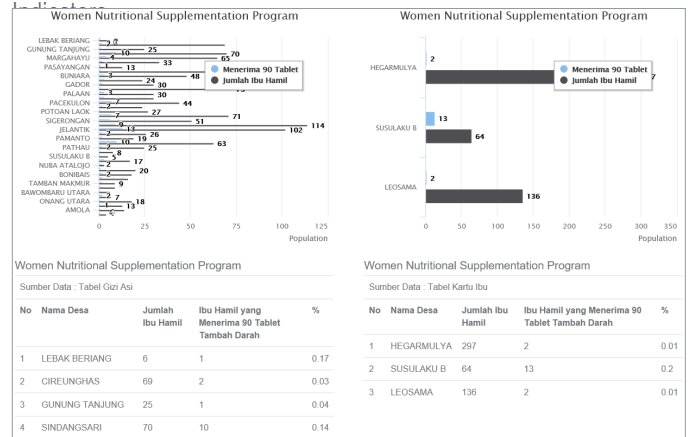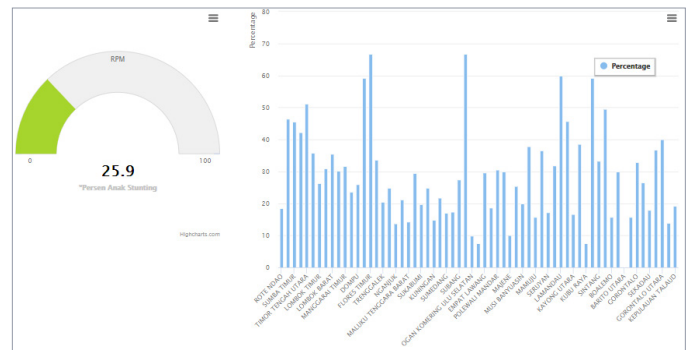Figure 2: DHSS Presentation of Maternal Nutritional Program Indicators

Figure 3: DHSS Presentation of Provincial Level Data

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