Brief report

The Benin experience: How computational modeling can assist major vaccine policy changes in low and middle income countries

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ABSTRACT

While scientific studies can show the need for vaccine policy or operations changes, translating scientific findings to action is a complex process that needs to be executed appropriately for change to occur. Our Benin experience provided key steps and lessons learned to help computational modeling inform and lead to major policy change. The key steps are: engagement of Ministry of Health, identifying in-country "champions," directed and efficient data collection, defining a finite set of realistic scenarios, making the study methodology transparent, presenting the results in a clear manner, and facilitating decision-making and advocacy. Generating scientific evidence is one component of policy change. Enabling change requires orchestration of a coordinated set of steps that heavily involve key stakeholders, earn their confidence, and provide them with relevant information. Our Benin EVM + CCEM + HERMES Process led to a decision to enact major changes and could serve as a template for similar approaches in other countries.

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1. The problem

While scientific studies can show the need for vaccine policy or operations changes, translating scientific findings to action is a complex process that needs to be executed appropriately for change to occur. For example, our previously published study utilized a computational simulation model of the Republic of Benin immunization supply chain, generated by our HERMES (Highly Extensible Resource for Modeling Supply Chains) software platform, to demonstrate the potential benefits of redesigning the Benin immunization supply chain (i.e., the series of locations, storage devices, vehicles, personnel, and processes involved in getting vaccines from the Central location in the country to the population) [1]. However, the study did not describe the efforts and processes that enabled the modeling to lead to policy change. What follows are some of the key steps and lessons learned in our Benin experience that helped computational modeling inform and lead to major policy change.

2. Key steps

2.1. Key step 1: engagement of Ministry of Health

Fig. 1 shows a timeline of the project, which emerged from the initiation of the LOGIVAC project by the Agence de Médecine Préventive (AMP) and World Health Organization (WHO) endeavoring to establish a regional training and reference center for health logistics at the Institut Régional de Santé Publique (IRSP) in Ouidah, Benin. A vital component of the LOGIVAC Project was having a substantial in-country presence. Key members of the LOGIVAC Team (e.g., H. Dicko and M. Avella) resided permanently in Cotonou, the capital of Benin. Having an in-country presence enabled the LOGIVAC Team to develop relationships with the Ministry of Health (MoH) and WHO Expanded Program on Immunization (EPI) team in Benin. Part of the LOGIVAC project focused on identifying innovative supply chain solutions that can be scaled up in Benin, which

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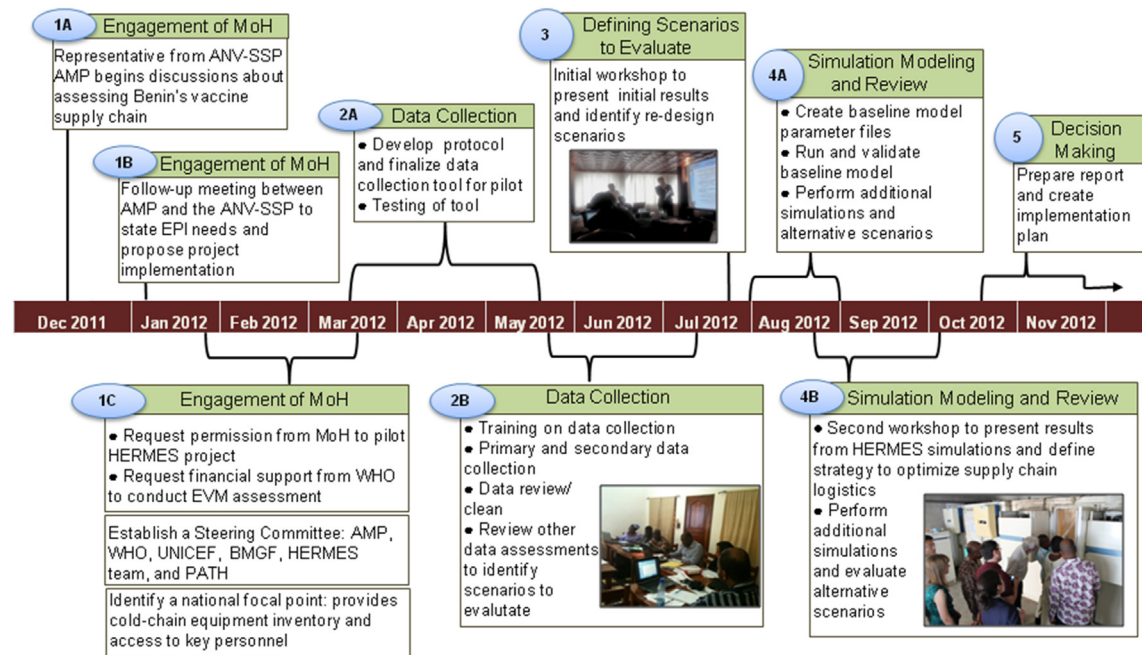
Fig. 1. Overview of the EVM + HERMES implementation in Benin. (1) The EPI department informed AMP of its immediate needs (mainly related to insufficient cold chain storage capacity throughout the country, in particular, at the central level). The Ministry of Health requested financial support to conduct the EVM assessment from the WHO Benin country office. (2) Questionnaires were pilot tested in April 2012 and revised. Prior to data collection, an AMP- and PATH-facilitated training session (2 days for the EVM questionnaire, 1 day for the HERMES questionnaire, 1 day pre-test and 1 day debrief) familiarized data collectors and supervisors with the questionnaires and Excel data entry sheets. Data was collected from selected locations, followed by data entry and review. (3) On 25 July 2012, the Benin MoH convened a preliminary workshop to present results and to define the process of the supply chain optimization project. Attendees included delegates from different departments of the MoH (Essential Drugs Supply and Procurement Division, Department for the maintenance of equipment, HIV/Aids Program, TB Program, EPI), PATH, VMI, AMP, WHO, UNICEF, USAID and Transaid. (4) On 20–21 September 2012, a second meeting to review the HERMES simulation experiment results ensued. Attendees included representatives from the Benin's MoH, ANV-SSP, AMP, WHO, the HERMES Team, the Bill and Melinda Gates Foundation, PATH, Transaid, and UNICEF, among others. Following the presentation of the HERMES, CCEM and EVM assessment results, Benin's MoH, identified strategic orientations for supply chain optimization, including redesign the vaccine supply chain as supported by HERMES simulation experiments. (5) A report was prepared and distributed to Ministry. Begin plans for implementation.

completed an extensive cold chain equipment survey in 2010. Formal engagement with Benin decision-makers began in December 2011 and continued throughout the entire process (Fig. 1). Early and frequent engagement with country officials is essential. They must be involved in, and drive, the decision-making process, since they are ultimately the ones that must accept and implement decisions. Country ownership of decision-making and solutions will maximize the probability of acceptance. Potential system modifications and solutions should come from, or have, strong input from the country stakeholders instead of solely from external parties that may not fully understand all ramifications of their implementation plans. The goal of this procedure was not to make decisions for the country, but rather provide the country with tools to facilitate the country's decision-making.

2.2. Key step 2: identifying in-country "champions"

It is also important to identify key individuals with the ability and enthusiasm to serve as in-country "champions" for the procedure and potential change. In Benin, our team was fortunate to have a forward-thinking Minister of Health Dorothée Kinde-Gazard, who understood the problem, process, and potential solutions, welcomed change and new ways of thinking, had time to dedicate to addressing the issue, and had the charisma and influence to enact changes. Champions may not be evident initially. Those who could eventually serve as champions initially may not be familiar with the problem, potential approaches, and possible solutions. In fact, they may not even realize the magnitude or the urgency of the problem. One should not assume that this lack of awareness is due to a deficiency in ability or education. Key stakeholders in any

country can be very busy and occupied by other seemingly more urgent matters. The timing needs to be right for potential champions to dedicate their time and energy. Therefore, the process of identifying "champions" may take time and patience.

2.3. Key step 3: directed and efficient data collection

Data collection purely for scientific inquiry versus data collection to guide policy change can be very different endeavors. Data collection to guide policy change can in some cases be more directed and focused. In the case of Benin, data collection aimed to meet HERMES data needs. The data collection tool was adapted from vaccine supply chain costing data collection tools developed and utilized by Project Optimize, a collaboration between PATH and WHO. The tools included a questionnaire for each level of the supply chain to capture resource usage for the storage and distribution functions, as well as stock movement data. Collected data included information on human resources, cold chain equipment type and specifications, and transport modes, frequency, and routes for delivering vaccines. Data also came from existing tools such as the Effective Vaccine Management (EVM) and Cold Chain Equipment Management (CCEM) assessments, Stock Management Tool (SMT), and the Benin Comprehensive Multiyear Plan (cMYP).

AMP pre-tested the questionnaires at two health centers and one commune to determine the administration time required and ease-of-use. Our project's steering committee then evaluated the questionnaires. Following the pre-test, but prior to data collection, AMP and PATH facilitated training sessions to familiarize data collectors and supervisors with the EVM tool and adapted Project Optimize questionnaires. Pairs of agents administered the