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Optimizing national immunization program supply chain management in Thailand: an economic analysis

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ABSTRACT

Objectives: This study aimed to conduct an economic analysis of the transition of the conventional vaccine supply and logistics systems to the vendor managed inventory (VMI) system in Thailand.

Study design: Cost analysis of health care program.

Methods: An ingredients based approach was used to design the survey and collect data for an economic analysis of the immunization supply and logistics systems covering procurement, storage and distribution of vaccines from the central level to the lowest level of vaccine administration facility. Costs were presented in 2010 US dollar.

Results: The total cost of the vaccination program including cost of vaccine procured and logistics under the conventional system was US\$0.60 per packed volume procured (cm³) and US\$1.35 per dose procured compared to US\$0.66 per packed volume procured (cm³) and US\$1.43 per dose procured under the VMI system. However, the findings revealed that the transition to the VMI system and outsourcing of the supply chain system reduced the cost of immunization program at US\$6.6 million per year because of reduction of un-opened vaccine wastage.

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Conclusions: The findings demonstrated that the new supply chain system would result in efficiency improvement and potential savings to the immunization program compared to the conventional system.

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Introduction

Universal vaccination program has played an important role in disease prevention. The program success is greatly based on effective and efficient supply chain and logistics system. Criteria for good supply chain management comprises of six rights, i.e. product (correct product as per request), quantities (correct as per request), place (sent to requested organization), time (timely supply), quality (no damage or with appropriate condition e.g. temperature) and costs (appropriate service charge or cost). World Health Organization (WHO) has launched the Effective Vaccine Management (EVM) Initiative focusing on key concepts on lower stock levels, reduced wastage, accurate forecast of vaccine requirements, and prevention of equipment break-downs.¹ WHO and PATH implemented a collaborative project called Optimize from 2007 to 2012 aiming to develop immunization systems and technologies including conducting studies and analysis on outsourcing of vaccine supply chain and logistics to private sector in several countries including Thailand.² Zaffran et al. provided the evidence of importance of vaccine supply and logistics systems in the recent review of studies in Senegal and Tunisia under project Optimize.³ The review indicated that in some countries, either un-opened or opened-vial vaccine wastage was accounted for 50%. Most un-opened vaccine wastage can be attributed to supply chain process. Stockouts are also caused by inappropriate supply chain system. It is recommended that immunization supply system may increase efficiency and effectiveness by outsourcing certain function of private or parastatal agency, which is corresponding to the Thai policy. Information technology and human resources may also pose concerns for supply chain systems.

Thailand is one of the countries that have demonstrated the importance of optimizing national immunization program supply chain management. Prior to 2009, the Thailand Department of Disease Control (DDC) managed the vaccine supply chain and logistics system (the conventional system). The vaccine logistics systems started with the delivery of vaccines from the producer/importer to the central warehouse of the pharmacy unit, located in the DDC. Vaccines were transported to 12 disease prevention and control regional offices, then to 76 provincial health offices, to district health offices, and finally to about 10,000 health service facilities (including hospitals and health centers) (Fig. 1). To streamline the vaccine supply and logistics system and improve information flow, the National Health Security Office (NHSO) and DDC launched a pilot project in 2009 to outsource vaccine supply management to the Government Pharmaceutical Organization (GPO), a state enterprise under Thailand

Ministry of Public Health. As part of the outsourcing arrangement, the GPO introduced and managed a vendor managed inventory (VMI) and contracted a private logistics company to distribute vaccines and related commodities in 28 of 76 provinces. Since 2010, the NHSO has been solely in charge of procuring and distributing vaccines for the Expanded Program on Immunization (EPI) and has continued to outsource its procurement and distribution functions to the GPO (Fig. 2). In late 2010, the VMI system was expanded to the whole country.

VMI is a streamlined approach for inventory management and order fulfillment. One of key features of VMI involves collaboration among suppliers and customers, which changes the traditional procurement and distribution processes. Instead of sending purchase orders indicating the types and doses required, customers electronically send inventory

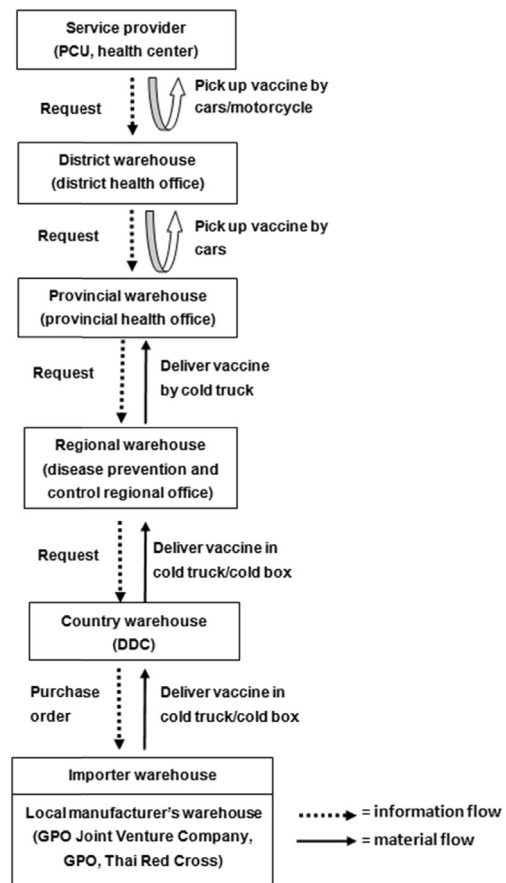


Fig. 1 – Conventional vaccine supply chain distribution system. GPO = Government Pharmaceutical Organization, DDC = Department of Disease Control, PCU = Primary care unit.

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