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Location of low-cost blood collection and distribution centres in Thailand

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Abstract

Decision making on facility locations for blood services has an impact on the efficiency of supply chain and logistics systems. In the blood supply chain operated by the Thai Red Cross Society (TRCS), problems are faced with amounts of blood collected in different provinces of Thailand being insufficient to meet demand. At the present time, TRCS operates one National Blood Centre in the capital and twelve Regional Blood Centres in different provinces to collect, prepare, test, and distribute safe blood. A proposal has been made to extend this network of blood centres using low-cost collection and distribution centres. Increasing numbers of fixed collection sites can improve access for donors. In addition, some facilities will be able to perform preparation and storage for blood that hospitals can receive directly. This paper addresses the selection of sites for two types of facility, either a blood donation room only or donation room with a distribution centre. A range of investment budgets is investigated to inform the strategic plan of this non-profit organisation. We present a novel binary integer programming model for this location-allocation problem based on objectives of improving the supply of blood products while reducing costs of transportation. Computational results are reported, using real life data, that are of practical importance to decision makers.

Keywords: Blood supply chain, Location analysis, Developing countries

1. Introduction

The locations of suppliers, processing plants and distribution centres are critical to the efficient running of any supply chain network: this is especially important when transporting perishable products such as blood. Moreover, the essential nature of the blood supply chain in delivering blood products to hospitals brings special problems in developing countries, such as Thailand where budgets are limited. This paper introduces a new location-allocation model for the siting of low-cost blood collection and distribution centres that are planned to provide an extended service to an existing network of regional blood centres in Thailand.

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