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Supply Chain Management Newsletter

Users of EpiSurveyor download data surveys to their mobile phones.

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Welcome to the Quarter 4, 2009 installment of the quarterly USAID | DELIVER PROJECT Supply Chain Management E-Newsletter. The e-newsletter includes articles on supply chain best practices, public and private sector supply chain technology, project topics, and descriptions and evaluations of pilot programs. The e-newsletter is also available on the USAID | DELIVER PROJECT website at www.deliver.jsi.com under Resources>Publications>Logistics Briefs and Success Stories>Supply Chain Management E-Newsletter: Quarter 4, 2009.

The team welcomes your input! To submit an idea for a future newsletter, or to share information with our readers, please contact Kelly Hamblin, Program Officer, at khamblin@jsi.com.

Greener Supply Chains: An Imperative for Public Health and Development

The move to greener supply chains is being driven as much by economics as by politics. However, it is clear that challenges and opportunities created by the drive to *go green* can potentially impact every area of the supply chain. This article touches briefly on a few of the interventions already being tested in the commercial sector that may have applications for international public health. See the full article below.

Using EpiSurveyor for Mobile Phone Data Collection

EpiSurveyor, an award winning software suite, enables the user to create surveys via an online interface, download the survey to a mobile phone, collect data at health facilities, and upload the data gathered back to a remove server, where it can be accessed online. See the full article below.

CSCMP Annual Global Conference: Summing it Up

The Council of Supply Chain Management Professionals (CSCMP) held its 2009 Annual Global Conference during September 20-23, 2009, in Chicago, Illinois. Over 2,500 supply chain specialists attended the conference, representing 45

countries and hundreds of different companies and industries, including food and beverage, electronics, software, petroleum, and airlines. See the full article below.

Greener Supply Chains: An Imperative for Public Health and Development

Background

Green is good business

According to a 2007 eyefortransport study, "there is direct correlation between a company's prioritization of green issues and their revenues and business success. In fact, key drivers for green initiatives include government compliance, improved customer and public relations, a decreased fuel bill and financial [return on investment]." (Harris 2009)

According to a 2007 McKinsey study (Supply Chain Digest 2008) of corporate practices about greening a supply chain, there is, currently, a large gap between supply chain executives realizing that they need to consider climate change issues when purchasing and making supply chain decisions and the executives actually taking those issues into consideration for operations. However, it is clear that challenges and opportunities created by the drive to *go green* can potentially impact every area of the supply chain—from network design to packaging (Venema 2009). There is no question that sustainability in the commercial sector will become increasingly green, the questions are really, "How?" and "When?" This article touches briefly on a few of the interventions already being tested in the commercial sector that may have applications for international public health.

Primum non nocere (First, do no harm.)

In designing public health interventions intended to benefit the health of individuals and communities, an overriding principle is "First, do no harm." The World Health Organization has reiterated this principle many times recently, particularly during the development of injection safety policies (World Health Organization 2002) and guidelines for the disposal of medical waste, but the principle is an ancient medical tradition. The supply chains that support the provision of health services have a particular responsibility in this area. On one hand, they are driven to provide access and to benefit the largest number of individuals with effective, high-quality services. On the other hand, providing those services must not cause irreparable damage to the air, water, and land on which the beneficiaries depend. Efficient supply chains serve not only the public health sector's desire to do no harm, but it should also free resources that can be used to improve access and quality. For public health, green is win-win.

Greener supply chain intervention areas for international public health

International public health supply chain logistics is not naturally green. It often requires moving large quantities of goods over large distances, which, in 2009, required the burning of fossil fuels. The products themselves are not recyclable or re-usable and, ironically, may even be a biohazard, particularly for large-scale disposal.

Although there are many potential areas of intervention, six supply chain interventions stand out as potential *quick wins* for reducing the carbon footprint of international public health logistics.

Better forward planning:

Better forecasting, shipment planning, and collaborative planning with suppliers can, in most cases, enable shipment consolidation plus reduce the number of smaller emergency shipments and the subsequent use of air freight, which makes a bigger carbon footprint than sea or rail transport. Improved forecasting, when applied, also reduces the chance of waste and the implications of having shipped volumes of goods that are never used—saving the cost of the goods, as well as eliminating the environmental impact of their transportation, and their ultimate removal from the supply chain.

Lighter and tighter—green packaging:

Reducing the weight or volume of the goods to be shipped by improving package design and/or using lighter materials can increase the units of product in the same amount of space, reducing both the total weight to be shipped, as well as the number of containers to move. This reduces cost and environmental impact. Using re-usable or recyclable materials—or using little or no packaging when possible, can reduce the volume of material going into the waste stream.

Network optimization:

Driven by regulations, community concerns, and/or by a desire to decrease power consumption, many industries are moving to reduce their carbon footprint. Software can be used to calculate a supply chain network's carbon footprint and then can determine the most cost-effective network that will meet user requirements. The relationship between carbon emissions and logistics activities involves many trade-offs. For example, a move to full truck–load transportation, which would decrease the number of trips and fuel consumption, may require longer lead times and higher inventories; or, to maintain the expected service level, may require additional distribution centers to position the goods closer to the customer.

Vehicle selection and maintenance:

Fuel efficiency can, of course, be one criteria used to select new vehicles for a transportation fleet; a well-maintained vehicle uses relatively less gas, produces fewer emissions that are harmful to the environment, and lasts longer than a poorly maintained one. Therefore, to go green, emphasis must be placed on routine maintenance of vehicles in the fleet. To reduce fuel consumption and emissions, the following interventions are expected to have the most immediate impact:

- Maintain correct tire pressure.
- Reduce engine friction through routine oil changes and oil filter replacement.
- Maintain optimal performance through routine engine tune-ups.

Drivers can also reduce fuel consumption by driving smarter—avoid sudden accelerations and stops and maintain moderate road speeds (adhere to speed limits). Trucks and SUVs, being heavy and less aerodynamic than smaller vehicles, get their best mileage at lower speeds (HowStuffWorks.com 2009). Depending on the model of vehicle, reducing cruising speed from 120 kilometers per hour (kph) to 100 kph can reduce fuel consumption by as much as 20 percent.

TRANSAID, an international development organization that specializes in transport management, reports that a study comparing weaker and stronger transportation management systems in developing countries determined that the stronger systems are 50 percent more cost effective and efficient in supporting health service delivery (Nancollas 2001).

Distribution center design:

Building or renovating distribution centers can help reduce environmental impact in a number of ways. Saving energy is one important aspect of the design. Photo sensors and motion detectors can shut off light fixtures when not in use. Insulation in the roof and walls can help maintain building temperature. Passive and mechanical cooling systems, such a *night-flush*, can cool the buildings during the evening hours, reducing or even eliminating the need for air conditioning (borealis 2009). Reflective roof surfaces can help keep the buildings from absorbing unwanted heat.

In developing countries, where electrical supplies are unreliable, alternative energy, such as solar, can provide not only a greener source of power but a more reliable one, as long as the systems are routinely maintained and repaired.

A distribution center can be made greener and more sustainable in many other ways. Managing water runoff from roofs and paved surfaces, for example, by redirecting it to wells where it can be stored and used to water landscaping, reduces a site's water consumption. Agencies like the U.S. Green Building Council (usgbc.org/, 2009) are a good source of information for green building guidelines.

Reverse logistics, waste management and recycling:

Reverse logistics, intended to keep expired materials out of local landfills, is not a new concept (Rodriguez 2008); neither are the separate collection of hazardous waste material or the collection and re-use of pallets and other re-usable packaging materials. Reverse logistics is also needed to support the return from the customer of usable but unneeded product. The challenge with reverse logistics activities and waste management is that they themselves consume energy and create pollution. Strategies intended to reduce environmental impact, such as recycling and re-using materials, or collecting waste material for safe disposal, have to be weighed against the total carbon footprint of the operation; effective environmental strategy requires making informed trade-offs. The same can be said of managing returns or recovering packaging. In many cases, it may be more efficient and less harmful to the environment to replace the unwanted product and dispose of the unwanted material in place and to provide biodegradable rather than re-usable packaging.

Medical waste management is intended to reduce public health risks and environmental impact, as well as to ensure regulatory compliance with local health and environmental law. As long as waste is properly segregated, the bulk of medical waste (wrappers, old documents, and other trash) can be disposed of locally; even sharps and biological waste can be treated on-site. However, some products, due to their toxicity or radiological qualities, may have to be collected for special handling and disposal. Medical waste that requires special handling equipment and trained personnel, for sanitary reasons, should not travel in the same vehicles that carry medical supplies.

Planning for the disposal of any category of hazardous medical waste is very challenging because the supply of such waste can be both very difficult to predict and highly variable over time; this has obvious implications for transport and disposal capacity. Many modeling tools now allow the user to set parameters to estimate the carbon footprint associated with different return policies and to measure the outcome of different trade-offs. These tools could be applied to provide at least some theoretical basis for waste management and recycling strategies and internal benchmarks for performance.

General Office Management

Best practices begin at home. One of the first steps in implementing green initiatives is to take advantage of quick wins in our offices. John Snow, Inc.'s *Green Sheet for Overseas Project Offices and Partner NGOs* is an attempt to sensitize the field offices to both the challenges and the opportunities for running more efficient, more environmentally friendly operations. The Green Sheet contains many useful facts; for example, it states that, on average, 75 percent of the electricity used to power electronics is consumed while the products are turned off. It also provides corresponding tips, such as using power strips whenever possible

and turning off the power switch or disconnecting the plug when the appliances are not in use. The Green Sheet covers nine key areas where offices can intervene to reduce resource consumption (JSI Green Team 2009).

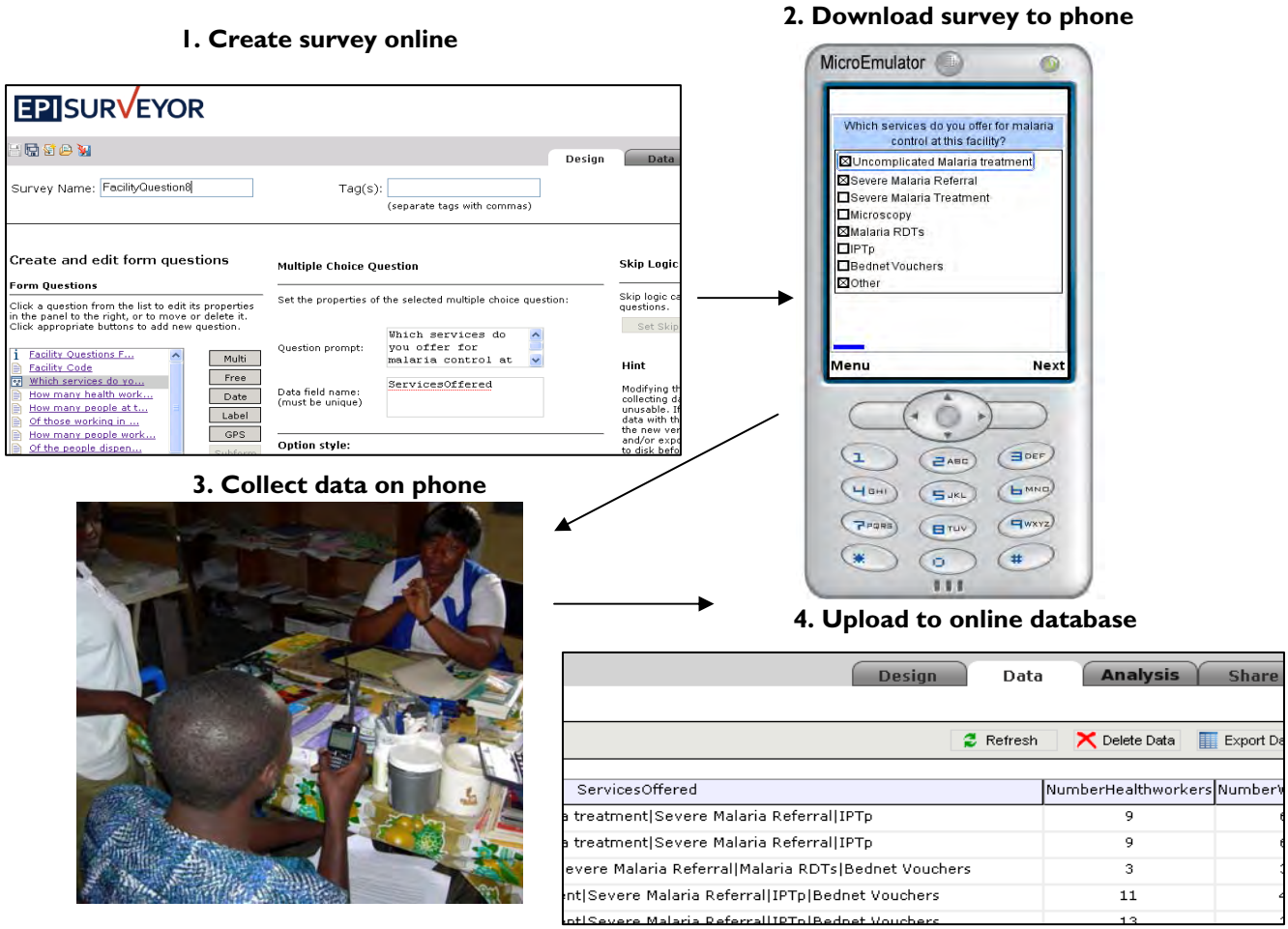
Conclusions

When implemented, greener supply chains will be good for business, good for the environment, and, ultimately, good for our customers. Whether motivated by the drive for efficiency, public relations, or public policy, strategies intended to reduce environmental impact, such as recycling; reducing energy, water, and other resource consumption, needs to be assessed in the context of the total impact on both the business and the environment and monitored and evaluated to confirm that they are having the desired effects.

Using EpiSurveyor for Mobile Phone Data Collection

EpiSurveyor, an award winning software suite, enables the user to create surveys via an online interface, download the survey to a mobile phone, collect data at health facilities, and upload the data gathered back to a remote server, where it can be accessed online.

Figure 1. EpiSurveyor System Overview



Task Order 3 of the USAID | DELIVER PROJECT recently worked with DataDyne to design and add several new features to the software, including the ability to back-up data from the mobile phone to a laptop, prior to sending it to the server; and, most important, the ability to run pre-programmed analysis of the data that is generated. The software package and these new features were tested in a field pilot in Ghana from July to August 2009.

New Features

Data Entry

When a user creates a survey with the online EpiSurveyor interface, the software automatically generates a matching database that is stored online. The mobile phone can be equated to a handheld computing device into which the user is able to directly input data into the database at the health facility. The data gathered in the field automatically populates the online database when it is uploaded from the phone, thereby removing both the step of creating a database and the need to manually input the data, as well as its corresponding costs, in terms of time, skillset required, and financial resources.

As part of the collaboration between DataDyne and the project, new features were developed that enable the user to view and correct data on the mobile phone while still at a health facility. To review it as a quality check, the user has the ability to transfer the data via cable or Bluetooth® to the user's laptop as a .txt file (compatible with Excel, Word, Notepad, etc.), prior to uploading data to the server.

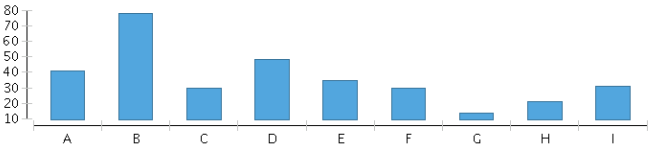
Data Analysis

The project also worked with DataDyne to develop an automated analysis function that generates a set of frequencies and corresponding charts and graphs for each question in a survey. In addition, specific templates can be tailored to carry out more sophisticated analysis to support any given set of indicators.

Figure 2. Example of Automated Analysis

% of uncomplicated malaria cases under age 5

	Facility Code	Percentage
A	25015310110002	41
B	25015330150004	78
C	25105330150061	30
D	2802	48
E	2810	35
F	313	30
G	8888888	14
H	SHAMA	21
I	All Facilities	31



Ghana Pilot

To conduct an appropriate assessment of the viability of using EpiSurveyor to replace paper-based data collection, the pilot was designed to assess three quantitative and qualitative aspects of using the software on mobile phones:

- *Time*—compared the time that elapsed at a facility while using the phone to the amount of time it took to gather the data using paper.
- *Data quality*—compared the data quality between what was uploaded to the online database from the mobile phones and what was gathered on paper and entered in an Excel database.
- *Ease of use*—evaluated comments and observations made by data collectors using the mobile phones.

During the first three days, the data collection teams (referred to as Paper teams) visited 25 health facilities. Following the first three days of visits, the paper data collectors went back to Accra; the five phone testers were again formed into two teams (EpiSurveyor teams.) The new teams spent an additional two days collecting data at an additional six facilities, where they used only the phones; again, they kept track of their time and provided feedback about their experience.

Findings

Time

The time from the Paper and EpiSurveyor teams are presented in table 1; it shows that the time required to conduct the End-Use survey at a health facility using EpiSurveyor was less for this activity than the time required to gather the data on paper. The average time at a facility for the Paper teams was two hours and 22 minutes (ranging between 45 minutes on the low end and four hours and 20 minutes on the high), whereas the average time at a facility for the EpiSurveyor teams was one hour and 57 minutes (ranging between one hour and 15 minutes and two hours and 25 minutes).

Table 1: Times at Health Facilities

Paper Teams	Average Time
Team A (5 facilities)	2:57
Team B (5 facilities)	2:58
Team C (6 facilities)	2:25
Team D (7 facilities)	1:30
Overall	**2:22**

EpiSurveyor Teams	Average Time
Team E (4 facilities)	1:57
Team F (2 facilities)	1:57
Overall	**1:57**

There are some limitations with these data. Resource and time constraints prevented the EpiSurveyor teams from visiting the same number of facilities as the Paper teams, and the smaller sample did not include the same variability of facility size and record availablity that the larger Paper sample did. For example, due to a constraint on the distance that could be traveled in the final two days of data collection, hospitals were not included in the EpiSurveyor sample; whereas, four of the facilities in the Paper sample were hospitals; each required significantly longer than average time per facility. That said, it should be noted that none of the smaller Community Health Planning Service (CHPS) facilities were included in the EpiSurveyor sample, although three were included in the Paper sample—all three took significantly less time than the average. Despite these ambiguities, the finding remains that the time required to gather data via mobile phones was comparable to, or took less time than, the time it took to use paper.

Data Quality

To assess the quality of the data gathered using EpiSurveyor, the team conducted a comparison of the data in the EpiSurveyor database with what was collected on paper and entered into Excel by hand. The results indicate that the results were very similar between the EpiSurveyor database and the data gathered by paper and input by hand. From the 412 different fields compared, six discrepancies were discovered, which represented a 1.5 percent difference between the two methods. It is important to state that these differences are not necessarily an indication that the Excel data were more accurate than the EpiSurveyor data. Four of the six discrepancies came from data entered into a form used to assess whether or not a facility maintained proper storage conditions (see table 2.) This form consists of a series of questions that must be answered "yes" or "no," as judged by the data collector (e.g., "*The current space and organization is sufficient for existing malaria medicines and supplies, including room for reasonable expansion in the event of receipt of expected product deliveries.*") As mentioned above, the data under comparison were gathered during the first three days of data collection, during which several people on a team were entering information using paper, and one person gathering data on the cell phone. As such, it is probable that the four discrepancies on this form were merely a reflection of the fact that the somewhat subjective storage conditions form was completed in EpiSurveyor by a different data collector than the one who recorded the answers on paper, resulting in different responses. It is also worth pointing out that, in any case, those discrepancies did not lead to a change in the

overall calculation of the indicators for this activity. In other words, the final results reported out of the two databases would have been the same.

Table 2: Example Comparison of EpiSurveyor and Excel Databases (storage conditions)

		A	B	C	D	E	F	G	H	I	J	K	L	M	N
Tester 1	EpiSurveyor	1	0	0	0	1	0	0	1	0	1	1	0	0	1
	Excel	1	0	0	0	1	0	0	1	0	1	1	1	0	0
Tester 2	EpiSurveyor	1	1	1	1	1	1	0	1	1	1	0	1	0	1
	Excel	1	1	1	1	1	1	0	1	1	1	0	1	0	0
Tester 3	EpiSurveyor	1	1	0	0	0	1	0	1	1	1	0	0	0	0
	Excel	1	1	0	0	0	1	0	1	1	1	0	0	0	0
Tester 4	EpiSurveyor	0	0	1	1	1	1	1	1	0	1	0	0	0	0
	Excel	0	0	1	1	1	1	1	1	1	1	0	1	0	0

Qualitative Feedback

In addition to evaluating EpiSurveyor using the concrete results previously discussed, each EpiSurveyor user was given a short questionnaire for making observations at health facilities about how to improve data collection using the cell phones. Their feedback made it clear that, despite any perceived limitations of the hardware and software, the ability to automatically perform analysis and to eliminate the need to manually enter data after the data collection period made replacing paper-based data collection with EpiSurveyor desirable. In fact, across the board, when asked whether or not they would choose to replace paper-based data collection with EpiSurveyor, every respondent replied that they would. Perhaps more telling, the in-country staff who received training on the phones and participated in data collection requested that they be allowed to continue using the phones during the next quarter.

Outcome

Based on the results from the Ghana pilot, it seems that there are a wide range of possible applications for the EpiSurveyor software and cell phone-based data collection. DataDyne has said that it is committed to a distribution model for EpiSurveyor that would allow perpetual free use of its basic functionality. This basic functionality could be very useful for many public health data activities, with no required contract and little or no contact with DataDyne. DataDyne intends to support this free functionality by charging for higher levels of support or customization from the subset of their users who have those higher-level needs.

See www.datadyne.org for more information, or www.episurveyor.org to create an account.

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information from the 170 sessions; many lessons learned from the private sector are equally applicable to international public health, as summarized below.

Increased Visibility

Increasing visibility throughout the supply chain requires exchanging information and data between the various components of the system, including suppliers and customers. Although organizations may resist sharing proprietary information on operating costs, the visibility enables the different companies that make up the supply chain to better plan and accommodate these costs. Pier One Imports had a great example—they have agreed to run an open book approach with their ocean freight carriers, who are charging a mark-up on cost. The rates that these carriers charge Pier One Imports are currently higher than the going rate (because of the economic downturn), but Pier One Imports is willing to pay extra during these tough times to make sure their freight carriers remain in business and can guarantee cost predictability in the future (when rates are expected to spike). Arrangements such as these require a high degree of trust between both parties, but in the end, can be mutually beneficial.

Kraft also had a good example of using what they called *collaborative transportation engineering*. Planning routes that link a company's outbound and inbound shipments can improve transportation asset utilization and make shipments cost-effective for their partners. Kraft not only increases their product flow, but they share the cost savings with their customers.

Applicability to international public health. Increased visibility occurs when accurate and timely demand and/or consumption data flow up the supply chain to improve asset utilization, such as transport and storage, and to inform forecasting and procurement. Feedback information must also flow back down the supply chain to the facility level for better re-supply planning and asset management.

Performance Metrics

The importance of performance metrics was mentioned in several of the sessions. Collecting data on how your supply chain is running can help drive decision making at the operational level. It also forces out latency in decision making, which can reduce the bullwhip effect. Knowing their performance can also help supply chain managers identify and address gaps in the supply chain.

Applicability to international public health. Stockout levels and number of days of stockouts is a crucial and significant indicator, but its limitation lies in that it does not inform where performance breakdown is occurring; therefore, it is difficult, if not impossible, to make important changes. On the other hand, logistics performance metrics, such as fill rate, or on-time delivery, provide a more granular view of supply chain performance, and managers can easily identify where bottlenecks occur and propose solutions.

Supply Chains in Uncertain Times

In these tough economic times, supply chains around the world should strive to be more efficient. Many companies are looking to their supply chain operations to extract much-needed cost savings. This will, in turn, make well-functioning supply chains leaner and more efficient.

Some suggestions include—

- Use performance metrics to identify gaps and continuously improve the supply chain. Freeing up inventory can be a source of individual capital.
- Be the best-in-class. Not all supply chains need to be the best at everything, but strive to be the best supply chain in your setting. This is especially relevant in global supply chains with very unique supply chain constraints.

- Tailor your supply chain to each individual setting. Build what the customer wants and needs, but balance it with a cost the customer can bear. Know the cost of your supply chain and how it relates to the product it delivers. A $5.50 per unit supply chain cost may work for a product worth $100, but it is excessively expensive for a product worth $20

Applicability to international public health. High inventory levels are often used to cope with an under-performing supply chain. This inventory is very expensive, and it frequently sits in storage for months at a time with its only added value being a buffer against stockouts because of the unreliability of the supply chain. Public health supply chains should strive to be best-in-class in performance and efficiency. With a better performing supply chain, less inventory is needed to cover the same service level. The cost savings from lowering inventory levels could be reinvested in the health system to procure additional product that will serve even more patients or clients, increasing service levels at a lower cost.

If you would like to see archived versions of the presentations, or to learn more about the conference, visit the CSCMP website at http://cscmpconference.org/. The next conference will be in San Diego during September 26–29, 2010.

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