HEART
HEALTH & EDUCATION ADVICE & RESOURCE TEAM

Helpdesk Report: Comparative advantages and disadvantages of "push" and "pull" mechanisms in pharmaceutical management

Date: 15 June 2016

Query: Produce a report focused on the evidence on the comparative advantages and disadvantages of "push" and "pull" mechanisms in pharmaceutical management.

Content

1. Overview

In pharmaceutical management, distribution schemes for medicines can be defined as "push" or "pull" systems depending on which levels of the system order medicines and which, if any, passively receive medicines from higher levels. In a pull system, each level of the system determines the types and quantities of medicines needed and place orders with the supply source. Staff at health facilities work out demand estimates and submit requisitions to central stores. This can also be called an independent demand or requisition system. In a push system, supply sources determine the types and quantities of medicines to be delivered to lower levels. Supplies are delivered according to a delivery plan made at the beginning of a period. Health facilities are expected to provide stock and consumption information to the supply source to assist planning. This is also known as an allocation or ration system (Management Sciences for Health, 2012).

A key text in relation to improving access to medicines is MDS-3: Managing Access to Medicines and Health Technologies (Management Sciences for Health, 2012). This guide has been developed with contributions from almost 100 experts in the field. It includes a clear overview of the conditions favouring push and pull systems of distribution and their advantages and disadvantages. It argues that pull systems are preferred when there is capacity to manage them effectively. This includes the need for lower level staff members to be competent in needs assessment and inventory management and for good data to be available to those making decisions. Advantages of pull systems include that they are responsive to health facilities' particular medication requirements, so there is more flexibility in selecting medicines for specific health problems in particular regions or types of health units. Their flexibility regarding quantities of medicines can result in less shortages or surpluses of items and less wastage caused by expiry of medications. Push systems are less flexible and responsive but they can be useful in particular situations. They are widely used in disaster relief. Some countries use kit systems, which are a typical example of a push

system, for routine supply of essential medicines to rural health facilities. These can be provided with a simplified system of budgeting, procurement, storage, transport and supply management. Push systems can be useful when there is a lack of good data available to decision-makers; staff at health facility level do not have competence in inventory control or rationing is necessary as demand exceeds supply. Some countries use a mix of push and pull systems. For example, supplying medicines as kits in primary care and enabling hospitals to make requisitions to meet their own needs.

Valuable lessons can be learned from case studies of making the transition from push to pull systems. In Tanzania, the scaling up of the pull system involved the re-engineering of inventory management, warehousing and picking and packing operations. It had a significant impact on the size and complexity of inventory, storage and distribution operations (MOHSW, 2008). In Zanzibar, a network and transportation optimisation analysis was used to identify the best, most cost effective delivery routes when making the transition from a push to pull system. This was particularly important given the increase in the number of products to be distributed compared to the previous kit system (USAID DELIVER, 2013). In South Sudan, the Systems for Improved Access to Pharmaceuticals and Services programme, trained health workers to use project management and logistics management information systems to support the transition to a pull system (USAID SIAPS, 2014).

In Uganda, the Government has experimented with various supply chain models. In 2002, they made the transition from a push to a pull system. A study in a rural hospital setting found that this reduced the number of days of out-of-stock drugs, hence improving availability of essential medicines, and reduced the volume of expired drugs (Tumwine et al., 2010). In 2010, a dual pull-push system was introduced. The pull system was maintained for hospitals and higher level health centres, while the push system was adopted for rural and hard to reach health facilities. A study found that the re-introduction of the push system at primary care level improved availability of essential medicines. It reduced average stock-out days per month from 20 days to 5 days. However, 63% of items were oversupplied with a risk of expiry. Other perceived advantages of the push system reported by key informants included: improved efficiency in management of the supply chain, saving time and reducing operational costs and relevance in resource-constrained settings because expertise in quantifying medicines and supplies is not required at lower level health facilities. Other perceived disadvantages included lack of responsiveness to local disease burden due to standard items and quantities being supplied Bukuluki et al., 2013). A more recent study of the effectiveness of the dual pull-push system for health centres in one district of Uganda found that the trend of essential medicine availability seemed to be in decline since its initiation. Average stock–out duration of essential medicines and supplies was 23.89%. Factors affecting availability included lack of consistency in delivery schedules and lack of consideration of individual health facilities' needs (Bruno et al., 2015).

A different approach to traditional push and pull systems are "top-up" or informed push systems. Delivery trucks are loaded with commodities based on population or previous usage information. Trained delivery staff count stock levels at the health facilities and assess the necessary amount of stock to be "topped up." This system can be used for a limited number of commodities. It uses minimum and maximum stock requirements, set in advance, so works well with preventative health commodities, such as vaccines or family planning supplies, where the demand is predictable. It is less suitable for commodities with variable demand. This Delivery Team Topping UP (DDTU) system has been used successfully in Zimbabwe to distribute sexual and reproductive health medicines and supplies. Evaluations identified that 95% availability of contraceptives had been achieved and stock out rates for Nevirapine tablets decreased from 33% to 2% (USAID DELIVER). A cost effectiveness analysis found that the DTTU approach is less costly than a pull system for a smaller number of commodities aimed at primary health care facilities. However, in a system with a large number of commodities, supply chain costs would be likely to be lower in a fully functioning pull system than a DTTU system (USAID DELIVER). Informed push systems have also been

used effectively for supply of vaccines and essential medicines in Senegal (WHO, PATH, 2013) and Northern Mozambique (Village Reach).

The “push” and “pull” concepts in relation to distribution are a way of understanding, and trying to improve the effectiveness of, a part of the supply chain necessary to provide medicines and supplies to health facilities. Other models focus on the broader supply chain system and its strengthening. For example, the “Supply Chain Evolution Model” offers guidance on the development of an integrated supply chain, moving through stages from ad hoc to organised to integrated to extended. This is intended to improve the flow of information at all levels, clarify roles and increase efficiency in use of resources (McCord and Olsen, 2011).

2. Advantages and disadvantages of push and pull systems: key reading.

MDS-3: Managing Access to Medicines and Health Technologies (2012) Management Sciences for Health. Arlington, VA.
http://apps.who.int/medicinedocs/documents/s19577en/s19577en.pdf

Conditions favouring push and pull distribution systems include:
Conditions favouring a pull system:

- Lower level staff members competent in assessing needs and managing inventory.
- Sufficient supplies available at supply sources to meet programme needs.
- Large range of products being handled.
- Good data available to decision makers.

Conditions favouring a push system:

- Lower-level staff not competent in inventory control.
- Rationing necessary as demand exceeds supply.
- Limited number of products being handled.
- The situation requires short-term supply through pre-packed kits e.g. disaster relief.

Advantages and disadvantages of kit systems:
The kit system is a typical example of a “push” system. Supplies are distributed based on a centrally estimated need. They are packed centrally into sealed cartons and distributed unopened to health facilities. Kits are widely used in emergency relief efforts. Several countries use kits for routine supply of essential medicines to rural health facilities.

Potential advantages of a kit system include:

- Rational selection of limited range of essential medicines and supplies.
- Simplified budgeting, procurement, storage, transport and supply management.
- Reduced risk of theft in transit.
- Decreased handling at central medical store saves resources.
- Scheduled supply intervals lead to more secure delivery to rural health units.
- Better availability of essential medicines and supplies at primary care level.

Disadvantages include:

- Less flexibility in selection of essential medicines for specific health problems in different regions or types of health units.
- Resistance by senior prescribers because of limited range of medications in the kit.
- Lack of flexibility in quantities of medicines, leading to shortages or surpluses of certain items.
- Difficulty in supplying or returning individual items, leading to wastage caused by expiry.

- Absence of central information on usage of individual medicines, leading to difficulty tracking consumption at national level.
- Negative effect on development of supply management systems, skills for inventory control, quantification, ordering and distribution planning.
- Added cost of kit packing.
- Difficulty combining kits with a cost-sharing programme.

3. Evidence from country/ programme case studies

MOHSW (Ministry of Health and Social Welfare) Tanzania. 2008. Indepth assessment of the medicines supply system in Tanzania. Dar es Salaam: MOHSW
http://apps.who.int/medicinedocs/documents/s16503e/s16503e.pdf

Moving from a push to a pull system can involve complex and demanding changes in inventory management, warehouse operations and distribution. An example of this was the process of transition from primary health kits to a direct requisition system in Tanzania. The Ministry of Health rolled out a policy of replacing essential medicine kits with an indent (direct requisition) system to tailor medicine orders to fit the needs of each particular health facility and to reduce waste. Health facilities place their orders with the medical stores department through the District Medical Officer. The scaling up of this system involved the re-engineering of inventory management, warehousing and picking and packing operations. The primary health care kits comprised four pre-packed stock items requiring only simple block stacking in the warehouse. Instead of distributing more than 3,000 pre-packed kits each month, under the pull system, the medical stores department has to pick, pack and deliver items according to customized orders. This has a significant impact on the size and complexity of inventory, storage and distribution operations.

USAID DELIVER PROJECT, Task Order 4. 2013. Zanzibar Central Medical Store (CMS) Network and Transportation Optimization Analysis.
http://deliver.jsi.com/dlvr_content/resources/allpubs/countryreports/TZ_ZanzCMSNetw.pdf

The Zanzibar Central Medical Stores (ZCMS) in Tanzania operates a health commodities supply chain that serves the two major island groups that constitute Zanzibar: Ungjua and Pemba. ZCMS had been using a variety of channels to serve 146 facilities: monthly bulk push deliveries to four hospitals, standard kits pushed monthly to 44 primary health care (PHCs) facilities, and quarterly pulled orders through Zanzibar Integrated Logistics System (ZILS) to 98 PHC facilities. ZCMS wanted to transition all facilities to ZILS, but they needed assistance in selecting the best routes to serve the region from its main store on Unguja and its hub on Pemba. The network and transportation optimization analysis examined the three parallel supply chains, as well as the location of the Pemba hub, to help identify network and distribution strategies for cost savings. This was particularly important given the increase in the number of products moving through the ZILS system compared to the kits system. Moving from the baseline to the optimised distribution reduces the number of routes needed to deliver all shipments from 29 to 24; a 400 kilometre decrease in distance travelled or a 23 percent reduction. Optimised routes are shorter in total time, but the average route duration is longer, which maximises a working day. ZCMS can increase shipment volume by 30 percent before reaching the 29 routes originally envisioned.

USAID SIAPS Systems for Improved Access to Pharmaceuticals and Services Support for moving from push to pull system- South Sudan. 2014.
http://siapsprogram.org/2014/01/06/building-a-public-health-system-one-county-at-a-time-tambura-county-south-sudan/

In the pharmaceutical sector in South Sudan there are significant challenges including:

- Multiple vertical supply chains supported by different donors
- Complex pharmaceutical supply management system due to uncoordinated parallel procurement systems and/or poor donation practices
- A push system that results in over and under-supply of some items
- Weak information management system that does not provide timely and reliable medicine consumption/morbidity data
- Poor storage facilities and conditions
- Lack of transport and communication system

The USAID-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS) program has been working to provide training on pharmaceutical management to health workers in the Ministry of Health, county health departments, and health care facilities. SIAPS trained health workers to use Project Management Information Systems (PMIS) tools and a Logistics Management Information System (LMIS) tool. In Tambura County, the health authorities are implementing the use of these tools to shift away from a push system to a pull system for the supply of pharmaceuticals. Each county health department uses the LMIS tool to analyse the data needed to make decisions about inventory and then send the report to the Central Medical Stores in Juba. The pull system allows Tambura County health facilities to prevent accumulation, damage, and expiry of unused medicines and other medical products. This system also helps health facilities maintain a buffer stock to mitigate the effects of delays from the Central Medical Stores.

Availability and Expiry of Essential Medicines and Supplies During the 'Pull' and 'Push' Drug Acquisition Systems in a Rural Ugandan Hospital.
Yona Tumwine, Paul Kutyabami, Richard A Odoi 1 and Joan N Kalyango. 2010. Tropical Journal of Pharmaceutical Research. 9(6): 557-564.
http://www.bioline.org.br/pdf?pr10067

Records of essential medicines and medical supplies in a rural Ugandan hospital were reviewed and compared over two year periods of the Push system and the Pull system. The median number of days out-of-stock for drugs and medical supplies was 94 versus 24 ($p < 0.001$) and 8 versus 0 ($p < 0.39$) for the Push and Pull systems, respectively. The mean percentage days out-of-stock in the two periods was 15.3 % versus 3.5 % ($p < 0.001$) and 1.8 % versus 1.3 % ($p = 0.34$) for drugs and medical supplies, respectively. Expired drugs were worth US$1,584 (25 items) in 2000/2001 and US$1,307 (13 items) in 2004/2005. Factors contributing to availability of supplies were inadequate training, lack of transport and inadequate funding. The Pull system improved availability of essential medicines and reduced the volume of expiries in this hospital setting.

Changing from the "Pull" to the "Push" System of Distributing Essential Medicines and Health Supplies in Uganda: Implications for Efficient Allocation of Medicines and Meeting the Localized Needs of Health Facilities
Paul Bukuluki, Peter K. Byansi, John Sengendo, Nyanzi I. Ddumba, Paul Banoba, and David Kaawa-Mafigiri. 2013. Global Health Governance. 6 (2).
http://blogs.shu.edu/ghg/files/2014/02/GHGJ_62_74-84_BUKULUKI_ET_AL.pdf

The Ugandan Government has experimented with various supply chain models. Between 1985 and 2001, the health sector relied on the push approach, or essential drug kit supply systems, to deliver and distribute Essential Medicines and Health Supplies (EMHS) to all public health facilities. Under this system, the quantity of drugs supplied to lower health units was fixed and did not vary with the disease burden or patient load. This system was fraught with many challenges, including frequent stock outages of essential drugs. For example,

commonly demanded and prescribed drugs (e.g. ciprofloxacin, chloroquine, quinine, and analgesics and malaria injectables) ran out before the stipulated replenishment period. The top-down nature of the push system was considered inefficient, difficult to track, and prone to waste through expiration.

In 2002, the pull system was adopted; districts, local governments and health units requested medicines and health supplies that matched the disease burden, patient profile, and budget ceilings for EMHS for each respective budget cycle. This was accompanied by intensive capacity building in supply chain management at national and facility levels. The shift to the pull system sought to minimise stock-outs while increasing access and availability of EMHS in a timely manner.

In 2010, this was replaced with a dual pull-push system. The pull system was maintained for higher level health centres and hospitals, while the push system was adopted for rural and hard-to-reach health facilities. The re-introduction of the push system was intended to reduce delays in requisition and procurement of EMHS, minimise risks of corruption in medicines procurement, and address the chronic drug stock-outs at the primary care levels. In addition, the shift was aimed at reducing the burden on frontline health workers associated with requisition of medicines and other health supplies.

This mixed methods study reports key informants' views of the advantages and disadvantages of re-introducing the push system at primary care level including:

Advantages:

- The perception that the push system promotes equity at the lower levels through the delivery and availability of standard drugs.
- Improved efficiency in management of the supply chain: saving time and reducing operational costs.
- More effective and efficient delivery and supply of EMHS.
- Relevance in resource-constrained settings because it does not require highly qualified personnel at the lower level health facilities to carry out quantification of medicines and essential supplies.

Disadvantages:

- Standard items and quantities supplied so not responsive to local disease burden.
- Increased likelihood of under or over supply of some medicines: resulting in wastage and expiry of drugs not in high demand.

This study found that the push system improved availability of essential medicines. It reduced average stock-out days per month for all EMHS in the facilities from 20 days to 5 days. However, 63% of items were oversupplied with the risk of expiry.

Availability of Essential Medicines and Supplies during the Dual Pull-Push System of Drugs Acquisition in Kaliro District, Uganda.

Okiror Bruno, Onchweri Albert Nyanchoka, Miruka Conrad Ondieki and Maniga Josephat Nyabayo. 2015. Journal of Pharmaceutical Care and Health Systems. S2:006. doi:10.4172/2376-0419.S2-006.
http://www.omicsgroup.org/journals/availability-of-essential-medicines-and-supplies-during-the-dual-pullpushsystem-of-drugs-acquisition-in-kaliro-district-uganda-2376-0419-S2-006.php?aid=41540

This study on availability of essential medicines in health centres during the dual Pull-Push system in Kaliro District, Uganda, was undertaken to be used as an indicator of effectiveness of the dual pull-push system of drugs acquisition in the district. Results showed that average stock-out duration of essential medicines and supplies was 23.89% (20.47 % for essential medicines and 27.32% for medical supplies). The authors observed that the trend of essential

medicines and supplies availability during the dual pull-push system seemed to be declining since its initiation in 2010. Factors affecting availability of essential medicines and supplies included lack of consistency in delivery schedules. The lead time for delivering drugs to the healthcare facilities was either inconsistent, so it was difficult to predict when the drugs would be delivered or was too long to sustain a supply till its next replenishment. Other factors reported included lack of consideration of the different needs of different health facilities and lack of strong governance and coordination of the national system.

4. "Top-up" or informed push systems

Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. 2014. Promising Practices: Distribution. Arlington, VA: Management Sciences for Health.
http://siapsprogram.org/wp-content/uploads/2014/07/4_Distribution-final.pdf

A top-up or informed push system is one in which medicines are distributed on predetermined delivery schedules without an order from the lower levels of the supply chain. Delivery trucks are often loaded with a pre-determined quantity of commodities based on population or previous usage information. Trained delivery teams count stock levels and top-up the commodities needed. The specific quantity of commodity left at (or removed from) each facility is usually based on a number of factors, including stock on hand, losses and adjustments, and days of stock-out since last delivery.

Advantages:

- For countries struggling with information flow, a "top-up" or informed push process eliminates reliance on the health facility to order the correct amount of stock.
- Improved regularity of distribution.
- Reduced stock-out rates.
- Improved reporting rates.
- Health facility staff do not need training/ supervision in data entry and resupply calculations.

Disadvantages:

- A large amount of upfront investment is needed in reliable vehicles, drivers and technical staff.

Conditions in which a top up/ informed push system may/ may not be suitable:

- Used for a limited number of commodities (a suggested maximum is 55) that have relatively steady demand.
- The top-up or informed push system often uses minimum and maximum stock requirements, which are set in advance. The distribution team then tops up service delivery points that are below the stock minimum and removes stock from service delivery points that are above the stock maximum. This works well with preventative health commodities, such as vaccines or family planning supplies where the need is fixed and can be predicted based on population data. Commodities with variable demand are less conducive to a system with predetermined minimum/maximum stock levels.
- Situations where rationing decisions must be made at higher levels of the supply chain because there is not adequate supply to meet demand may not be conducive to a top-up or informed push system.

Delivery Team Topping Up: Bringing about reliable distribution in difficult environments. USAID/DELIVER, 2008.

http://deliver.jsi.com/dlvr_content/resources/allpubs/logisticsbriefs/ZW_DTTUBrin.pdf

The Delivery Team Topping Up (DDTU) System has been effectively used in Zimbabwe for the distribution of condoms and contraceptives to health facilities. This delivery system streamlines ordering and reporting processes by letting the vendor manage the inventory at health facilities. Orders are not placed by the health facilities, but instead the delivery teams calculate the needs at the time of the deliveries using forms designed for this purpose. This approach decreases the burden on the health workers for reporting. The delivery teams carry out physical inventories and reconcile quantities delivered, quantities in stock, and—in some cases—quantities returned. By bringing the source of supply (the delivery truck) closer to the source of demand (the health facility), and streamlining the steps and processes in between, this system results in a more efficient flow of commodities and information.

An evaluation in 2007 found that the DTTU system had achieved 99% of coverage of all service delivery points—more than 1,200 clinics. On the same national scale, it had achieved more than 95% availability of contraceptives and HIV and AIDS condoms. Following these positive results, HIV tests and nevirapine were added to the DTTU. Stock-out rates for nevirapine tablets decreased from 33% to 2% after they were merged into the system. The DTTU system has expanded to manage 21 commodities.

Measuring cost to optimize health commodity delivery in Zimbabwe. USAID DELIVER, 2010.
http://pdf.usaid.gov/pdf_docs/PNADY088.pdf

The USAID DELIVER project Supply Chain Costing Tool was used to evaluate the cost effectiveness of the Delivery Team Topping Up (DDTU) System compared to the Essential Drug System (EDS), a traditional pull distribution system functioning effectively before the economic decline in Zimbabwe. Key outcomes of the costing exercise include:

- A DTTU informed push approach is less costly than a pull system for a smaller number of commodities aimed at primary health care facilities.
- The DTTU system can add PHC commodities for a similar average cost of delivery with additional funding for capital and operating costs.
- For EDS, staff time, training, and supervision at the facility level represent the majority of the cost, and these activities must be funded to ensure that the system works. Without them, EDS is likely to underperform. EDS is also a burden to medical staff members, who take time away from patients to perform supply chain activities.
- In a fully functioning pull EDS, with a large number of commodities, supply chain costs are likely to be lower than if they were managed in a DTTU system. Training and supervision costs would be spread over a greater total value of commodities.

OPTIMIZE Senegal Report. World Health Organisation. PATH. Seattle: PATH; 2013.
http://www.path.org/publications/files/TS_opt_senegal_rpt.pdf

An informed push system has been developed in Senegal called the “Moving Warehouse.” It delivers vaccines, essential medicines, reproductive health commodities, and HIV, malaria, and tuberculosis medicines directly to health facilities. In a pilot study, it improved its reliability in completing delivery circuits throughout the pilot, nearing 100% by the end of 2012. As a result, general vaccine availability was at the appropriate level in four out of five pilot districts. overall annual supply chain costs increased, but cost per vaccine remained steady.
In 2012, Senegal also piloted an informed push system for family planning commodities, using similar principles to the moving warehouse for vaccines. During the six-month pilot programme, stock-outs were eliminated and there were marked increases in the use of intrauterine devices, injectables, pills, and implants.

Evaluation of the Project to Support PAV (Expnded Program on Immunization) in Northern Mozambique, 2001-2008. Village Reach, 2008.
http://www.villagereach.org/wp-content/uploads/2010/02/Evaluation-ExecSum-and-Report-081202.pdf

The Dedicated Logistics System (DLS) is run by the Provincial Health Departments in Northern Mozambique to deliver vaccines and medicines directly to health facilities. During the delivery, field coordinators collect data on vaccine supplies, stock-outs, vaccines administered, and cold chain maintenance to inform forecasting and logistics management.

There have been challenges in implementing the system including: delivery team budgets were not adequate initially; provincial immunisation staff have had to change their job duties to make time to participate in monthly delivery routes for two weeks per month; vehicles are shared across multiple programmes which can delay distribution. A 2008 evaluation showed that the DLS dramatically improved coverage rates, resulting in a 93% coverage rate for all vaccinations given to children age 24 to 34 months in the intervention province.

5. Supply chain strengthening model

McCord, Joseph and Nadia Olson. 2011. Supply Chain Evolution: Introduction to a Framework for Supply Chain Strengthening of Developing Country Public Health Programs. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 4.
http://deliver.jsi.com/dlvr_content/resources/allpubs/guidelines/SuppChaiEvol.pdf

A “Supply Chain Evolution Model” demonstrates to countries how to implement and sustain an integrated supply chain. It illustrates how public health systems can move through a process management trajectory that leads to improved supply chain management capacity, from ad hoc to organised, to integrated, to extended stages. In the earlier stages, health system managers have little understanding of what their supply chain system looks like, how it is operating, and how to manage various supply chains as one cohesive system that interacts with its broader environment.

As MOHs and donor partners coordinate and carry out efforts to define, measure, and manage public health supply chain processes, those supply chains can evolve. In the later stages, the flow of information and visibility into supply and demand improves at all levels of the supply chain. Roles and responsibilities of personnel are clarified and validated. In the integrated and extended stages, health system managers increasingly understand how their system operates, ways to use resources more efficiently, how to manage and align supply chain actors to achieve common goals, and, ultimately, ways to interact more effectively with the broader environment in which the supply chain is situated.

Getting Products to People: The JSI Framework for Integrated Supply Chain Management in Public Health. John Snow Inc.
http://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=11907&lid=3

6. Other useful resources

John Snow Supply Chain Management:
http://www.jsi.com/JSIInternet/IntlHealth/techexpertise/display.cfm?tid=1000&id=79

Management Sciences for Health (MSH): http://www.msh.org

People that Deliver (PtD): http://www.peoplethatdeliver.org/

PSM Toolbox: http://www.psmtoolbox.org/en/

Systems for Improved Access to Pharmaceuticals and Services Program (SIAPS):
http://siapsprogram.org/approach/supply-chain-management/

USAID DELIVER project: http://deliver.jsi.com/dhome

Village Reach: http://www.villagereach.org/

World Health Organisation Medicines Supply Publications:
http://www.who.int/medicines/areas/access/supply/en/index6.html

7. Additional information

Author
This query response was prepared by Imogen Featherstone

Expert contributions were received from:
Reinhard Huss, University of Leeds.
Wilbert Bannenberg, hera.

About Helpdesk reports: The HEART Helpdesk is funded by the DFID Human Development Group. Helpdesk reports are based on 3 days of desk-based research per query and are designed to provide a brief overview of the key issues, and a summary of some of the best literature available. Experts may be contacted during the course of the research, and those able to provide input within the short time-frame are acknowledged.

For any further request or enquiry, contact info@heart-resources.org

HEART Helpdesk reports are published online at www.heart-resources.org