

Do systems contribute to the sustainability of the Revolving Drug Fund (RDF) in Sudan?

Mahgoub Mohamed Hamed ⁽¹⁾, Mohamed Izham Bin Mohamed Ibrahim ⁽²⁾

(1) Pharmacist, Ministry of Health, White Nile State.

(2) B.Pharm. (USM), Ph.D. (PCPS), Social and Administrative Pharmacy Discipline, School of Pharmaceutical Sciences, Universiti Sains Malaysia

Correspondence: Mahgoub Mohamed Hamed, Tel: +249914493011, (or) +249122629925, **E-Mail:** mahgzain@gmail.com

Abstract

Efficient management of a health system's drug supply is important because drugs have conventionally been a cornerstone for the management of many diseases and they continue to be an essential ingredient of many modern treatment algorithms. Systems (structures and processes) indicators were checked at two administrative levels: central and regional. Sudan regions (districts) were considered as strata. One state was randomly chosen in each region. Main methods for data collection were structured interviews; check lists, document reviews, stock record reviews, physical stock check and sample surveys, using a pre-piloted questionnaire. Key findings included: presence of structures such as: NDP (regularly updated), legislations, regulations and enforcement agencies. RDF is exempted from the 'treasury cycle' at the state level. Staff trained. Procedures for managing drug supply and financial operations available. Drug selection is based on EDL. RDF main stores are complying with best practices for drug storage and management. Revenues from drug sales are not used to pay the salaries of public health personnel. Funds and logistics to all states allocated before starting the RDF. In contrast: a functioning DTC at the central and the state levels is absent. Essential medicines concept is not a part of the basic curricula in health training institutions at the state level. No reporting system for consumption data in health facilities. Conclusion: It is evident that RDF had been planned for to be a viable, efficient and sustainable program.

Keywords: system, structure, process, NDP, management, health financing, sustainability.

Introduction:

The Mexico Statement on Health Research called on national governments to pursue sustainable

programs to support public health and health-care delivery systems.

George Schieber, et al (2006), highly evaluate the importance of the sustainable health financing as it provides the resources, economic incentives for the operation of health systems and acts as a key determinant of health system performance in terms of equity, efficiency, and health outcomes. Brian Nolan, V.T. (1995) suggested: the fundamental purpose of the cost recovery (user fees) system in health services is to generate more resources for the health sector, he argued, this could allow cost effective basic services to be expanded.

RDF as a drug distribution system has been defined in many of the specialist literature as: a self-sustaining (cost recovery) source of funding to ensure access to a continuous supply of quality drugs at an affordable price. Timothy A. Johnston, S.S. (1999) was suspicious about the capitalization of national or regional revolving drug fund (RDF) as they can be an effective way to improve drug availability but only if investments are preceded by sufficient institutional reforms to ensure efficiency and accountability of the program.

In Sudan the RDF had been launched as a national program in the presence of the president in May 2002, started to work in July 2002 in seven states. In July 2003 it covered another ten states and by the end of 2006 it covered a total of 19 out of the 25 states in Sudan. National coverage by these funds is a part of the national drug supply plan in Sudan (Sudan, R.D.F.-C.M.S. 2006).

Ahmed (2006) emphasized that: there is not any comprehensive assessment conducted for the pharmaceutical supply system until now in Sudan. Limited assessments to particular components of the supply system have only been done within the last few years and most of them are not published. While assessing the pharmaceutical supply system in Sudan; Ahmad focused on the central level and concluded from interviews that: the geographical coverage of the distribution network is

progressing slowly, but steadily and the weak infrastructure of the remote peripheries impedes further expansion. In addition the assessment revealed the need for strengthening medicines supply systems through country assessments, promotion of 'best practices', and medicines' supply management training. Here Ahmad indirectly reflected the absence of the main elements of sustainability from the need to strengthen medicines' supply systems, the promotion of 'best practices' and the much care needed for the rehabilitation of the managerial capacities. This had been high lighted in the Mexico Statement on Health Research: "Most concerns about sustainability - especially in low-income and middle-income countries- are related to premature discontinuation of programs after an initial period of support. In addition to the needs left unmet, discontinued programs are wasteful of human, monetary, and technical start-up investments, and can diminish community trust and support for future programs.

The aim of this study was to assess the sustainability of the RDF in Sudan through the assessment of the systems (structures and processes) of the RDF.

Methods:

This study describes distribution as a series of management functions. Indicators and interview questions were designed from Managing Drug Supply and Rapid Pharmaceutical Management Assessment (RPMA) by the MSH (Nicholas Studzinski, et al., 1995).

According to the nature of objective the study design was descriptive and retrospective covering the period from 2002 to 2006. Retrospective studies are always observational since there is no opportunity for intervention on the part of the researcher. (Richard L. Slaughter, et al., 2001).

The complete assessment requires that information be gathered on structure and process indicators at two administrative levels - central and regional (=state - 'including Health facilities') hence; the population included: at the central level: the federal pharmacy directorate officials, CMS officials. Structured interviews with closed ended questions and a paragraph for comments for both the respondent and the researcher and document reviews are the main data collection methods.

At the state level the population included: the minister of health, pharmacy directorate officials, state legislative council health committee members (LCMs), RDF officials at the RDF headquarters and at different health facilities levels the population included: RDF outlets staff. Structured interviews with closed ended questions with chances for comments by the respondents and the researcher "responses were handwritten onto the interview sheets during the interviews", document review and systematic observation (check list) were the main data collection methods. Study population at different levels of hospitals and health centers also included: patients. Sample surveys were the main data collection methods.

Prior to the main data collection phase of the study the questionnaire was piloted with the RDF in Aljazeera state and minor amendments were made to clarify some of the questions.

Sudan was divided into geographical regions as strata; then the states were randomly chosen among these regions. This thought might give a greater chance for variables that may be expected to influence the way pharmaceuticals are managed as: geography, socio-economic factors, population density, or key features of the health care system to work (Sekaran, U. 2003). This process resulted in the following four states: the; White Nile, Blue Nile, Red Sea and the Northern state. South Darfur state was included purposively as a representative for the conflict area. Khartoum the capital city of Sudan and the main population center was excluded from this study because it has its own autonomous RDF. Southern Sudan has its own government and its separate health system, so it has been excluded.

At the health facilities (HF) level, to represent all significant variants of the overall system the population was divided into strata (subgroups) and then the random selection resulted in: 18 public hospitals at the state level distributed as follows: the main biggest public state referral hospital in each state (5 hospitals). Four rural hospitals in each of following states White Nile, Blue Nile, Northern where the RDF is not present at the health center level, and one rural hospital (Sinkat hospital) in the Red Sea state (a total of 13 rural hospitals). Two health centers and one people's pharmacy (Al-Shaheedat pharmacy) in the emergency hospital in Port - Sudan the capital city of Red Sea state constituted the rest of the HFs. Interviews with patients lasted for approximately 3 minutes with each of the 440

patients surveyed for: how did they know about RDF in addition to their demographic data. In South Darfur state at the time of survey the RDF existed in the capital city of the state only; at Nyala educational hospital. The list of indicator pharmaceuticals had been prepared following the Rapid Pharmaceutical Management Assessment guide lines.

Limitations of the Study:

This study covers the northern states equal to 62% of the total number of the states in Sudan. Sudan has a big area a matter and how representative are the results for the pharmacies and facilities sampled overall and is it sufficient to draw general/national conclusions from such a little number of samples; these results may only provide the first sparkle in the process of further research to draw a complete picture about the drug distribution system in the public sector in Sudan. In addition some important data are not available as for: the percentages of fulfillments of requested demand from health units and the average stock out duration from health facilities i.e. it is estimative information (not accurate).

Results:

The federal pharmacy directorate:

The latest copy of the national drug policy (NDP) as recommended by WHO, approved by the government copy covers the period from 2005 to 2009 exists. Comprehensive drug control legislations, regulations and enforcement agencies are in place together with a law permitting generic substitution by the pharmacist in the public sector (NDP 2005- 2009, page -11). A functioning Drug and Treatment Committees (DTC) and Standard Treatment Guidelines (STGs) do not exist at the central level. National Drug Formulary List (NDFL) issued in 1991, not updated yet.

According to CMS officials RDF in Sudan is managed through a mixed approach structure. Implementation of the RDF at the state level was a phased plan prior to that studies to ensure sufficient recovery of funds and procedures for drug and financial management and training of the staff (multidisciplinary team) were planned for and available. RDF at the state level is exempted from the treasury cycle. Generics policies are applied during the central procurement

procedures in CMS and a quality control unit exists.

All health ministers at the state level where this study was conducted agreed on the reliability of the RDF as a mechanism to avail medicines in MOH facilities and they recognized that the essential medicines' concept is not a part of the basic curricula in health training institutions. The comments received from 4 ministers (80%) were diverse in nature (see Box 1)

Box 1

"Many physicians act as active opponents to RDF"
Minister in state ⁽¹⁾

"There are problems in management. MOH is not benefiting from the RDF (financially) so relation is very weak."

Minister in state ⁽²⁾

"RDF actively supports the poor (affordability, availability), so for me it is considered as one of the most outstanding projects achieved in Sudan such as Marawe Dam and Petrol discovery."

Minister in state ⁽⁴⁾

"I understand the concept of the RDF so I support the RDF strongly."

Minister in state ⁽⁵⁾

Box 2

"The RDF should have branches for the main store in other cities in the state"

State (1)

"To support the RDF's efficiency; managerial skills of the RDF staff (managers) should be enhanced"

State (2)

"Though the war had stopped and diminished the wide spread in the state; the RDF helped in the control of medicines' counterfeit by availing most of the needed medicines in the capital city (Nyala) – now the quality of medicines trusted"

State (5)

Health Committees' Chiefs (HCC) in the legislative councils in all states that were surveyed agreed that they are well oriented regarding the concept of the RDF and ensured their real support. Three out of the five HCC surveyed (60%) gave suggestions and Comments:

Pharmacy directorate officials at the state level agreed that the RDF is compliant with the national regulatory authority standards in all states surveyed. Drug information centers exist in the Red Sea and the Northern states only (40%). Functioning DTC were not found at the state level, however, an educational hospital level was found only in "Dungula" in the Northern state (20%).

At the state RDF level processes manuals and checklists for drug supply processes are available in 3 states (60%). All states (100%) are using the EDL during the drug selection process. In 4 states (80%) drug selection is always a responsibility of a committee. Patients' preference is considered during the process of selection in all states surveyed. ABC analysis is applied as a quantification mechanism only in 2 states (40%). The standard operating procedures (SOPs) for procurement, receiving, and issuing were found in 2 states only (40%). Medicines' transportation is scheduled to RDF outlets in 4 states (80%). Inspection teams' are lead by pharmacists working in the 5 states that were surveyed (100%) and the CMS is not the only supplier of medicines to RDF for all states that were surveyed. Inventory records available and well kept and bin or stock cards containing the average consumption rates are in use in all states. Regular calculations for the minimum and maximum stocks in the main storage are planned and performed in 3 states (60%). Annual audit/inventory reports for the drug store are available in 4 states (80%). The regular drug supply to RDF outlets is applied on pull basis in all states.

In all states (100%) covered in the survey, the following storage conditions were maintained in proper way at the RDF main store level: storage room temperature controlled mainly through air conditioners. Sunlight cannot access the storage room. Storage area is free from moisture and pests. Medicines are stored on shelves, pallets or cold storage in a systematic way (FEFO = first to expire first out) and the storage area ventilation is maintained through the presence of windows, doors, fans and air coolers or air conditioners.

Observation: The Northern state has (3) branches for the main store covering different geographical areas in the state.

Financial management and accountability:

Laws or strong regulations that protect the RDF against political interference especially with funds are in place in four states (80%). Revenues from fees or drug sales are not used to pay the salaries for public health personnel in facilities where the RDF offer its services in all states surveyed (100%). Annual budgets planning income and expenditure and regular summary reports of accounts payable and receivable and balance sheets are used in all states surveyed on the other hand annual auditory reports are available in 4 states (80%).

Financial control at the accounts departments is maintained by dividing duties among different individuals that is; responsibilities are delineated with exception in 4 states (80%). All transactions regulated through the use of written procedures then recorded and monitored. Strict guard on the collection and proper expenditure of revenues by the use of government procedures on misuse of public funds applied in all states surveyed (100%). At the health facility level (HF): 21 HFs were checked for adequate storage conditions and medicines' handling in the 5 states covered during the survey. In all HF temperature control is maintained through roofs and ceilings. Availability of windows, doors, fans and in some of the pharmacies in main hospitals air conditioners give a chance for good ventilation in 18 HF (85.7%). It was observed that direct sunlight can access inside the pharmacy area in 2 HF (9.5%). Medicines are stored directly on the floor (= no pallets) in 2 HF (9.5%). Fortunately storage areas are free from moisture and pests in the 21 HF (100%). Medicines are stored in a systematic way in the 21 RDF outlets visited during the survey (100%). A fridge is available in 19 HF (90.5%). STG (for malaria) are available in 6 units (28.6%). EDL was found in 2 units only (9.5%); on the other hand a price list from the RDF and all other records were adequately kept in a locked separate cupboard or drawer.

Patients' survey results:

Total of population surveyed was 440. Patients' response rate was 100% for the quick interviews (about 3 minutes). 75.5% (332) of the population surveyed were males, 59.7% (263) of them were

from the private sector, 30.2% (133) from the public sector, students constituted 9% and < 1% others.

Unfortunately only 20.2% of the population surveyed knew about RDF through media. Inferential statistics with $p < 0.05$ reflects great differences in their knowledge about RDF through media among different states which scored in the Red Sea and the Northern states around 40% with an average value for the rest of the states around 7%.

Discussion:

Federal Pharmacy Directorate

The presence of the NDP 2005- 2009 - as recommended by WHO is a positive sign in providing quality pharmaceuticals to the public, regulating control of pharmaceuticals, and supporting cost-effective management. The presence of a law permitting generic substitution by the pharmacist in the public sector; paves the road for the RDF to avail affordable medicines in the public sector. In contrast absence of the DTC as a key structure indicates a point of weakness and may explain the absence of STG and why the National Drug Formulary List (SNF) is not updated since 1991. A DTC, STG and a NDFL are important tools in availing medicines cost effectively and according to the real need.

Central Medical Supplies (CMS)

RDF is managed through a mixed approach. In practice this facilitates developing managerial capacities at lower levels and managing different functions more efficiently e.g. adjustments in drug list may make an RDF more responsive to local circumstances. RDF phased implementation at the state level gives the chance to detect weaknesses and strengths in the whole system before proceeding on wider coverage to avoid wastage of resources and time.

Studies conducted before the implementation of the RDF to ensure sufficient recovery of funds, the agreement that exempts the RDF from the "treasury cycle" at the state level, allocation of required funds before starting RDF at the state level, availability of the procedures for drug and financial management and the training courses conducted to orient the multidisciplinary team prior to the implementation of the RDF; all act in a

continuum constructing the basic tools for the viability and accountability of the RDF performance moreover; they help to avoid failures in the supply system that can lead to life-threatening shortages of medicines and wastage of scarce public resources.

Application of generics' policies during the central procurement procedures in CMS helps to lower drug prices, drags down the prices of the branded versions of the drug (Juan Rovira 2003), and promotes confidence in the program. Existence of quality control unit in the CMS ensures that patients receive safe and effective medicines; achieving one of the principal goals of the RDF.

State ministry of health (MOH):

The minister

The real awareness of the ministers of health at the state level reflects the country's recognition that regular budgetary means require supplementation in order to bridge the gap between the drug supply and demand to ensure the public access to essential medicines. On the other hand absence of essential medicines concept from the basic curricula in the health training institutions/universities in all states surveyed indicates a point of weakness that needs a special care, because an overall capacity strengthening of the health and supply systems is a prerequisite to respond adequately to the increased medical and pharmaceutical needs of populations. Comments given by ministers show opaque relation between health care providers (physicians) and the RDF and the problems in management can lead to distortions of policy that are bad for public health.

State Legislative Assembly: *health committee members (HCCs)*

HCCs' orientation and real support to the concepts and importance of the RDF are vital during the introduction or expansion of an RDF as they offer the needed political support and protection. Comments offered by the HCCs showed even their deep understanding and strong support to the concept of the RDF like that from HCC in South Darfur state as a conflict area.

State MOH (ministry of health): *Pharmacy directorate*

The actual compliance of RDF with the national regulatory authority standards suggests a situation where the government's efforts in allocating financial resources or staff are not wasted; in addition it also offers the example in quality practicing needed to avail safe medicines for the public. Existence of drug information centers in two states only indicates a weak point in the system as they are considered as a measure of the degree of access to unbiased and current information required for rational selection, procurement and use of medicines (Nicholas Studzinski, et al. 1995).

existence of a functioning DTC in one educational hospital only at the state level ensures the absence of effective coordination mechanisms between the national and state levels in other states; a status that will not help the development and implementation of consistent policies, formulary lists, procedures and better services (more access to essential medicines) for the public (Anonymous (2007).

Drug supply processes

Availability of processes' manuals and checklists' for drug supply processes in 3 states (60%) reflects a moderate awareness among RDF managers in different states to develop procedures for drug supply and financial management which are essential aspects for any approach. Drug selection is a responsibility of a committee in 4 states (80%), drug selection in all states based on EDL and patients' preference is considered during the process of selection to ensure the prioritization of availability of the most essential products with due regard to disease prevalence, evidence on efficacy and safety, and comparative cost- effectiveness (Jonathan D.Quick, et al., 1997).

Standard operating procedures (SOPs) for procurement, receiving, issuing, and ABC analysis, VEN analysis as mechanisms or instruments for the quantification and prioritization of needs available in 2 states only (40%); reflecting weaknesses in the management of procurement process which may be depending on the current experience to estimate, quantify and forecast which may result in drug shortages or loses by expiries.

CMS is not the only supplier of medicines to RDF in all states surveyed; this may be due to that: some medicines are not included in the CMS list or

they are not available in the CMS. (Rao, et al., 2006).

Transport arrangements are scheduled ensuring steady drug supply (availability) in 4 states (80%), in the fifth state this cannot be attained due to the unpaved, rough roads and the relatively longer rainy season in the state, so medicines are stocked in large quantities to avoid life-threatening shortages in remote areas but this may exhaust capitals available.

Regular inspective tours by teams -lead by a pharmacist- are scheduled to check the general performance, revenue collection and maintenance of good storage conditions at the level of the health facility (RDF outlets). These tours also help in moving near expiring medicines from overstocked facilities to under stocked ones. In addition, information on stock outs is needed from facilities since inventory records at the distribution depots may not fully reflect undersupply problems.

Inventory control and information management

Well kept inventory records, bin or stock cards containing the average consumption rates in addition to the existence of computer systems as local area net (LAN) in the headquarters of the RDF creates a domain for record keeping ensuring best care for information management at the drug store level reflecting the real awareness about the importance of the drug management information system (DMIS) which is vital in decision making. Planning and performing regular calculations for the minimum and maximum stock in the main storage in 3 states (60%) shows a point of weakness. Reports are produced in all states surveyed; this may help to achieve the primary purpose of inventory control in managing procurement and stock movement. The regular - on demand (pull basis) - drug supply to RDF outlets in all states ensures physical availability (accessibility).

Regular annual audit/inventory reports show one of the strengths of the systems because they reflect transparency and ensure the efficiency of record keeping a base line for the information management. Unfortunately this applied in 4 states only (80%).

Adequacy of storage conditions

Inventory control in the RDF main storage supported by computer system and the compliance with best practices for drug storage and management as shown previously as results; indicate a situation where the primary purpose of a medical store is achieved in the stages of receiving, holding, and dispatching stocks. This helps to reduce costs resulting from drug wastage and to avail safe medicines in the proper needed quantities to the public. Also careful management of the drug inventory may help anticipation of a time of increased drug use this may allow to take advantage of sales while insuring supplies are on hand.

Two-level distribution system results in lower operating costs and faster stocking of health facilities. This is observed in the Northern state where the 3 branches for the main store cover different geographical areas in the state.

Financial management and accountability

Due to insufficiencies in budgets of the ministries of health at the state level health ministers tend to seek other sources to solve problems. Apparently RDF represents the richest, nearest and the most vulnerable source; but the presence of laws or strong regulations act as hinders to protect RDF against political whim especially with funds. Revenues from drug sales are not used to pay the salaries of public health personnel in facilities where RDFs offer their services; this together with the protection afforded against political whim help to maintain RDF protected against decapitalization, ensuring efficiency, accountability and the sustainability of the program.

Application of the main principles of an effective financial control system at the RDF headquarters, as stated by Jonathan D.Quick, et al., 1997 in dividing duties among different individuals in the accounting department, delineation of responsibilities, regulation of all transactions through the use of written procedures, recording and monitoring of transactions and the awareness and application of the accounting regulations with a strict guard on the collection and proper expenditure of revenues by the use of government procedures on misuse of public funds; give the RDF the tools and power to safe guard funds; which means nourishment, viability and sustainability of the activities of the RDF.

Finally transparency is shown through the presence of annual budgets planning income and

expenditure, regular summary reports of accounts payable and receivable and balance sheets. Michael Ramos ensures: theoretically these should comply with the elements of the annual auditory reports as: the accuracy of specific account balances, compliance with policies and procedures of the program, adequacy of the design and/or operating effectiveness of the department internal control and disclosure controls and the accuracy of reported financial results of the department (Ramos, M. 2007). Annual auditory reports are available in 4 states (80%) but it must be available in all states.

Viability and sustainability:

Bossel, H. (2001) proposes: viability is the ability of a system to cope with challenges and will not be overwhelmed by them, i.e., its responses can outpace the threats to it.

Mc Michael, A.J. (2006) gives a brief definition for sustainability of a health system as “the maintenance of health benefits”. Per Nilsen, et al., (2005) support Mc Michael as they define sustainability as the: “continuation of health programs”. As a Multidimensional definition Olsen, I. (1998) looks at sustainability as: “the long term ability of an organizational system to mobilize and allocate sufficient and appropriate resources (manpower, technology, information and finance) for activities that meet individual or public health needs and demands”. This is supported by James C. Knowles, et al., (1997) when they refer the institutional sustainability to the capacity of the system, if suitably financed, to assemble and manage the necessary non-financial resources to successfully carry on its normal activities.

CONCLUSION:

Overall insights in this paper indicate that, both the institutional and the financial structures and processes (systems) as available in the literatures are well planned for and implemented to a greater extent. Accordingly it is predicted that: systems of the RDF in Sudan to a higher extent are able to contribute to its sustainability. However, there is a great need to establish effective DTCs at different health care levels; and to elevate the managerial skills of the RDF managers in terms of technical operations for the drug supply and in the other managerial, financial functions and

statistics. Researches on local problems at the state level and regular evaluation at the national level are important.

References:

- Ahmed, F.E. (2006) Assessment of the Pharmaceutical Supply System in Sudan
- Anonymous (2004) The Mexico Statement on Health Research
Knowledge for better health: strengthening health systems. THE MINISTERIAL SUMMIT ON HEALTH RESEARCH. MEXICO CITY.
[Online]. [Accessed 8th November 2008]
Available from World Wide Web:
http://www.who.int/rpc/summit/agenda/en/mexico_statement_on_health_research.pdf
- Anonymous (2007) Sudan. IN I. Please (Ed.).
[Online]. [Accessed 30th July 2008]
Available from World Wide Web:
<http://www.infoplease.com/ipa/A0107996.html>
- Brian Nolan, V.T. (1995) Cost Recovery in Public Health Services in Sub-Saharan Africa World Bank P-4 Google e-book [Online]. [Accessed 17th July 2008].
Available from www:
[http://books.google.com.my/books?hl=en&lr=&id=NeH_9wKDbwC&oi=fnd&pg=PP7&dq=Nolan+and+Turbat+1995&ots=JD3yUtFBn6&sig=9bR\]cc9TcBTkIEPv-mj1Oc\]4n6o#PPA4,M1](http://books.google.com.my/books?hl=en&lr=&id=NeH_9wKDbwC&oi=fnd&pg=PP7&dq=Nolan+and+Turbat+1995&ots=JD3yUtFBn6&sig=9bR]cc9TcBTkIEPv-mj1Oc]4n6o#PPA4,M1)
- Bossel, H. 2001. Assessing viability and sustainability: a systems-based approach for deriving comprehensive indicator sets. *Conservation Ecology* 5(2): 12. [Online]. [Accessed 8th November 2008]
Available from World Wide Web:
<http://www.consecol.org/vol5/iss2/art12/>
- George Schieber, Cristian Baeza, Daniel Kress, and others (2006) Disease Control Priorities in Developing Countries. (Chapter 12 - Financing Health Systems in the 21st Century) George Schieber, C.B., Daniel Kress, and Margaret Maier: Financing Health Systems in the 21st Century. The World Bank Group P – 225
[Online]. [Accessed 23rd January 2008]
Available from World Wide Web:
<http://files.dcp2.org/pdf/DCP/DCP12.pdf>
- James C. Knowles, C.L.A.W.S., (1997) Measuring Results of Health Sector Reform for System Performance: A Handbook of Indicators. IN U.S.A.F.I. Development (Ed.) Partnerships for Health Reform. [Online]. [Accessed 28th July 2008]
Available from World Wide Web:
http://info.worldbank.org/etools/docs/library/99169/CD_CC/precourse/CCFY04CDRom/Week2/2Tuesday/S3HealthSysPerformance/MeasuringResultsofHSReform.pdf
- Mc Michael, A.J. (2006) Population health as the 'bottom line' of sustainability: a contemporary challenge for public health researchers. *The European Journal of Public Health* 16, 579-581.
- Nicholas Studzinski, A.B. (1995) RAPID PHARMACEUTICAL MANAGEMENT ASSESSMENT: AN INDICATOR-BASED APPROACH. Management Sciences for Health (MSH). (Adopted)
[Online]. [Accessed 22nd September 2007]
Available from World Wide Web:
<http://erc.msh.org/newpages/english/toolkit/rpma.pdf>
- Olsen, I. (1998) Sustainability of health care: a framework for analysis. *Health Policy and Planning* 13, 287-295.
- Per Nilsen, T.T., Lennart Nordenfelt and Kent Lindqvist (2005) Towards improved understanding of injury prevention program sustainability. *Safety Science*, 43, 815-833.
- Rao, R., P Mellon, D Sarley (2006) Procurement Strategies for Health Commodities An Examination of Options and Mechanisms within the Commodity Security Context IN T.U.S.A.F.I. Development (Ed.), DELIVER
John Snow, Inc.
- Richard L. Slaughter, D.J.E. (2001) Evaluating drug literature: A Statistical Approach R.R.Donnelley and Sons.
- Sekaran, U. (Ed.) (2003) Research Methods for Business: A Skill Building Approach, 4th Edition, Wiley
- Timothy A. Johnston, S.S. (1999) Investing in Health - evaluation of national revolving drug funds, The World Bank. Google books