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**DELIVER**

**DECENTRALIZATION  
AND THE  
HEALTH LOGISTICS SYSTEMS IN GHANA**

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## **DELIVER**

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## **Abstract**

Decentralization has been one of the most far-reaching interventions in the health sector reform packages. In Ghana, Health Sector Reform took place from 1998-2002 under the Health sector Support Project (HSSP) supported by the World Bank and continued under another five-year medium term health strategy for the period 2002 -2006. To implement these reform packages, a number of health reform initiatives were put in place, most notably, the decentralization of administration within the sector, and the integration of supply systems to improve management efficiency.

This is the second country study designed by DELIVER and the Harvard School of Public Health to assess the impact of decentralization on the performance of health logistics systems. The first study took place in Guatemala. Using the decision space model, the following paper examines pre-defined functions within the health logistics system in order to measure the changes in performance indicators related to changes introduced by decentralization and integration.

The study's indicators for greater decision space in Ghana were related to better performance for financing and planning/budgeting and worse performance for procurement, inventory control, storage, LMIS, training and client contact. Comparisons of results in Ghana are made to results in Guatemala and conclusions are drawn as to which functions should remain centralized and which functions should be allowed a greater level of decision space.

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## **Executive Summary**

Decentralization and integration are often feared by logistics experts for their potentially disruptive effects to health logistics systems. DELIVER and Harvard School of Public Health designed a series of studies to be implemented in six countries to assess the impact of decentralization on the performance of health logistics systems. The first study was in Guatemala. This report presents the findings from the second country study in this series: Ghana.

This study examined the impact of decentralization and integration of decision-making authority to regional and district levels on the logistics management and distribution of essential drugs, contraceptives and vaccines. It used an approach and methodology to the study of decentralization of health systems that we call the “decision space” approach. This approach determines empirically the range of choice for different functions of the logistics system that officials at different levels of the system report experiencing. It then evaluates how the reported range of choice relates to the performance of the logistics system.

The study was initiated in 2002 and the survey was implemented by a local consulting firm of Deloitte and Touche in collaboration with DELIVER, Harvard School of Public Health and officials from the Ghanaian Ministry of Health.

## **Ghanaian Health Logistics System**

The health commodity supply chain in the public sector in Ghana is made up of a Central Medical Store and a network of Regional Medical Stores in each of the 10 administrative regions of the country. Drugs and supplies including contraceptives are managed through this supply chain to health facilities throughout the country.

A series of reforms of the health system began in the 1970s, including the creation of District Health Management Teams. In January 1992, the most far-reaching reform in the drug supply system was introduced with the establishment of Revolving Drug Accounts at all levels of the supply chain, managed by the facility. This policy, called the “Cash and Carry” system required the full cost recovery for essential drugs. The policy was expanded in 1996 for non-drug supplies and in 1997 user fees were introduced for contraceptives. Further decentralization of the health system was initiated in 1996 with the passing of The Ghana Health Service and Teaching Hospital Act (Act 525). Among the provisions of this act was the delegation of day- to-day operational control to a semi-autonomous Ghana Health Service and within the GHS semi-autonomous Budget Management Centers (BMC). Also created as part of the GHS were ten Regional Health Administrations with 110 District Health Administrations.

The Health Sector Supply system for the most part is based on a pull system with the lower facility withdrawing as appropriate based on its “needs”. With the introduction of the “Cash and Carry” system, each level is operating on a business model. All supplies are fully paid for, purchased from the higher level of the supply chain or from the open market as the need may be. The costs for supplies are recovered from its clients. This requires that each level of the supply chain determine its needs and mobilize resources to procure these to make them available to support service delivery. This means that decisions around a number of key logistics functions are taken at the local level.

A number of additional efforts were initiated to improve and strengthen the procurement systems in the health sector to support this “Cash and Carry” system. These efforts included the development of new

procurement procedures and a training program to implement these at all BMCs. Ghana is also implementing a national essential drugs program and under this a national essential drug list has been published and reviewed periodically with the last edition published in 2000.

## Findings

Using a methodology called “decision space” analysis, this study assessed the degree of decentralization and integration of the logistics system using two survey instruments in a sample of 72 facilities representing 5 of the 10 regions in Ghana. The instruments assessed the degree of decentralization and integration for seventeen specific logistics functions and evaluated the performance of the logistics system.

Although some functions still remain centralized, the decentralization process in Ghana has resulted in a considerable degree of local control in the logistics system as perceived by informants in the system.

In this study we distinguished between “general decision space” and “variable decision space”. General decision space was a comparative assessment by international and national experts of the general range of choice allowed for a specific function. For instance, in Ghana the local authorities have a moderate range of choice over financing while in Guatemala they have almost no choice over financing. However, within that moderate range of choice, some Ghanaian districts exercised more choice than other districts because they modified the national guidelines. This is an example of the “variable decision space” and we then measured the difference in performance that came from this variation.

We assessed the impact of different levels of variable decision space on selected performance variables associated with each of 16 functions of the logistic system. The performance variables were both specific to the function – for example for financing we examined cash and capital balances -- and overall indicators for the system – mean stock out rates. We found a limited number of significant relationships between higher levels of variable decision space and positive and negative performance, as shown in Table 1.1.

**Table 1.1 Degree of General Decentralization and Logistics System Performance, Ghana**

Logistic Function	Degree of General Decision Space for Drugs	Higher Logistics Performance	Lower Logistics Performance
Financing	Moderate	X	--
Cost recovery	Moderate	--	--
General Planning and Budgeting	Moderate	X	--
Product selection	Low	?	?
Needs quantification	High	--	--
Procurement	Moderate-High	--	X
Inventory control	Moderate	--	X
Storage	Moderate	--	X
Transportation	High	--	--
Logistics information mgmt system	Moderate	--	X
Personnel	High	--	--
Supervision	High	--	--

Training	Moderate	---	X
Organizational Support	High	---	---
Product Quality Assurance	Moderate	---	---
Client Contact and Use	Moderate	---	X

\* see Annex A for a more detailed decision space map for each function

The following points summarize the key relationships:

- In Ghana there was a moderate range of choice allowed to decentralized units, and those facilities which modified national guidelines (our indicator for variable decision space) had higher cash stock balances and lower stockouts.
- Those units which prepared their own plans and budgets and had a copy available and did not change their plans and budgets after reviewed by a higher administrative level also had higher cash stock balances and fewer stockouts.
- For product selection we found that some facilities created a shorter Essential Drug List based on their own disease patterns. Those who did so were more likely to purchase brand products and purchase from the private sector rather than the public stores. This finding suggests more commercial behavior, but not necessarily better performance.
- Decision space for procurement was generally high to moderate and those which used more of the decision space by making up their own procurement plans were more likely to purchase drugs that were not on the National Essential Drug List (NEDL). Slightly less than half the sample purchased drugs beyond the NEDL
- Inventory control allowed moderate decision space and those facilities that chose not to use stock cards for control were less likely to have stock levels within the required max-min levels.
- While decision space for storage was moderate, those facilities which received guidelines for storage (i.e. had less variable decision space) were more likely to meet 100% of the storage conditions set for drugs.
- Those facilities which did not use central LMIS forms (had more variable decision space) were less likely to submit quarterly reporting of contraceptives and monthly reporting of drug availability.
- For training, those facilities that selected their own participants for courses rather than letting the center make the selections had fewer personnel trained in logistics functions for drugs.
- Those facilities which modified national protocols for service were likely to have more client complaints.

While we examined the relationship between degrees of integration of drugs, vaccines and contraceptives, which were moderate to low for most functions, no significant relationships were found.

## Conclusion

We find in Ghana that allowing greater decision space in financing and planning/budgeting results in better performance while greater decision space results in worse performance for procurement, inventory control, storage, LMIS, training and client contact.

Comparing the Ghana and Guatemala studies we find some consistent results. There are some functions that appear to perform better if they remain relatively centralized in part because there are limited choices of effective procedures. Inventory control, LMIS, storage, and product selection functions probably should be limited by central guidelines and these guidelines should be enforced. However, decentralization of planning and budgeting was associated with improved performance in both countries suggesting that better local information is needed for this function.

## Acknowledgements

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## Acronyms

BMC	Budget Management Centre
DANIDA	Danish Agency for International development
DFID	Department for International Development (UK)
DHA	District Health Administration
DHMT	District Health Management Team
GAVI	Global Alliance for Vaccine Initiative
GHS/HQ	Ghana Health Service/Headquarters
GPRS	Ghana Poverty Reduction Strategy
HSSP	Health Sector Support Project
IDA	International Development Agency
LIAT	Logistics Indicator Assessment Tool
LMIS	Logistics Management Information System
MOH	Ministry of Health
NGO	Non-Governmental Organization
RDF	Revolving Drug Fund
RHA	Regional Health Administration
SWAp	Sector Wide Approach
USAID	United States Agency for International Development
WHO	World Health Organization

## I. Study Objectives and Conceptual Framework

Improved availability of health commodities depends on effective logistics systems to move commodities down the supply chain to service delivery points and ultimately to the end user. Initiatives of health reform, especially decentralization of health systems, might possibly have an impact on logistics system performance. The United States Agency for International Development- funded DELIVER project seeks to determine how health system decentralization and integration might affect the performance of logistics system functions. As management systems are decentralized and/or integrated, findings from these studies will be used to design interventions aimed at enhancing the performance of health logistics systems. The findings will increase the information available locally in the study countries and publicly to the international public health community. The first country studied in this series was Guatemala (see Bossert, et al. 2003)

This report presents the findings of the second country study: Ghana. Ghana was chosen based on a survey of DELIVER country representatives and advisors who reported on the levels of decentralization and the availability of previous studies on health reform and the pharmaceutical sector that could be used to look at trends.

The report first presents a description of the study objectives and conceptual framework, followed by a brief background to the Ghana health system and reforms. The bulk of the report presents the findings of the degree of decision space and integration and the relationship to the performance indicators for each of the key functions of the logistics system, including also comparisons with the Guatemala study. The report concludes with an overall assessment of how increased decentralization is related to logistic system performance.

## **Conceptual Framework**

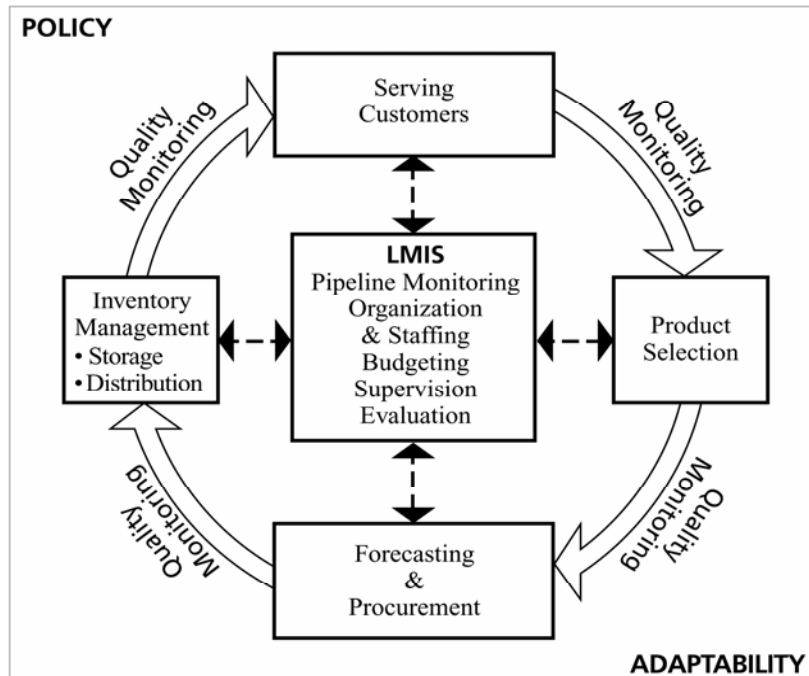
This exploratory study attempts to measure the extent of decentralization in the system by reviewing the reported local decision making at various levels of the health system. The health logistics system is analyzed by functions, and decision making in each of these functions are determined, while also analyzing selected indicators of performance that related to these functions.

The conceptual framework for this study is based on the 'decision space' approach to decentralization, which was developed by Thomas Bossert (1998) of the Harvard School of Public Health. This approach is grounded in the principal-agent framework used by economists and political scientists to study diverse institutional issues involving central and peripheral actors, and uses a comparative analytical tool which focuses on the range of choice allowed in the decentralization process. The conceptual base does not try to quantify formal 'decision space', but rather offers a preliminary characterization of its range as narrow, moderate and wide, within the array of health logistics system functions.

The logistics functions under study are derived from the logistics cycle which identifies the critical functions in the cycle as depicted below. From this cycle, a "decision space map" was developed to examine the effects of decision-making on logistics.

## **The Logistics Cycle**





## Objectives of the Study

The main objective of the study is to respond to the research questions posed by the concept paper for this study:

- A. How does health reform that includes decentralization of health systems and management impact the performance of logistics systems?
  - i. Are different types of decentralization (devolved vs. deconcentrated) likely to have different effects on logistics system performance? How?
  - ii. Are different degrees of “decision space” likely to have different effects on logistics system performance? How?
  - iii. Are some elements of logistics functions—product selection, needs quantification, procurement, storage, distribution, use, and logistics information management—affected in different ways by decentralization? And, if so, how? (See table 1 for other functions).
  - iv. Are some elements of logistics system performance (e.g., availability vs. efficiency vs. affordability) more likely to be impacted by decentralization than other elements?

## II. Study Methodology

The Ghana study consisted of a two-part survey. One part of the survey assessed the degree of decentralization of the current system using the Decision Space Assessment questionnaire. Data collection on decision space involved semi-structured interviews with key participants in the logistics system at the central and local levels. The types of personnel interviewed are listed in Table 1.1. The “decision space” approach was adapted by HSPH and DELIVER for this particular study to assess the degree of decision space granted and/or assumed in the logistic system. The study assessed the decision

space in Ghana in relation to that found in Guatemala as well as to evaluate the variation of decision space that occurred within Ghana. There is no standard measure of decision space yet empirically determined so the findings of the HSPH DELIVER series is an accumulative process of assessing the degree of choice exercised in different conditions of decentralization. Each country study will contribute to the comparative standard setting of the following studies. The surveys were developed with both international and local experts to create a pre-established set of possible responses defining whether a facility has a high or low degree of choice in executing/managing each of the logistic system functions.

The second part of survey obtained data on the current performance of the logistic system using DELIVER's Logistics Indicators Assessment Tool (*LIAT*). The LIAT was modified to the Ghanaian situation by the team from HSPH, DELIVER, and staff from the MOH research and procurement units. Completing the LIAT required information from a variety of data sources, including stock/tally cards, ledgers, periodic returns/reports, requisition and issue vouchers, consumption and other transaction records such as receipts, invoices and waybills. Data were also collected through direct observation of warehouse conditions and physical count of the health commodities in facility stores and clinics.

Table 1.2. Summary of Survey Information Sources

<b>Data collection method</b>	<b>Source of Information</b>
Interviews	Directors of Regional Health Services, Directors of District Health Services, Medical Superintendent, Medical assistant i/c or Head i/c, Health Services and Hospital Administrators, Accountant, Pharmacists, Heads of Programs - Family Planning, Public Health; Store keepers, Supplies officer and Welfare officers.
Observations	Storage sites for health commodities (storage conditions and stock inventory)
Document Review	<ul style="list-style-type: none"> <li>▪ Product Stock/Tally Cards</li> <li>▪ Activity Ledgers</li> <li>▪ Requisition and issue vouchers</li> <li>▪ Routine returns/reports</li> <li>▪ Receipts, invoices and waybills</li> </ul>

The local firm Deloitte and Touche (D&T) was contracted to be responsible for hiring and training the data collectors, organizing and supervising data collection, data entry, and preparing a preliminary report. MOH staff also participated as facilitators in the training. Twelve experienced professionals conducted the interviews. D&T supervisors assigned to each regional team were responsible for verifying data quality, editing the interviews at the end of each day, ensuring all tasks were carried out at the interview, and rescheduling visits as needed. The two-day training course included overview of the methodology and study purpose and detailed review and practice of the instruments and how to conduct interviews. Following the training, the instruments were pilot-tested in nine facilities (two at each level and one NGO). Final revisions to the instruments were made by the DELIVER, HSPH and D&T.

Data collection was carried out in the first two weeks of December, 2002. All data were coded and initially entered into SPSS and a double entry technique was used to ensure data quality. After data entry and verification, the data were transferred to STATA for further analysis in the U.S.

The study team decided to include the same sample of facilities that was selected in the 1999 MOH study in order to allow for comparisons across time. The 1999 MOH study was particularly well designed, using a multi-stage sampling procedure involving the selection of regions, districts, and health facilities through a combination of purposive and random sampling. The present sample was increased to include Regional Health Administrations (RHA) and regional hospitals, and the number of randomly selected districts increased from two to five per region.

Table 1.3 compares the sample of the Guatemala and Ghana studies. Five of the total ten regions were represented: Greater Accra region, Central region, Eastern region, Brong Ahafo region and Northern region.

The decentralization tool was applied in 47 facilities and the LIAT in 72 facilities. Because the District Health Administration (DHA) undertakes substantial decision making for the Health Posts under their control, the decentralization tool was used with DHAs on behalf of the Health Posts. The LIAT tool was used at all levels except the DHA. The performance indicators of the Regional Medical stores are captured as Regional Health Administrations as explained in the study background in this report.

Table 1.3. Decentralisation Study Sample, Ghana, 2002

Facility Type	Country Total (N)	1999 Survey Sample Size	2002 Survey Sample Size	2002 Sample: Percent of Total Facilities
Regional Health Administration	10	0	5	50%
Regional Hospital	10	0	5	50%
DHA	110	15	25*	23%
District Hospital	106	11	22	21%
Health Center/Posts	342	41	40 **	12%
Total	578	67	97	17%

\* LIAT data were not collected at this level. \*\* Decision space information was not collected at this level.

Ghana's selection was based in part on the availability of previous system assessments conducted prior to or at the start of health sector reforms, thereby providing a baseline look at some shared indicators. Two such studies are the 1993 Rational Pharmaceutical Management (RPM) survey of the Ghana Pharmaceutical sector and the 1999 MOH study on the pharmaceutical sector in Ghana. These studies had measures of logistics system performance that are similar to those being used in the present survey.

### Limitations of the Study

One limitation is the standard limitation of surveys of opinions and attitudes. The reported decision space is based on perceptions of officials involved in the logistic system as reported to interviewers and is not verified by review of documents or other sources. While the questions have been designed to ask for specific concrete and factual responses, perceptions often change and in some cases are open to different interpretations. A second limitation is that the relationships we found for the performance of functions were limited to the statistical significance of a small number of indicators for each function. While this is limitation was apparent also in the Guatemala study, it was even more limiting in the Ghana study. The Ghana sample was smaller than Guatemala. The total sample size in Guatemala was 281 facilities, while

the total sample size in Ghana was 57 (the data from the 40 Health Centers collapses into the DHA level). In Guatemala this sample size represents 23% of all facilities while in Ghana this represents only 17% of all facilities. The variation in implementation of different variable decision space among facilities was also much less than in Guatemala. This lack of variation and small sample size left many of the potential relationships with insufficient numbers for statistical significance.

### III. Background

#### Ghana Health Sector Reforms

Ghana's population was estimated to be 20.244 million in 2002, with a growth rate of 1.7%. Per Capita Gross Domestic Product (GDP) (purchasing power parity) is estimated at \$2015 in 2002. The country has a life expectancy at birth of 57.06 years and infant mortality rate of 55.64deaths/1,000 live births with the percentage of births attended by a skilled health staff reported at 44%. The country has an HIV/AIDS prevalence rate of 3%.<sup>1</sup>

Contraceptive prevalence rate for the period 1995-2000 was reported to be 22% based on data referring to married women aged 15-49.

Data based on statistical information from WHO country and regional offices, and regional advisors and through the World Drug Situation Survey carried out in 1998-99 reported Drug Access at 0-49%.

The Ghana Health Sector has been going through significant reforms spanning the past two decades. This has been part of a government effort to restructure public administration in the country to increase effectiveness and outputs. The major reforms of the health sector have been undertaken under the *Medium-term Health Strategy* "Towards Vision 2020" and the Program of Work 1997-2001. This strategy was supported by several development partners, bilateral and multilateral organizations, including the World Bank (IDA), USAID, DFID, DANIDA, Royal Netherlands Government, European Union, Nordic Fund, among others. The IDA contribution to the program was under the Health Sector Support Project (HSSP) Credit (Cr-29940), implemented from 1998 – 2002. This support was implemented through an innovative approach, the sector-wide approach (SWAp). The objectives of the HSSP were identical to the objectives of the Government's program of work for health and included:

- a) improve health status by: (i) Increasing access to a basic package of health services, (ii) Improving the quality and efficiency of health services, and (iii) forging linkages with other partners in health development;
- b) improve financing by increasing budgetary allocation to the health sector and donor funding and by improving revenue generation from households;
- c) reduce population growth;
- d) reduce malnutrition;
- e) improve access to water and sanitation, and
- f) reduce poverty

This HSSP, implemented as a flagship operation by the World Bank has been touted as the most successful sector-wide operation in Africa<sup>2</sup>. This project formed the basis for the development of another five-year medium term health strategy for the period 2002 --2006, currently under implementation with

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<sup>1</sup> <http://www.cia.gov/cia/publications/factbook/geos/gh.html>

<sup>2</sup> Implementation Completion Report on IDA HSSP Credit. World Bank website

similar management arrangement and a renewed thrust to consolidate earlier gains and institutionalize a number of reforms started in the health sector. The current medium-term health strategy, is linked to the Ghana Poverty Reduction Strategy (GPRS), is captioned ‘Bridging the Inequalities Gap’ which have the following health related objectives:<sup>3</sup>

- a) Bridging the equity gaps in access to quality health and nutrition services
- b) Ensuring sustainable financing arrangements that protect the poor
- c) Enhancing efficiency in service delivery.

In response to these GPRS objectives, the health sector strategic objectives are to:

1. Improve quality of health services
2. Increase access to health services
3. Improve the efficiency of health services delivery
4. To foster partnerships in improving health , and
5. To improve financing of the health sector.

To achieve these objectives, a number of health reform initiatives were put in place, most notably, the decentralization of administration within the sector, and the integration of supply systems to improve management efficiency. Some of these reforms were undertaken under that auspices of the Economic Recovery Programs (ERP I and II). These ERP and the follow-on Structural Adjustment Programs (SAP) were all at the prompting of the International Donor community, led mainly by the IDA/IBRD of the World Bank. The most notable aspects of the reforms were abolishing hitherto free health care services and the introduction of user fees.

Decentralization of the public health sector in Ghana began with incipient activities including the creation of District Health Management Teams (DHMT) in the late 1970’s but was given a major push in 1996 with the passing of the Ghana Health Service and Teaching Hospital Act. This resulted in the creation of 10 Regional Health Administrations and 110 District Health Administrations as well as the delegation of day to day operational control to a semi-autonomous Ghana Health Service (GHS) and within the GHS, the creation of semi-autonomous Budget Management Centres (BMC).

## **The Ghana Health Logistics Systems**

The health commodity supply chain in the public sector in Ghana is made up of a Central Medical Store and a network of Regional Medical Stores in each of the 10 administrative regions of the country. Drugs and supplies, including contraceptives, are managed through this supply chain to health facilities throughout the country. Health facilities are expected to get their supplies from the appropriate regional medical stores based on their location. Vaccines are managed slightly separately through a network of cold storage warehouses in all regions and cold chain vehicles, which in most cases are located at the same premises as the Regional Medical Stores. Each Regional Medical Store (RMS) is managed by the respective Regional Health Administration and provides a supply service to health facilities in the region. In this study, Regional medical stores are classified as part of the regional health administration and the performance levels of the RHA relates to the logistics functions performed by the RMS

The health commodity supply system has been mainly based on similar systems as those used in the management of all public sector stores in the country. Until recently, all public sector stores were considered as part of the Ministry of Finance and storekeeping practices and records have been managed

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<sup>3</sup> The Second Health Sector 5 Year Programme of Work 2002-2006 Ministry of Health Ghana.

by the use of sets of prescribed forms and documentation. Over the past two decades, efforts have been made to modernize and adapt these systems to meet the peculiar needs of the health sector. However these efforts fall short of a robust Logistics Management Information System (LMIS) and dependence on this system for most of the data used in this study had a significant effect.

A number of reform interventions in the health logistics system were introduced along with the general reforms in the management of the health sector described above. In January 1992, the most far-reaching reform in the drug supply system was introduced with the establishment of Revolving Drug Accounts at all levels of the supply chain, managed by the facility. This policy, called the “Cash and Carry” system required the full cost recovery for essential drugs. The policy was expanded in 1996 for non-drug supplies and in 1997 user fees were introduced for contraceptives. The basic logic of the Cash and Carry system utilized a commercial logic to improve the logistics system – encouraging local officials to become responsible for assuring that their revenues are in some balance with expenditures and that this financial basis should improve drug availability.

Prior to these reforms, drug supply was fully financed by the central government budget. Vaccines and contraceptives were financed separately through donor-funded vertical programs and these separate programs continue today with funding from USAID and UNFPA for contraceptives (except for a shortfall in supply one year that was covered by World Bank credit) and vaccines covered by the GAVI fund.

The Health Sector Supply system for the most part is based on a pull system with the lower facility withdrawing as appropriate based on its “needs”. With the introduction of the “Cash and Carry” system, each level is operating a business model. All supplies are fully paid for, or purchased from the higher level of the supply chain or from the open market as the need may be, and the cost recovered from its clients. This requires that each level of the supply chain determine its needs and mobilize resources to procure these to make them available to support service delivery. This means that decisions around a number of key logistics functions are taken at the local level.

Among the more recent reforms were efforts to improve and strengthen the procurement systems in the health sector. These included the development of new procurement procedures and a training program to implement these at all BMCs. Ghana is also implementing a national essential drugs program and under this a national essential drug list has been published and reviewed periodically with the last edition published in 2000.

The study focused on commodity distribution in the public health sector. Four main supply systems can be identified in the Ghanaian Health system based on the types of commodities managed through them. These are the (i) Essential Drugs, (ii) Non Drug Consumable items, (iii) Contraceptives and (iv) Vaccines supply systems.

Essential drugs and Non-Drug Consumables have for the most part been managed jointly, and for the purposes of this study were considered to be in the same logistics system. There are however minor differences in the personnel and decision-making roles in the system.

The introduction of user fees and full cost recovery of product costs, coupled with the establishment and management of revolving funds at each facility, or BMC as the case may be, shifted considerably authority and responsibility to the BMC level. The Ministry of Health provided some training and a set of guidelines on the operations of these logistics systems. Procurement guidelines provided for the establishment of procurement committees with a recommended membership and defined roles. The BMCs were also subject to periodic audits and a supervisory system put in place to monitor performance. A recommended fee structure was put in place for commodities and a system of reimbursement was introduced to cover the costs incurred by the health facility in treating patients who are exempted for

payment of user fees, as laid out in a government legislative instrument on hospital fees, LI 1313. The presence of a relatively robust private sector pharmaceutical distribution capacity in Ghana ensured that BMCs could purchase from outside the public supply system if the need arises to ensure that service provision is not undermined by a lack of products in the public sector supply system. A set of conditions under which these procurements could be made was put into place.

The contraceptive logistics system is for the most part managed separately, and the fact that these are not managed on a full cost recovery or a “cash an carry” basis sets them apart. The re-supply of contraceptive commodities is dependent on the submission of reports from the lower level of the distribution chain up the system.

Contraceptives and vaccines are however not purchased, but supplied based on the submission of appropriate reports or returns from the lower facilities.

## IV. Findings

### Analysis and Presentation

Each logistics function is examined separately in the order shown in the Logistics Cycle:

1. Finance
2. Cost Recovery
3. General Planning and Budgeting
4. Product selection
5. Needs quantification/Forecasting
6. Procurement
7. Inventory control
8. Storage
9. Transportation (distribution)
10. Logistics Management Information System (LMIS)
11. Human Resources/Personnel
12. Supervision
13. Training
14. Organizational Support
15. Quality Assurance
16. Client Contact and Use

The analysis within each function begins with a list of the decision space and logistic system performance indicators that were examined for that function. The analysis of decision space has two dimensions. One is a comparative assessment of the *general degree of decision space* for each function in relation to the potential decision space that might be available. This general degree of decision space is based on expert judgment of international and local experts and forms the basis of cross country comparative analysis. This measure of decision space will be used for comparisons between Ghana and Guatemala and will show, for instance, that for financing functions Ghana has moderate range of choice while Guatemala has limited range of choice because this function is fully centralized in Guatemala, while the Cash and Carry policy grants Ghanaian facilities some choice within a feasible range. The second dimension is the *variable decision space* within Ghana. The variable decision space will use indicators that are likely to vary from facility to facility. For instance, for the financing function, within Ghana some facilities were able to modify the central guidelines for the revolving drug fund (i.e. exercising greater decision space) while other facilities simply followed the central guidelines without making their own decisions. This variable decision space is determined empirically by the responses of the respondents to the Decision Space Assessment survey.

In this report, the first indicators presented are the *general degree of decision space* indicators for that function. The second is the *variable decision space* that is a proxy measure for the degree of decentralization and is dichotomized into “high” decision space and “low” decision space. The second indicators presented are related to--or an outcome of-- the particular function and measure how well an aspect of the logistics system is functioning at the time of the survey or recent past.

The relationship between the variable decision space for each function and each of the performance indicators is analyzed using a paired T-test on the equality of means (see description of a T-test below). The number of facilities (N) included in the decision space analysis is shown for each function. Any “N” less than the total 57 means either that there were missing values (some facilities did not answer) or decision space in this function was not applicable to an entire level of facilities.



Using a T-test for statistical significance, the difference between means of two groups (different decision space categories) are compared. The null hypothesis for each test is that the mean of the outcome variable is equal for both groups. A value called a “T-test” and a “p-value” helps us to determine if this null hypothesis is statistically significant. If the T-test is large enough and the p-value is small enough, we can reject the null hypothesis and conclude that the means for the groups are statistically different. We will reject the null “with certainty” for any p-value of less than 0.10. When a T-test cannot be used, a correlation coefficient is presented which represents the overall positive or negative trend between two variables. A positive correlation coefficient signifies a positive trend while a negative correlation coefficient signifies a negative trend. The trend is significant for any p-value less than 0.10.

Although we have tested all possible relationships between degrees of decentralization and logistics performance indicators, we report only those relationships that are shown to be statistically significant. For the performance indicators that were not significantly related to the decentralization or integration variables, we present a description of the variable and the frequencies found in the survey in order to provide information on the current performance of the system and for comparisons with other studies.

## Financing

The financing mechanisms for the health commodities in Ghana are quite complicated and vary for essential drugs, contraceptives and vaccines. The major, but not the only, difference is that user fees charged for essential drugs and related commodities at the user point is designed to cover the “full costs” of the commodities, while the charges for contraceptives are heavily subsidized and there are no charges for vaccines. These financing mechanisms have evolved over years and the mechanisms for financing essential drugs and related commodities has changed significantly over the past two decades. This financing system is believed to be a very successful revolving fund model. **The general degree of decision space for financing of essential drugs is therefore “moderate” at all levels as funding for Essential Drugs is now fully the local responsibility within a set of guidelines provided by the central level.** The general degree of decision space for contraceptives and vaccines is narrow.

Within this “moderate” range of choice for medicines, there was some variation in that some facilities modified the guidelines that had been disseminated by the central authorities. Therefore this survey was able to assess one *variable decision space* indicator: *Whether the facility modified Revolving Drug Fund Guidelines*. The facility was determined to have “High” variable decision space if the facility reported that it modified the Revolving Drug Fund Guidelines.

Based on the description of the financing mechanisms above, it would be expected that local decision making and its influence on the logistics system would be related to certain performance indicators. First, financing should be related to the availability of financial resources, which in turn will affect the commodity supply. For example, the first performance indicator below, an increase in the stock and cash balances, should indicate a favorable financing environment. We anticipated that while this may give a good impression of the financial health of the supply system, it may not present a complete picture since such increases may be artificial and supported by outstanding accounts payables, hence our interest in the second indicator of performance which adjusts the total capital for outstanding payments. Stockouts at the time of the visit and over the last six months are the two final performance indicators. Stockouts are often used as a general assessment of overall system performance. We include them in the evaluation of many functions to determine the potential relationship between key functions and the performance of the whole system.

The four logistics system performance indicators used to assess the effects of local choices made in the financing:

- (1) *Percent Increase in Stock and Cash Balances 2002:* This is the percent difference between stock and cash balances from 2001 to stock and cash balances from 2002.
- (2) *Total Capital 2002 Adjusted for Outstanding Payments (Equity of Facility in Stock)*  
Total capital for 2002 (Equity of Facility in Stock) was defined as the total stock balances for 2002, plus the total cash balance for 2002, minus outstanding payments to top three suppliers, plus the amount owed by top three suppliers.
- (3) *Mean percent of drugs stocked out at the time of the visit.* Stockouts at the time of the visit are calculated using the Stock Status Table. A product in a facility is considered stocked out if there was no reported usable stock on hand according to the physical inventory. The percent of products stocked out in each facility is then calculated by type of product. For example, RHAs reported a 3% stockout rate for medicines. This means that of the 11 possible products they could have had on stock at the time of the visit, on average 3% of these products were stocked out.<sup>4</sup>
- (4) *Mean percent of drugs stocked out in the last six months.* Stockouts in the last six months are calculated using the Stockout and Stock Data Quality Table. Each facility reported the number of stockouts in the last six months for each product. The percent of products stocked out in each facility is then calculated by type of product.

While almost all facilities (88%) had guidelines for the Revolving Drug fund, only 17 percent of the facilities modified the guidelines (see Table 2.1). Regional level facilities were more likely to have modified the guidelines than district level facilities. This level also showed the highest percent change in cash and stock balances.

Table 2.1 Variable Financing Decision Space and Performance Indicators

Facility type	Decision Space indicator (High DS facilities only)	Performance indicator (All facilities)			
	Modify Revolving Drug Fund guidelines	Percent change in cash and stock balances from 2001-2002	Total Capital 2002 Adjusted for Outstanding Payments (Cedis)	Stock out on day of visit (Drugs)	Stock out in last 6 months (Drugs)
Regional HA	40% (2)	120% (5)	933,993,635 (5)	3% (5)	9% (4)
Regional Hospital	40% (2)	281% (5)	229,488,886 (5)	4% (4)	0.5% (2)
District HA	6% (1)	36% (12)	34,139,792 (15)	11% (15)	17% (13)
District Hospital	10% (2)	89% (21)	85,607,281 (22)	6% (22)	8% (15)
Total (N)	17% (8/48)	100% (43)	174,741,908 (47)	7% (46)	11% (34)

**There was a statistically significant relationship between whether the facility had modified the Revolving Fund Guidelines and the percent change in cash-stock balances from 2001 to 2002 and the total capital in 2002 adjusted for outstanding payments.** Table 2.2 shows that facilities that modified their Revolving Drug Fund guidelines (had higher variable decision space for financing) had a much higher percent increase in stock and cash balances from 2001 to 2002 (233%) than facilities that did not modify their RDF guidelines (73%). We also found that facilities that modified their revolving fund guidelines had a higher capital in 2002 (adjusted for outstanding payments). There was no relationship between modifying the revolving drug fund guidelines and stockouts for essential drugs.

<sup>4</sup> This calculation does not include products reported as missing values—assuming they do not carry this product at all.

Table 2.2 Relationship between Variable Decision Space for Financing and Cash and Stock Balances (2001-2002)

Decision Space indicator	Percent change in cash-stock balance (2001-2002)	Total Capital 2002 Adjusted for Outstanding Payments (Cedis)
Modified Revolving Drug Fund Guidelines (High DS)	233% (8)	481,146,070 (8)
Do not modify Revolving Drug Fund Guidelines (Low DS)	73% (32)	118,217,767 (32)
Ttest	T= -2.28 p= 0.02 N=40	T= -2.1 p= 0.04 N=40

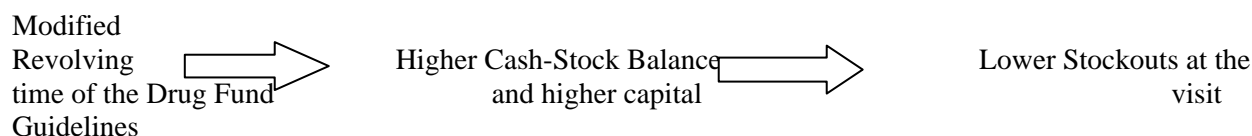
Although there was no direct relationship between variable decision space for financing and stockouts, there was an indirect relationship—through capital. It was hypothesized that facilities, by utilizing their higher variable decision space in financing to increase their capital, would have better drug availability (less stockouts). This hypothesis proved to be true in that we did find a relationship between the increase in cash and stock balances from 2001 to 2002 and stockouts at the time of the visit. **Those facilities with a higher increase in stock and cash balances had fewer stockouts at the time of the visit.** These results show that although a higher variable decision space in financing does not lead directly to less stockouts, there appears to be an indirect, two stage process. Stage one is the relationship between modifying the revolving drug guidelines which leads to higher cash and stock balances and capital. Stage two is the relationship between higher cash and stock balances and capital and lower stockouts at the time of the visit. This finding is consistent with the general approach of the Cash and Carry system which is to utilize a commercial logic to improve the logistics system – encouraging local officials to become responsible for assuring that their revenues are in some balance with expenditures and that this financial basis should improve drug availability.

Table 2.3 Relationship between First stage performance indicator (change in Cash and Stock Balances) and second stage Indicator (Stockouts at the time of the visit)

Table 2.3 Second Stage Correlation Results between Cash and Stock Balance and Stockouts

Second Stage Indicator	Stockouts at the time of the visit
Percent change in cash-stock balance (2001-2002)	Correlation Coefficient = -0.2832 P=.07

### Two Stage Schematic:



### Cost Recovery

Ghana's cost recovery program for health commodities is fundamental to the "Cash and Carry" Program. This program provided seed capital for each facility in the form of commodity supplies over a period of time, during which the facilities recovered "full costs" of the commodities from clients and did not have to pay the higher level in the supply chain (RMS or CMS) for the supplies. This process built up both a cash reserve and a stockpile of commodities that facilities then used as their seed capital. For the essential drugs supply system, this process of establishing a seed capital was implemented over a couple of years

ending in December 1991. A similar process of establishing a seed capital for non-drug consumable items was initiated and ended in or about 1996, after which health facilities needed to pay for the commodities they received. Initial training in revolving fund management at the Center, Region, District and Facility levels was provided to managers in the system. The cost recovery system is still in place for these commodities.

In the Cash and Carry system for contraceptives there was some variation allowed since the MOH set guidelines for the percentage of markups that facilities are allowed to keep from the proceeds (1992). This finding was confirmed in our study where we found that a few facilities (five) retained more than 50% percent of their funds from contraceptive fees.<sup>5</sup>

**Based on a qualitative analysis it was concluded that facilities have a “moderate” degree of general decision space over the cost recovery program for essential drugs, contraceptives and non-drug consumables. However, for vaccines the degree of decision space is “narrow” since facilities must charge a standard price markup set by the MOH.**

The basic logic of the cost recovery system is based on the assumption that local decision making in response to the ever diminishing resources to the health sector will cause local managers to adopt mechanisms to raise funds locally. Cost recovery or cost sharing with the clients or beneficiaries of the health care system is one such mechanism and this mechanism is expected to lead to actions to increase resource flow at the local level. Possible actions will include adding additional criteria to the GHS/HQ guidelines to ensure that loopholes in the exemption policies of central government are closed and/or raising the percentage of revenue that the facility keeps from essential drugs sales. Under the current exemptions policy, the government provides that certain disease categories and age groups of patients are exempt from paying hospital fees including the cost of commodities. It is known that the implementation of this policy is not uniform across the country and this indicates that modifications have been made in response to local conditions and other factors. The first variable decision space indicator examines the percent of facilities that use their decision space to change the exemption guidelines. Other possible strategies to increase resource flow for commodities at the local level are through increasing the price mark-up on product bought from both the public and private supply sources. The second and third variable decision space indicators examine this level of mark-up of prices for drugs from the public (medical stores) and private sector.

The three variable decision space indicators were assessed to measure variable decision making for cost recovery:

- (1) *Criteria added to the GHS/HQ guidelines on exemptions.* Facilities were asked if they had found it necessary to include additional criteria to the GHS/HQ guidelines on exemptions as a result of their local needs/circumstances. High decision space is if a facilities added criteria.
- (2) *Percent price mark-up of drugs purchased from Medical Stores:* the percent increase in price (markup) for each drug purchased from medical stores in the last four quarters. Percent markup is calculated as the percent increase between the last purchasing prices for each drug and the current selling price using the same unit in each calculation.
- (3) *Percent price mark-up of drugs purchased from Private Sector* the percent increase in price (markup) for each drug purchased from the private sector in the last four quarters. Percent markup is calculated as the percent increase between the last purchasing prices for each drug and the current selling price using the same unit in each calculation.

Based on the description of the cost recovery mechanisms above, it was expected that local decision making would be related to the same performance indicators as measured for the financing function

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<sup>5</sup> Due to this small sample size no further analysis was done using this finding.

above. First, cost recovery should be related to the availability of financial resources, which in turn will affect the commodity supply. For example, the first performance indicator below, an increase in the stock and cash balances, should indicate a favorable financing environment. We anticipate that while this may give a good impression of the financial health of the supply system, it may not present a complete picture since such increases may be artificial and supported by outstanding accounts payables, hence our interest in the second indicator of performance which adjusts the total capital for outstanding payments. Similar to financing, we also used two additional logistics performance indicators, namely, stock-outs at the time of the visit and over the last six months.

The same performance variables that were used to analyze financing were used to analyze cost recovery (see Financing function for complete details):

- (1) *Percent Increase in Stock and Cash Balances 2002.*
- (2) *Total Capital 2002 Adjusted for Outstanding Payments (Equity of Facility in Stock)*
- (3) *Mean percent of drugs stocked out at the time of the visit.*
- (4) *Mean percent of drugs stocked out in the last six months.*

Table 3.1 shows that facilities that had a **moderate level of variable decision space for Cost Recovery**. Slightly more than half (57%) of facilities added criteria to the GHS exemption guidelines. The average markup for drugs purchased from both the public and private sectors was 34%.

Table 3.1 Variable Decision Space Indicators for Cost Recovery

Facility type	Decision Space indicators (High DS facilities only)		
	Add criteria to GHS/HQ guidelines	Percent markup for drugs purchased from Medical Stores	Percent Markup for drugs purchased from private sector
Regional HA	75% (3)	35% (5)	17% (4)
Regional Hospital	60% (3)	37% (5)	50% (4)
District HA	47% (9)	40% (15)	39% (4)
District Hospital	61% (11)	32% (19)	29% (17)
Total (N)	57% (26/46)	36% (44)	32% (29)

There were no significant relationships between the variable decision space for cost recovery and any of the performance variables.

## General Planning and Budgeting

Annual work plans and budgets are generally drawn up at each level under general guidelines established by the MOH/GHS. These guidelines provide guidance on the sector priorities, proposed budgets, and also provide all levels with indications for their health programs and budget ceilings. These are consolidated at the national level and there is a review process through which budgets received from lower levels are accepted (approved) or required to be changed or amended. As part of these annual plans each level is expected to include a procurement plan. In one region, the regional level did the work plans for all facilities but this is unusual.

**Our comparative analysis suggested a “moderate” choice for planning/budgeting since local officials had some choice based on local health needs within general planning guidelines provided from the central level.** One indicator of this variable decision space is whether they prepared their own annual procurement plans. A second indicator is whether or not the facility’s procurement plans and hence annual work plan and budgets were subject to review by a higher level and whether the plans were

changed by that review. We took not changing the original plans as an indication of more choice at the local level.

Two *variable decision space* indicators for General Planning/budgeting were examined:

- (1) *Prepare own annual plan and budgets.* We defined high decision space as those that prepared their own plans and budgets and had an inspected copy. Low decision space was defined as those that may have prepared their own plans and budgets but did not have a copy.
- (2) *Did not change work plan/budget after it is reviewed.* We defined high decision space as not changing the plan even after review and low decision space as obeying higher authorities and changing the plan upon review.

As shown in table 4.1, there is a high level of decision space for preparing their own annual plans and budgets (70%), however there is a low decision space (35%) in terms of not changing the plan/budget after it is reviewed. Most facilities do make the changes they are advised to make. Combining these two variable decision space indicators leads to a moderate level of variable decision space for general planning and budgeting.

Table 4.1 Variable Decision Space Indicators for General Planning and Budgeting

Facility type	Decision Space indicators (High DS facilities only)	
	Prepare own annual plans and budgets	Did not Change work plan/budget after it is reviewed
Regional HA	100% (5)	0% (0)
Regional Hospital	80% (4)	60% (3)
District HA	64% (16)	32 % (8)
District Hospital	67% (14)	38 % (8)
Total (N)	70% (39/56)	35 % (19/54)

The same performance variables that were used to analyze financing and cost recovery were used to analyze general planning and budgeting:

- 1) *Percent Increase in Stock and Cash Balances 2002.*
- 2) *Total Capital 2002 Adjusted for Outstanding Payments (Equity of Facility in Stock)*
- 3) *Mean percent of drugs stocked out at the time of the visit.*
- 4) *Mean percent of drugs stocked out in the last six months.*

There were two significant relationships between the above variable decision space variables and the four performance variables. As shown in the table 4.2, **those facilities that had a high variable decision space and did not change the work plan/budget even after it was reviewed had a higher increase in cash and stock balances**

As was shown above in table 2.3, increase in stock and cash balances is also related to lower stockouts at the time of the visit.

Table 4.2 Relationship between Variable Decision Space Indicators for General Planning and Budgeting and Performance Variables

Decision Space indicator	Percent Increase in Stock and Cash Balances 2002
Did not Change work plan/budget after it is reviewed (High DS)	172% (14)

Did Change work plan/budget after it is reviewed (Low DS)	54% (27)
Ttest	T= -2.0 p= 0.04 N=41

The above results show that there is a second two stage relationship occurring for general planning and budgeting. **Similarly to financing, those who exercise higher variable decision space in budgeting and planning have higher cash and stock balances on hand, which lead directly to lower stockouts at the time of the visit.**

**Two Stage Schematic:**



**Product Selection**

Ghana is implementing a National Drug Policy that supports the concept of an Essential Drugs List. There is a National Essential Drug List (NEDL) in Ghana, first published in the 1980’s and revised regularly with the last review in 2000. The NEDL is designed to cover most of the health problems in the population and applies only to the public health system.

Under the National Drug Policy, it is recommended that each health facility develop a shorter list of drugs, a drug formulary, tailored to its peculiar needs and the health problems that are prevalent among its clients. This is to ensure that local formularies include drugs that are relevant to local needs. The National Essential Drugs List is therefore the inclusive list, which defines the limits, within which local formulary lists will be selected. Enforcement of this is however weak.

The National Essential Drug List is also categorized by level of care. The guidelines for this categorization are proposed to confine the distribution of drugs to specific and appropriate settings and levels of health care delivery. This categorization which is also related to the level of training of the health care providers at each level, is designed to make simple drugs available at the lower level and drugs requiring higher skills at the higher levels of the health care system.

Selection of contraceptives and vaccines are however done only at the central level and all products offered in the national programs are expected to be available at all levels, with the only qualifier being that there is a trained provider at the level to use the products.

**The general degree of decision space for product selection is judged to be “low” since there is a well-defined National Essential Drug List that seems to be respected. The list includes drugs, contraceptives, and vaccines.**

For variable decision space, we hypothesized that local decision making will influence the type and range of drugs that are used at the facility either in response to the profile of local health problems or other factors, and that these local choices would lead to a local list of products. These may be adapted from the NEDL and contain only a subset of products on the national list, or may also include extra products not appearing on the national list. The study hypotheses were that having a separate local EDL or making a shorter local EDL based on disease patterns might be related to a lower percent of generic purchases because generic drugs were more likely to be on the NEDL. We also hypothesized that having a separate

local EDL or making a shorter local EDL based on disease patterns might be related to lower purchases off the National EDL.

In measuring the impact of product selection at the local level, we hypothesized that facilities which make a shorter list would be more likely to have selected based on local health needs. However, the more choices are implemented at the local level, the more likely it is that local preferences may not necessarily be consistent with the prescribed NEDL, based on a number of factors such as the desire to meet client preferences and the more commercial oriented behavior by the facility. We hypothesized that local choices will result in higher procurement of branded rather than generic drugs from private rather than public sources and higher procurement of drugs not on the NEDL. In other words, we expected greater local choice to result in a shift from the centralized public sources (which may be a positive result) but also to choices that are not desirable – buying off the NEDL and increased purchase of branded rather than generic drugs.

We measured two variable decision space indicators for Product Selection:

- (1) *Having a separate local essential drug list (separate from the ministry list)<sup>6</sup>*
- (2) *Making a shorter list of EDL based on disease patterns.*

Three performance indicators:

- (1) *Percent of total products purchased from Medical Stores that were generic or brand.*
- (2) *Percent of total products purchased from Private Sector that was generic or brand.*
- (3) *Purchased drugs off of the EDL (we are assuming this is National EDL)*

As Table 5.1 shows, very few facilities had their own EDL (only 17 percent). One of four surveyed District hospitals reported they had their own EDL. However, on the other question, fifty percent of facilities reported making a shorter EDL “based on disease patterns”. Combining the two variable decision space indicators for product selection leads to a low overall variable decision space.

The percent of generic products purchased in the public sector (medical stores) and private sector is high while the percent of brand products purchased in either sector is low. Slightly less than half of the facilities (46%) purchased drugs off the National EDL.

Table 5.1 Variable Decision Space for Product Selection and Related Performance Indicators

Facility type	Decision Space indicator (High DS facilities only)		Performance Indicators for Procurement				
	Have their own local EDL	Shorter EDL based on disease patterns	Generic Medical Stores	Brand Medical Stores	Generic Private Sector	Brand Private Sector	Purchased drugs off EDL
Regional HA	0%	80% (4)	100% (5)	0% (5)	67% (3)	33% (3)	0%
Regional Hospital	60% (3)	80% (4)	98% (5)	2% (5)	82% (4)	18% (4)	60% (3)
District HA	5% (1)	33% (6)	87% (15)	9% (15)	56% (4)	4% (4)	13% (2)
District Hospital	23% (5)	50% (10)	91% (19)	3% (19)	90% (16)	3% (16)	76% (16)
Total (N)	17% (9/52)	50% (24/48)	91% (44)	5% (44)	81% (27)	9% (27)	46% (21/46)

<sup>6</sup> This includes both having a copy on hand and just saying they have a local EDL.



In examining the relationship between variable decision space for product selection and the performance indicators, we found that our hypotheses were partly true.

**Those that created a shorter EDL based on local choices were more likely to purchase brand products (less likely to purchase generics) from the private sector. Those that did not create a shorter EDL based on local choices were also more likely to purchase brand products but from the public sector (medical store) rather than the private sector.** Both those that make a shorter EDL based on disease patterns and those that do not make a shorter list purchase brand products. However, those that do make a shorter EDL list tend to purchase brand products from the private sector, while those that do not make a shorter list tend to purchase brand products only from the public sector.

This seemingly paradoxical finding is a result of the fact that not enough questions were asked or data collected to completely analyze the rationales for purchasing from the private sector, or for purchasing branded products. It is possible that the two groups compared here, dichotomized solely on the basis of a local drug list may be reporting the procurement of different products (brands) which would make the conclusions drawn erroneous.

**Those local authorities that had a local EDL and/or created their own EDL based on disease pattern were not more likely to purchase off of their EDLs** (i.e. no significant difference between means for these two groups).

Table 5.2 Relationship between Variable Decision Space for Product Selection and Related Performance Indicators

Decision Space indicator	Brand Private Sector	Brand Medical Stores
Shorter EDL based on disease patterns (High DS)	19% (12)	0.7% (19)
Did no create a Shorter EDL based on disease patterns (Low DS)	0% (11)	5% (19)
Ttest	T= -1.8 p= 0.07 N=23	T= 1.8 p= 0.07 N=38

Diana Check Numbers of Brand and Generic Purchases:

## Needs Quantification

This function of the logistics system relates to the determination of what products and the quantities thereof for each procurement or ordering cycle. Under the revolving drug funds, a recommended re-supply period is defined for each level of the health care system, which relates the quantities to be maintained in inventory at each time to the rate of consumption of these. This, in theory, determined the maximum and minimum levels of stock to be held to avoid stock outs and/or overstocking.

At each level, the stores management is responsible for determining the quantities of each item to procure at each time. The fact that they also had to mobilize financial resources to meet the needs made it imperative that the quantities be determined as accurately as possible. Needs quantification is used to refer to the process of determination quantities required for each procurement as opposed to forecasting which refers to the projection of future needs over a longer duration, most notably, a year.

In general, no strict enforcement of a methodology or process for the needs quantification was established in the system. However it was expected that using logistics data and monitoring consumption patterns in the past will lead to better forecasts.

**The general decision space for needs quantification/forecasting for essential drugs was “high” because the Cash and Carry system required each level to develop their own estimates of need for drugs and there was no clear set of guidelines or methodology supplied by the central authorities.**

**General decision space was low for contraceptives and vaccines which were all forecasted at the central level.**

For other commodities, such as contraceptives and vaccines there was the likelihood that higher levels of the system would do the needs quantification for lower facilities, it was felt that variable decision space for this function might show differences that could affect performance. In order to measure the variable decision space for needs quantification, we asked personnel in each facility if they participated in the forecasting of their essential drug needs or if a higher authority did the forecasting for them. Therefore the variable decision space indicator used for Needs Quantification was: *Quantify annual requirements on their own*. As shown below, almost all facilities (81%) quantify annual requirements on their own. (See Annex B for decision space results for contraceptives and vaccines).

The effectiveness of local decisions on needs quantification might be measured by whether they used the accepted best practice of using their own logistics data to do this, rather than other options (using data for reporting purposes only). If not, their performance was expected to be poorer. If the facilities did their own needs quantification using non-standard or unacceptable methodologies, this might have affected the accuracy of these estimates. Poor estimates of needs might also result in more stock outs.

We hypothesized that facilities doing their own needs quantification would be able to determine more accurately what their requirements are since they have better information on their requirements. We also hypothesized that those using logistics based information would have better forecasts leading to lower stock outs and improved logistics performance. Logistics information would also help with forecasting accuracy.

Four logistics system performance indicators were examined:

- (1) *Use logistics data for needs quantification*
- (2) *Mean percent of products stocked out at the time of the visit (presented previously as a performance indicator for other functions above)*
- (3) *Mean percent of products stocked out over the last six months (presented previously as a performance indicator for other functions above)*
- (4) *Forecasting accuracy for medicines*. Forecasting accuracy is defined according to the LIAT as how much, more or less, in percentage terms each facility forecasts over how much they actually consume. For example, if a facility forecasts they needed 100 condoms for a given period and they only consume 50 condoms during that period, then the forecasting accuracy for that period is  $[(100-50)/100] \times 100$  or 50%. This facility forecasted 50% more than they consumed. Similarly, facilities may forecast less than they consume, meaning their forecasting accuracy would be a negative percent.

Table 6.1 shows that there was a high level of decision space for needs quantification for essential drugs (81%). Almost all facilities use logistics data to do their drug need calculations. Product stockouts on the day of the visit was relatively low at all levels. However, in the last six months 28 percent of facilities reported a stock out of one or more products. Regional Hospitals had the lowest stock out rates among all

facilities. Regional hospitals had the lowest stock out rates. On average all facilities are forecasting more than they consume, with an average of 94% more in terms of forecasting accuracy.

Table 6.1 Decision Space for Needs Quantification and Related Performance Indicators

Facility type	Decision Space indicator (High DS facilities only)	Performance indicators (All facilities)			
	Quantify own annual needs (Drugs)	Use logistics data to calculate needs (Drugs)	Stock out on day of visit (Drugs)	Stock out in last 6 months (Drugs)	Forecasting accuracy medicines
Regional HA	100% (5)	100% (5)	3% (5)	9% (4)	107% (3)
Regional Hospital	100% (5)	100% (5)	4% (4)	0.5% (2)	144% (3)
District HA	87% (13)	100% (15)	11% (15)	17% (13)	105% (6)
District Hospital	68% (15)	95% (21)	6% (22)	8% (15)	58% (7)
Total (N)	81% (38/47)	97% (46)	7% (46)	11% (34)	94% (19)

The small variation in the decision space variable for forecasting did not allow for any further analysis between forecasting decision space and performance indicators. However, the trends in the data in table 6.1 show some interesting results. All facilities who quantify their own annual needs are using logistic data in order to make these calculations. However, despite the fact that all facilities are using logistic data and calculating their own needs, there are still stockout in the system (both at the time of the visit and over the last six months). This suggests that there must be some other factor affecting stockouts besides forecasting. As mentioned in the financing section, cash and stock balances seem to have some effect on stockouts. Those facilities with a higher increase in stock and cash balances from 2001 to 2002 had fewer stockouts at the time of the visit. The final column of table 6.1 shows that all facilities are over forecasting for medicines.

## Procurement

Procurement is a very interesting aspect of the logistic system in Ghana and interesting from a decision space analysis. In theory the facilities use their revolving funds to purchase essential drugs from the public medical stores -- Central Medical Stores, Regional Medical Stores, District Medical Stores (CMS, RMS or DMS). The facilities go directly to the Medical Stores to purchase, collect and transport the drugs. However, in some cases the medical stores may reject orders if they are seen to be inappropriate (too much in volume for the target population of a facility, or non-essential drugs for that facility level, or if the facility does not have personnel skilled in use of that drug). The stores may also not be able to provide the drugs because they do not have them in stock. This last reason is supposed to result in issuing a "Certificate of Non-Availability". This certificate is supposed to authorize the facility to purchase drugs from private providers. However, it is not clear that any of these theoretical steps are generally enforced. It is thought that if the medical stores reject the orders the facilities go directly to the private sector whether or not they have a Certificate of Non-Availability.

It was determined that **the general decision space for procurement was moderate to high since facilities were expected to develop plans which may be modified by central authorities. Facilities were generally expected to purchase from government medical stores but also were allowed to purchase from the private sector if a Certificate of Non-Availability was granted or evidence that the medical store could not fill the order.** Even if purchases from the private sector were often made without the Certificate, the general practice was to purchase from public stores so it was not felt that the

decision space was wide. It was found that procurement decisions for contraceptives and vaccines were centralized.

The fact that local managers of the health system make their own procurement decisions (most of the time) would dictate that the impact of their decision making on the logistics system is a direct one. The investigations of variable decision space in this area are designed to determine which decision-making respondents indicated they have local choices and how those choices are used in terms of procurement decisions.

We hypothesize that facilities that purchase more from outside the public sector would be more likely to purchase drugs that are not on the NEDL. This is because the public sector would not be able to meet the demand for drugs not on the NEDL since stocking in the public sector is based solely on the EDL. Facilities desirous of using these drugs would therefore have to obtain them from the private sector.

The variable decision space indicators for Procurement are:

- (1) *Have their own procurement plan*: facilities had high decision space if they had their own procurement plan.
- (2) *Purchased from the private sector if order not filled*: we asked what facilities/offices did when less than 100% of their last order was provided. High DS was defined as purchasing from the private sector; low decision space was if they re-ordered at a later date or did nothing.
- (3) *Reprimanded for buying from private sector*: Facilities were asked if in the last 12 months they had been reprimanded for purchasing from the private sector. High decision space was defined as not being reprimanded and low decision space as being reprimanded.

One performance indicator was chosen to evaluate variable decision space on procurement. It was felt that if local decisions resulted in drugs purchased off the Essential Drug List<sup>7</sup>, then the local decisions on procurement were not following central norms. A little less than half the sample purchased drugs off the National EDL.

Table 7.1 Procurement Decision Space Indicators

Facility type	General and Variable Decision Space indicators (High DS facilities only)			Performance Indicators for Procurement (All facilities)
	Have own procurement plan	Purchased from private sector if order not filled	Not reprimanded for purchasing from private sector	Purchased drugs off National EDL
Regional HA	100% (5)	20% (1)	75% (3)	0% (4)
Regional Hospital	100% (5)	60% (3)	100% (5)	60% (3)
District HA	72% (18)	18% (3)	100% (13)	13% (2)
District Hospital	82% (18)	74% (14)	85% (17)	76% (16)
Total (N)	81% (46/57)	46% (21/46)	90% (38/42)	46% (21/46)

<sup>7</sup> It is assumed that this is the National Essential Drug List.

**As hypothesized above, those that purchase from the private sector if their orders are not filled are also more likely to purchase drugs off the National EDL.** However, those that are not reprimanded for purchasing from the private sector are not any more likely to purchase drugs off the National EDL than those who are reprimanded.<sup>8</sup>

Table 7.2 Relationship between Procurement Decision Space Indicators and Performance Variables

Decision Space indicator	Purchased drugs off National EDL
Purchased from private sector if order not filled (High DS)	65% (20)
Did not purchase from private sector if order not filled (Low DS)	32% (19)
Ttest	T= -2.0 p= 0.03 N=39

## Inventory Control

Inventory control relates to the logistics function on product handling, and the processes involved in its withdrawal or use as well as the information management on the stacks. In Health logistics, it is recommended that products be managed on a First-to Expire-First-Out (FEFO) basis. This requires that products that will expire first be removed from inventory for use as opposed to other inventory management systems that are based for instance on the first-in-first-out (FIFO) basis. This in turn drives the nature and type of record keeping to facilitate management based on these principles.

There are general guidelines developed by the central level on Inventory control, but it is known that enforcement is weak. This therefore allows for some latitude of local decision making in this area.

**General decision space was found to be moderate for drugs, contraceptives and vaccines, since there were guidelines on inventory control, however they were not enforced by higher levels. The lack of guidelines could be interpreted as allowing wider decision space for those facilities that did not have the guidelines.**

To analyze decision space further, we used two indicators of variable decision space, which reflect the level of local decision making in the inventory control function. Facilities that had received no guidelines were expected to have made up their own and hence will be assumed to have higher decision space. Alternatively, since the “stock cards” were a key inventory control document provided from the central level as part of guidelines for inventory control, facilities that had chosen not to use these were also assigned a higher decision space. The indicators of decision space were therefore:

- (1) *Facility Given Guidelines on Inventory Control.* Facilities that were not given guidelines were considered to have high variable decision space.<sup>9</sup>
- (2) *The percent of facilities not using stock cards to maintain stock levels.*

For performance within the inventory control function, we examined indicators of compliance with best practices and indicators of stockouts. It was expected that effective inventory control required consistent

<sup>8</sup> Since these results are insignificant they are not reported.

<sup>9</sup> This is taken from the Stock Status Table. Those who did not report usable stock on hand with data from stock cards were considered not to use stock cards.

use of stock cards and maintaining stocks between max-min levels. As with other functions, failure to use effective inventory control could also result in stock outs.

We hypothesized that since best practice in logistics is fairly stable in terms of inventory control and stock management, irrespective of the level of the system, guidelines from the higher level will maintain these standards and lead to better performance. Facilities who maintain that they were not given guidelines and who therefore established their own standards and systems for inventory control were more likely to perform poorly compared to those who used guidelines set by the central level. The use of stock cards was taken as a reasonable indicator of the use of central guidelines on inventory control.

The logistics performance indicators for Inventory Control were

- (1) *Percent discrepancy between stock cards and physical inventory*: Percent discrepancy between stock cards and physical inventory is defined as the percent increase or decrease between the amount of stock on the stock card and the amount in the physical inventory. A figure of “0” is perfect as the facility has the exact same amount on the stock cards as in the physical inventory. An acceptable range of agreement is any figure between –5% and 5%.
- (2) *Percent of facilities with stock between max-min levels*: Facilities should have at least one month and no more than three months of stock in their physical inventory.
- (3) *Percent of products (drugs) stocked out at the time of the visit*
- (4) *Percent of products (drugs) stocked out in the last six months*
- (5) *Average number of days per stock out (in last six months)*

Table 8.1 presents results of the one variable Decision Space indicator and three of the logistics performance indicators (See annex B for results for Contraceptives and vaccines). Table 8.2 presents the remaining logistic performance indicators.

The great majority of facilities (70%) were categorized as having "low" variable decision space for Inventory Control. What is perhaps the most surprising is the low stock out rates despite only half of facilities using stock cards and only one third of facilities had the ideal stock levels.

Table 8.1 Variable Decision Space for Inventory Control and Related Performance Indicators

Facility type	Decision Space indicator (High DS facilities only)		Logistics Performance Indicators for Drugs (All Facilities)		
	Not given inventory control guidelines	Percent not using stock cards	Percent stock card discrepancy	Percent within Max-Min stock level	Percent of products stocked out on day of visit
Regional HA	20% (1)	20% (5)	-3% (5)	41% (5)	3% (5)
Regional Hospital	20%(1)	40% (5)	12% (4)	38% (5)	4% (4)
District HA	24% (6)	53% (15)	-2% (15)	36% (15)	11% (15)
District Hospital	41% (9)	45% (22)	23% (22)	36% (22)	6% (22)
Total	30% (17/57)	45% (21/47)	11% (46)	37% (47)	7% (46)

Table 8.2 Inventory Control Performance Indicator: Stock outs in Last Six Months and Mean Duration (All Products)

Facility Type	Percent of products stocked out in last 6 months			Mean no. days stocked out for each stock out (among those reporting stock outs) <sup>10</sup>	
	Drugs	Contraceptives	Vaccines	Drugs	Contraceptives
Regional HA	9% (4)	11% (1)	0.5% (1)	15 (4)	7 (1)
Regional Hospital	0.5% (2)	14% (2)	-	--	16 (2)
District HA	17% (13)	14% (5)	4% (6)	23 (13)	23 (4)
District Hospital	8% (15)	7% (2)	0.2% (2)	12 (15)	25 (1)
Total	11% (34)	12% (10)	3% (9)	17 (32)	20 (8)

The only significant relationship between variable inventory control decision space and logistic performance was found between those facilities that did not use stock cards and the percent of facilities within the min-max stock level for medicines. **Those facilities that did not use stock cards were less likely (27% versus 45%) to have their stock levels for medicines within the required max-min levels.** These results show that stricter guidelines on the use of stock cards may lead to stock within the max min levels.

Table 8.3 Relationship between Decision Space for Inventory Control and Performance Indicator

Guidelines on inventory control	Percent of facilities stock within max-min levels (Contraceptives)
Not using stock cards (High DS)	27% (21)
Using stock cards (Low DS)	45% (26)
Ttest	t= 3.8 p= 0.0004 N=47

## Storage

Storage of pharmaceuticals and other health commodities play a key role in their efficacy and safety in use. National guidelines, which were consistent with best practices for storage, do exist, but these are not enforced and allow local choices to be made. Different levels could, and did develop their own guidelines and some lower administrative levels may receive norms or guidelines.

**General decision space for storage, was determined to be moderate for essential drugs, contraceptives, and vaccines since there were national guidelines but facilities could choose to store these products according to their own guidelines.**

The variable decision space indicator for Storage was whether the facility *Made their own guidelines for storage (essential drugs only)*. Facilities that made their own storage guidelines or received the guidelines from someone at their same level were considered high decision space. Those that received the guidelines from a higher level or made their guidelines in coordination with a higher authority were considered low decision space.

We hypothesize that those with high decision space and hence making their own storage guidelines and standards were more likely to have a lower performance compared to those using national guidelines.

<sup>10</sup>There were too many missing values to report figures for vaccines

Two logistics system performance indicators were based on international best practices recommended by DELIVER. These were used as the basis for measuring performance on the sites in terms of the storage function.

- (1) *Met 100 percent of storage standards:* These are the twelve basic storage conditions deemed necessary to maintain the quality and preserve the condition of products for users.
- (2) *Percent of cold chain standards met:* This is primarily for vaccines, but can apply to other products that require refrigeration. The standards for cold chain were: 1) the appropriate refrigerators and thermo flasks available to protect the vaccines during transport; 2) the appropriate temperature (between 0-8 centigrade) for all refrigerators; 3) if they had appropriately graphed/recorded the temperature on the day of the visit; and 4) if they had a guide for the vaccination scheme on hand.

Table 9.1 Storage Decision Space and Related Logistics Performance Indicators

Facility type	Decision Space indicator (High DS facilities only)	Performance indicators (All facilities)	
	Made their own guidelines	100% of storage standards met	Percent of cold chain standards met
Regional HA	25% (1)	40% (2)	80% (4)
Regional Hospital	20% (1)	60% (3)	50% (2)
District HA	12% (3)	13% (2)	40% (6)
District Hospital	60% (12)	23% (5)	44% (8)
Total (N)	31% (17/54)	26% (12/47)	48% (20/42)

**Facilities given guidelines were more likely to meet 100 percent of storage conditions for drugs** (table 9.2). Similarly to inventory control, stricter guidelines in terms of storage may lead to more facilities meeting storage conditions.

Table 9.2 Relationship between Storage Decision Space and Storage Conditions

Decision space indicator	Percent of facilities that met 100% of storage standards (Drugs)
Made own guidelines (High DS)	7% (15)
Receive guidelines from above (Low DS)	34% (29)
T=2.0 p=0.04 N=44	

## Transportation

Transport forms a key link in any distribution system, and in the health logistics system, the role of transportation in ensuring product availability cannot be overemphasized. Facilities may have their own vehicle for use in the transportation of commodities, or may have to rely on other sources. In some instances, it may be necessary to meet transportation costs from the revolving drug funds. Transport options for essential drugs and contraceptives available to facilities were assessed. Facilities/offices can choose any type of transportation. Vaccines are transported separately through the use of cold chain vehicles, but they may transport drugs and contraceptives together.



It will be envisaged that favorable decision making in transportation may lead to prompt deliveries or pickups and will improve product availability in the logistics system.

**General decision space was wide for transportation for drugs and contraceptives since they could select any form of transportation and there were no national standards. General decision space for vaccines was narrow.**

We hypothesize that facilities making appropriate choices in transportation would ensure that this key link in the logistics system is not broken and that this responsibility for transportation would lead to lower stock outs and shorter order lead times.

For variable decision space we selected *whether the facility used its Revolving Drug Fund to Pay for Transport since it was allowed to use this source of funding within national guidelines*. We asked each facility/office if they had used the Revolving Drug Fund to pay for the transportation of Essential drugs. If they did use the Revolving Drug Fund, this was considered high decision space. If they did not use the revolving drug fund this was considered low decision space. Table 10.1 shows that there is an average 58% high level of decision space for transportation.

Four performance indicators were identified for transportation:

- (1) *Average Order Lead Time for Medicine-the number of days between when an order is placed and when it is received*
- (2) *Mean percent of drugs stocked out at the time of the visit.*
- (3) *Mean percent of drugs stocked out in the last six months.*

Table 10.1 Variable Transportation Decision Space and Performance Indicators

Facility type	Decision Space indicator (High DS facilities only)	Performance indicators (All facilities)		
	Use Revolving Drug Fund to pay for transport for Essential Drugs	<i>Average Order Lead Time for Medicine</i>	<i>Mean percent of drugs stocked out at the time of the visit</i>	<i>Mean percent of drugs stocked out in the last six months</i>
Regional HA	50% (2)	11 (3)	3% (5)	9% (4)
Regional Hospital	60% (3)	3 (3)	4% (4)	0.5% (2)
District HA	54% (13)	6 (6)	11% (15)	17% (13)
District Hospital	64% (14)	3 (8)	6% (22)	8% (15)
Total (N)	58% (32/55)	5 (20)	7% (46)	11% (34)

**There were no significant relationships between transportation decision space and the four performance indicators listed above.**

### Logistic Management Information System

In reporting logistic information, the regional levels report to national level on the RMS. National drugs reporting forms called Quarterly Returns for Drugs and Drug Availability Form as well as Contraceptives Returns Form and Vaccine Returns Form are also submitted. The forms are not always printed, and

circulated but the store manager or pharmacist knows what information should be reported and appears to do so. The LMIS system in Ghana is generally not very strong and reporting is low with little or no enforcement. In addition, some districts and regions may make up their own reports for additional information. All BMCs report general HMIS information on the whole system. A few indicators on the HMIS forms address logistics system issues.

**General decision space was moderate for LMIS since there were national forms, but some facilities developed their own forms.**

We had one variable decision space for LMIS: *whether facilities/offices have developed their own forms for managing drugs/contraceptives/vaccines in the last six months.*

The performance indicators for LMIS measured whether facilities submitted LMIS forms. There are established and different forms for drugs, contraceptives and vaccines. For Essential Drugs the facilities report to districts who report to the region on a monthly basis. The regions report to national level on the RMS. The following four performance indicators were assessed:

- (1) Submitting Quarterly Forms for Essential Drugs
- (2) Submitting Quarterly Forms for contraceptives
- (3) Submitting Quarterly Forms for vaccines
- (4) Submitting Monthly drug availability forms

We hypothesize that in general, higher decision space for reporting would result in poorer performance. Facilities using the national forms and guidelines were expected to be more likely to submit their reports than those that have made up their own forms.

Table 11.1 Variable LMIS Decision Space and Performance Variables

Facility type	Decision Space indicator (High DS facilities only)	Performance indicators (All facilities)			
	Develop own LMIS forms	Submit Quarterly reporting of drugs	Submit Quarterly reporting of contraceptives	Submit Quarterly reporting of vaccines	Submit monthly report of drug availability
Regional HA	20% (1)	60% (3)	100% (5)	100% (5)	80% (4)
Regional Hospital	60% (3)	80% (4)	100% (2)	67% (2)	60% (3)
District HA	13% (3)	89% (16)	96% (22)	96% (24)	86% (18)
District Hospital	19% (4)	79% (15)	100% (12)	87% (14)	69% (11)
Total (N)	20% (11/55)	81% (38/47)	98% (41)	92% (45/49)	77% (36/47)

In examining the relationship between the variable decision space (developing their own LMIS forms) and submission of different quarterly reports, we found the following results. **Those facilities that developed their own LMIS forms were less likely to submit quarterly reporting of contraceptives and monthly reporting of drug availability.** These results suggest that stricter guidelines on LMIS may lead to a more efficient information system.

Table 11.2 Relationship between LMIS decision space and performance variables

Decision space indicator	Submit Quarterly reporting of contraceptives	Submit monthly report of drug availability

Develop own LMIS forms (High DS)	88% (34)	50% (10)
Do not Develop own LMIS forms (Low DS)	100% (8)	84% (37)
	T=2.2 p=0.03 N=42	T=2.3 p=0.02 N=47

## Personnel/Human Resources

General decision space for Personnel and Human resources is considered to be low. Although the reforms in the health sector was quite extensive and transferred reasonable control over most functions to the local level, not all functions are fully under the local management controls. Most notable among these are remuneration and the hiring of full term or permanent staff. A function still ostensibly centralized with certain decision points located even outside the health sector. The Health sector is still subject to the hiring and firing controls of the civil service. The hiring of full term staff is still performed at the central level.

However local health managers some reasonable latitude in assigning staff to tasks at the local levels. The establishment of the Ghana Health Service gives some authority for hiring non-permanent staff. The non-permanent staff can be hired and compensated with internally funds at local level.

**General decision space for personnel was “moderate to high” since local officials can assign any personnel to logistics functions and can hire non-permanent staff.**

Two variable decision space indicators for Personnel were examined:

- (1) *Transfer staff without approval*: If the facility transferred personnel in the last year without approval from a higher level this was considered high decision space. Transferring only with approval was considered low decision space.
- (2) *Use internally generated funds to motivate staff*: Facilities were asked if in the last year they had used internally generated funds to motivate or reward staff for performing logistics functions. If the facility used internal funds it was considered to have high decision space.

We hypothesized that local choices aimed at improved logistics performance will cause local managers to train staff performing logistics functions in order to maximize performance. A measure of this could be the ratio of staff working in the logistics system who have been trained.

One performance indicator was used: *percent of staff trained in key logistics functions*. This is the number of staff trained in key logistic functions during the last two years. The areas include product selection, budgeting, ordering/procurement, inventory control, and LMIS.

For this function, we hypothesize that facilities which had a wider decision space on human resource and personnel would be able to transfer or assign staff to logistics functions and also use internally generated funds to motivate staff. We also hypothesize that these facilities would be more likely to train staff in the logistics functions for improved performance

Table. 12.1 Personnel Decision Space and Related Logistics Performance Indicator

Facility type	Decision Space indicator (High DS facilities only)	Performance indicator
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	Transfer staff without higher level approval	Use internal funds to motivate staff	Percent staff trained in logistics functions for drugs
Regional HA	20% (1)	40% (2)	91% (4)
Regional Hospital	0% (0)	60% (3)	50% (2)
District HA	16% (4)	47% (8)	66% (13)
District Hospital	9% (2)	81% (17)	54% (17)
Total (N)	12% (7/57)	63% (30/48)	62% (36)

**There was no clear pattern between human resource variable decision space and the performance indicators for human resource functions.**

## Supervision

Supervision systems in the logistics system are not very well defined. In most instances, supervision of the lower levels emanates mainly from the regional level and structured mainly along the vertical disease programs. General management supervisory trips are also organized from the regional level. In most regions, the concept of a team and integrated approach to supervision is used. Teams are constituted from the higher level and these would then monitor all the various programs and different units at the lower level. This is to ensure that the health management teams have a comprehensive and team responsibility of all programs in their care. It is also designed to break the monotony of vertical supervision in which some programs receive supervisory support while others do not. Also worthy of mention is the concept of “district-parenting” in which a senior manager at the regional level is assigned as a “parent” for each district. This ensure that there is continuity in the oversight of what happens at each district and the there is a point person at the regional level for each district.

In order for these supervisory arrangements to work, supervision guides were developed, stating the specifics issues to review on a supervision trip and the interventions to be made. There were no strict national guidelines for these interventions and, especially for the logistics area, local levels developed their own guidelines.

**General decision space for supervision was deemed to be wide because there were no clear national guidelines for supervision specifically for logistics.**

Three variable decision space variables were chosen for supervision:

- (1) *Develop supervision guides:* Decision space is defined as high if the facilities or someone from their level designs the supervision guides. Decision space is low if a higher authority designs the guides for the facility.
- (2) *Decide on supervision schedules:* Decision space is defined as high if the facilities or someone from their level creates supervision schedules. Decision space is low if a higher authority creates the supervision schedules for the facility.
- (3) *Assign staff to supervision:* Decision space is defined as high if the facilities or someone from their level can assign their own staff to supervision. Decision space is low if a higher authority assigns staff to supervision for the facility.

We hypothesized that higher logistics performance would result from supervision that included specific logistics related activities that a supervisor will observe or inspect. Facilities that exercise wider decision space in the design and implementation of their supervision would address logistics system functions as a component of these guidelines. These include checking stocks and inventory records as well as validity of products in storage.

Table 13.1 Supervision Decision Space Indicators

Facility type	Decision Space indicator (High DS facilities only)			Performance Indicators	
	Design own supervision guides	Create own supervision schedule	Assign supervision staff	Made Supervisory Visit (drugs) in Last month <sup>11</sup>	Received Supervisory Visit (drugs) in Last month
Regional HA	80% (4)	100% (5)	100% (5)	67% (2)	50% (2)
Regional Hospital	20% (1)	80% (4)	80% (4)	50% (2)	100% (1)
District HA	21% (5)	75% (18)	87% (20)	80% (12)	---
District Hospital	33% (7)	57% (12)	71% (15)	20% (4)	33% (1)
Total (N)	31% (17/55)	71% (39/55)	81% (44/54)	47% (20)	38% (3)

We evaluated performance by the % of facilities that accomplished each of the key supervisory activities as noted in Table 13.2.

Table 13.2 What facilities accomplish during their supervisory visit

	Performance Indicator: What facilities accomplish during their supervisory visit <sup>12</sup>		
	For Drugs	For Contraceptives	For Vaccines
Supplies Checked	95% (42)	94% (33)	94% (37)
Stock Cards Checked	100% (44)	89% (31)	89% (33)
Expired Stock Card	75% (32)	65% (22)	66% (25)
LMIS Reports Checked	72% (31)	63% (22)	74% (28)
On-the-job training	43% (18)	53% (18)	43% (16)
Other	0% (44)	0% (35)	0% (39)

**Interestingly, there were no significant relationships between the decision space indicator and any of the performance variables. Neither receiving a supervisory visit or the content of the visit had any effect on supervisory performance.**

### Staff Training

Continuous training, or in-service training is important for improved organizational performance. In this function we examined the choices and decisions of local managers in making logistics related training available to staff and personnel; performing logistics functions. Of relevance here were two centrally provided or designed training programs that were logistics related. The two training programs that were selected for use in this study were training in procurement and another in rational drug use. These related mainly to essential drugs.

We examined the role or choices that local managers had in identifying training needs, conducting the required training using their own resources or selecting participants to be sent for training provided by the central, or a higher level.

**General decision space on staff training was “moderate” since there were national programs but also local officials could design their own training programs.**

<sup>11</sup> DHAs had a supervisory visit if 50% or more of their Health Centers received a supervisory visit

<sup>12</sup> DHAs are considered to have completed each item if 50% or more of their Health Centers completed this item.

We hypothesized that the number or ratio of people trained in logistics functions will be a reflection of the choices that local managers made. We expected that the more people there are trained in logistics functions in the last two years, the better the performance on the system.

Three variable training decision space indicators were examined:

- (1) *Identify training needs*: Facilities that identify their own training needs are considered as having high decision space.
- (2) *Conduct training with their own resources*
- (3) *Selection of participants for courses designed by higher authorities*: High decision space was defined as those who select their own participants or someone at their own level (regional or district level) selects the participants. Low decision space is if someone at a higher level selects the participants for the facility/office or the selection is done in coordination with a higher level.

There was one performance indicator: *Percent of staff trained in key logistics functions*.

Table 14.1 Training Decision Space Indicators and Related Performance Indicator

Facility type	Decision Space indicator (High DS facilities only)			Performance indicators(All facilities)
	Identify own training needs	Conduct training with own resources	Select participants for courses	Percent staff trained in logistics functions for drugs
Regional HA	100% (5)	50% (2)	60% (3)	91% (4)
Regional Hospital	100% (5)	80% (4)	20% (1)	50% (2)
District HA	84% (21)	65% (15)	29% (7)	66% (13)
District Hospital	91% (20)	74% (14)	21% (4)	54% (17)
Total (N)	89% (51/57)	31% (35/51)	28% (15/53)	62% (36)

**Facilities that select their own participants for courses were found to have fewer personnel trained in logistic functions for drugs than those whose participants are selected by a higher authority.**

Table 14.2 Relationship between Training Decision Space and Logistics Training

Decision space indicator	Percent staff trained in logistics functions for drugs
Select participants for courses (High DS)	50% (14)
Do not Select participants for courses (Low DS)	76% (17)
T test	t= 2.2 p= 0.03 N=31

## Organizational Support

Organizational support refers to the institutional capacity to solve problems through team work. In the reforms of decentralization of the health system, the District Management Teams and teams at Regional and facility levels were expected to work together to solve problems including those of the logistics system.

**General decision space for organizational support is wide. Almost all facilities reported they had a management team and this management team helped to solve their institutional problems.**

Due to the low variability, no variable decision space indicator was analyzed. Almost all facilities (98%) of facilities/offices reported that their management team met regularly to solve problems. All facilities (100%) reported that in these meetings problems were solved.

### Product Quality Assurance

Product quality is one of the logistics functions for which lower levels have a significant implementation role. However central authorities usually are responsible for product testing or registration procedures.

Most of the quality assurance activities that are possible at lower levels relate to proper product handling, which have been addressed in storage and inventory control, however, the need for local levels of the logistics systems to be vigilant in monitoring quality and reporting any untoward findings is a measure of their role in quality assurance.

These responsibilities suggest that **general decision space for product quality assurance was moderate.**

Two variable decision space indicators were measured:

- (1) Percent of facilities that disposed, sent a report, and/or returned (as opposed to doing nothing damaged, near expired drug, wrong product, or poor quality product.
- (2) Percent of facilities that kept a product with less than 18 months of shelf life in stead of returning it

Table 15.1 Decision Space Indicators for Product Quality Assurance

Facility type	Decision Space indicator (High DS facilities only)	
	Disposed, sent report, returned poor quality product	Kept product with less 18 mo. Shelf life
Regional HA	100% (4)	50% (1)
Regional Hospital	100% (3)	100% (3)
District HA	90% (9)	78% (7)
District Hospital	81% (13)	75% (12)
Total (N)	88% (29/33)	77% (23/30)

There were six performance variables for product quality.

- (1) Percent of facilities that had received a damaged good
- (2) Percent of facilities that had received an expired good
- (3) Percent of facilities that had received the wrong product
- (4) Percent of facilities that had received a product of poor quality
- (5) Percent of facilities that had received a product with less than 18 months of shelf life
- (6) Percent of facilities that had had a good damaged in their facility

The largest problem in terms of quality is receiving goods with less than 18 months of shelf life.

Table 15.2 Performance Indicators for Product Quality Assurance

Facility type	Performance Indicators (High DS facilities only)					
	Received Damaged Goods	Expired Products	Wrong Products Supplied	Poor Quality	Less 18 mo. Shelf life	Goods damaged in facility
Regional HA	50% (2)	25% (1)	25% (1)	0% (4)	40% (2)	75% (3)
Regional Hospital	33% (1)	100% (3)	0% (3)	66% (2)	60% (3)	20% (1)
District HA	18% (2)	63% (7)	0% (11)	18% (2)	45% (10)	9% (2)
District Hospital	40% (6)	47% (7)	6% (1)	6% (1)	72% (16)	18% (4)
Total (N)	33% (11/33)	45% (15/33)	6% (2/33)	5% (15/33)	57% (31/54)	18% (10/54)

**There were no significant relationships between product quality variable decision space and product quality performance indicators.** Despite this lack of relationship, one can see from the results above that despite disposing of products, sending reports, and returning poor quality products, there is still a moderate level of low quality products received. These mainly reflect problems of the central authorities. However, those that receive products with less than 18 months of shelf life tend to keep the products for use until they truly expire.

### Client Contact and Use

There are national protocols for prescribing practices, but it is unclear whether these protocols are modified by any local decision. We predicted a limited to moderate level of decision space for client contact and use.

We however postulated that if local choices resulted in any changes to the national protocols, this would affect the quality of services provided at the local level. This is because in designing the national protocols, of which Ghana is using an evidence based approach in developing its standard treatment protocols, the national level will most definitely have more expertise available to it. Any changes at the local level may result in the use of less effective protocols and hence result in a lower quality of service.

**General decision space for client contact and use is moderate.**

Two variable decision space indicators were investigated:

- (1) Percent of facilities with national protocols for Drugs
- (2) Percent of facilities that are able to modify national protocols to suit local conditions

Table 16.1 Decision Space Indicators for Client Contact and Use

Facility type	Decision Space indicator (High DS facilities only)	
	National Protocols for Drugs	Modify National Protocols
Regional HA	100% (4)	33% (1)
Regional Hospital	80% (4)	60% (3)
District HA	86% (6)	33% (4)
District Hospital	86% (19)	62% (13)
Total (N)	86% (33/38)	51% (21/41)



We hypothesize those facilities that delivered acceptable quality of services would have a high customer satisfaction and would receive fewer complaints from clients. The performance indicator for client contact and use is how many complaints the facility has received from clients.

Table 16.2 Performance Indicators for Client Contact and Use

	<b>Performance Indicator</b>
<b>Facility type</b>	Receive complaint from client
Regional HA	50% (2)
Regional Hospital	20% (1)
District HA	31% (5)
District Hospital	24% (5)
Total (N)	28% (13/46)

As we had hypothesized, we found that **facilities that modified national protocols received more complaints from clients than those that did not modify protocols.** These results suggest perhaps stronger control on client contact and protocols for prescribing practices, however a more detailed investigation of client satisfaction should be conducted to verify these results.

Table 16.2 Relationship between Decision Space Indicators and Performance for Client Contact and Use

<b>Decision space indicator</b>	<b>Receive complaint from client</b>
Modify National Protocols (High DS)	38% (19)
Do not Modify National Protocols (Low DS)	11% (19)
T test	t= -1.9 p= 0.05 N=38

It is important to note however that this indicator is based on reports from the facility and not on exit client interviews which would be more dependable. In addition, the use of this single indicator would clearly not address the quality of care issue completely. Within the constraints of the data collected in this study, though, this provides an interesting finding.

## Integration of Logistic Systems in Ghana

We reviewed the logistics functions for which integration is possible for the three types of products. We could only make a reliable measure of integration for six functions: financing, product selection, forecasting, storage, inventory control and personnel. Integration for all functions was less than 50%.

### Financing

We found a moderate level of integration for receiving funds for drugs and contraceptives. A facility is defined as integrated if the same entity (MOH, Regional level authority, District Assembly, or donors) provided funds for both drugs and contraceptives.

Table 17.1 Integration for Financing

	Integration for Receiving Funds for Drugs and Contraceptives
Regional HA	50% (2)
Regional Hospital	50% (4)
District HA	47% (17)
District Hospital	36% (17)
Total (N)	43% (40)

We examined the relationship between integration for financing and the four financing performance variables used for decentralization of financing, cost recovery, and planning and budgeting:

- (1) *Percent Increase in Stock and Cash Balances 2002.*
- (2) *Total Capital 2002 Adjusted for Outstanding Payments (Equity of Facility in Stock)*
- (3) *Mean percent of drugs stocked out at the time of the visit.*
- (4) *Mean percent of drugs stocked out in the last six months.*

There was no clear relationship between the level of integration for financing and any of the performance indicators listed above.

### Product Selection

Integration for product selection is examined by looking at the provision of guides for product selection from mutual insurance companies is integrated or not integrated. Integration means that facilities receive guides from mutual insurance companies for drugs, contraceptives, and vaccination together. Nonintegrated means that they receive guides from mutual insurance companies for drugs, contraceptives, and vaccination separately.

There was no integration for product selection.

Table 17.2 Integration for Selection

	Integration for receiving guides for Product Selection from mutual insurance companies
Regional HA	0%
Regional Hospital	0%
District HA	0%
District Hospital	0%
Total (N)	0%

## Needs Quantification

We found a moderate level of integration for needs quantification. Integration of needs quantification for annual requirement means that the facility forecasts annual requirements for drugs, contraceptives, and vaccines together. Non-integration means that the facility forecasts annual requirements for drugs, contraceptives, and vaccines separately.

Table 17.3 Integration for Forecasting

	Integration for forecasting annual requirements
Regional HA	100% (1)
Regional Hospital	---
District HA	57% (23)
District Hospital	36% (17)
Total (N)	43% (40)

Three of the same performance indicators for decentralization of needs quantification are used for integration of forecasting (due to low variation the percent that use logistic data for forecasting was not used as a performance indicator):

- (1) *Mean percent of products stocked out at the time of the visit (presented previously as a performance indicator for other functions above)*
- (2) *Mean percent of products stocked out over the last six months (presented previously as a performance indicator for other functions above)*
- (3) *Forecasting accuracy for medicines.*

There was no clear relationship between the level of integration for forecasting and any of the performance indicators listed above.

## Storage

Integration for storage was low. Integration of storage means that the facility stores drugs, contraceptives, and vaccines in one warehouse. Non-integration means that the facility stores drugs, contraceptives, and vaccines in different warehouses.

Table 17.4 Integration for Storage

	Integration for storage facilities
Regional HA	20% (5)
Regional Hospital	20% (5)
District HA	13% (24)
District Hospital	14% (24)
Total (N)	15% (55)

The same performance indicators used for decentralization of storage are used for the integration of storage:

- (1) *Met 100 percent of storage standards:* These are the twelve basic storage conditions deemed necessary to maintain the quality and preserve the condition of products for users.

No significant relationships were found.

## Inventory Control

Integration of inventory control was moderate. Integration of inventory control guidelines distribution means that guidelines for drugs, contraceptives and vaccines are provided to each facility by the same entity (MOH, Regional level authority, District Assembly, or donors). Non-integration means that guidelines are provided by different entities.

Table 17.6 Integration for Inventory Control

	Integration for provision of guidelines for Inventory Control
Regional HA	80% (5)
Regional Hospital	25% (4)
District HA	56% (18)
District Hospital	29% (14)
Total (N)	46% (41)

The same performance indicators used for decentralization were use integration of Inventory Control:

- (1) *Percent discrepancy between stock cards and physical inventory*: Percent discrepancy between stock cards and physical inventory is defined as the percent increase or decrease between the amount of stock on the stock card and the amount in the physical inventory. A figure of “0” is perfect as the facility has the exact same amount on the stock cards as in the physical inventory. An acceptable range of agreement is any figure between –5% and 5%.
- (2) *Percent of facilities with stock between max-min levels*: Facilities should have at least one month and no more than three months of stock in their physical inventory.
- (3) *Percent of products (drugs) stocked out at the time of the visit*
- (4) *Percent of products (drugs) stocked out in the last six months*
- (5) *Average number of days per stock out (in last six months)*

There was no clear relationship between the level of integration for inventory control and any of the performance indicators listed above.

## Personnel

Integration of personnel was low. Integration means that staffing decisions are made together for drugs, contraceptives or vaccines (although we cannot distinguish between those decisions made together or in any combination of two products). Non-integration means that staffing decisions made for only one product at a time.

Table 17.7 Integration for Personnel

	Integration for Personnel Allocations
Regional HA	25% (4)
Regional Hospital	40% (5)
District HA	46% (24)
District Hospital	33% (21)
Total (N)	38% (54)

There was no clear relationship between the level of integration for personnel and any of the performance indicators listed above for inventory control .

Overall, integration in Ghana appears to be low to moderate. Of the six functions where we could measure integration, we found three to have a low level of integration (product selection, storage and personnel) and three to have a moderate level of integration (financing, needs quantification and inventory control). We did not find any significant relationships between the level of integration and any of our performance indicators.

## Comparisons with Data from Previous Years

In previous studies of Ghana's logistic system, there were indicators of stockouts and types of purchases that were similar to the questions in the 2002 survey. We present the comparison of these data below.

### Stockouts of Essential Drugs

The level of stockouts has decreased from the 1999 to 2002. The level of stockouts according to a the report "Baseline Study on the Pharmaceutical Sector in Ghana 1999" was 17%. This is based on the availability of 30 tracer drugs. The percent of stockouts of essential drugs in 2002 decreased to 7%. The results of the 2002 study are based on the availability of fourteen tracer drugs. The decrease in stockout rate may be due to the lower number of tracer drugs in the most recent sample.

Table 18.1 Stockouts 1999 and 2002

Year	1999	2002
Stockouts	17%	7%

### Purchases from Medical Stores and the Private Sector

The "Baseline Study on the Pharmaceutical Sector in Ghana 1999" provided data on purchases from medical stores and the private sector for years 1995-1998. The data for 2001-2002 is taken from the "Pharmaceutical Pricing Study" done in Ghana by JSI. Our study provided the data from 2002. Purchases from the medical stores declined steadily until 1998, at which point they seem to level off just above 50%. Private sector purchases increase steadily from 1996-1998 and also seem to plateau off between 40-45%. The private sector figure from the "Pharmaceutical Pricing Study" for 2001-2002 is significantly lower than figures for all other years.

Table 18.2 Public and Private Purchases 1995-2002

Year	1995	1996	1997	1998	2002
Medical Stores	67%	77%	71%	55%	57%
Private Sector	33%	23%	29%	45%	41%

### Percent of Generic Purchases from Public and Private Sector

The "Baseline Study on the Pharmaceutical Sector in Ghana 1999" had data on the percent of generic drugs in use purchased from the public and private sector. Our study found a lower percent of generic drugs purchased from medical stores an a higher percent purchased from the private sector.

Table 18.3 Generic Purchases 1999 and 2002

Year	1999	2002
% generic from Medical Stores	77%	91%
% generic from Private Sector	66%	81%

## National EDL

The 1999 study reported data from 1999 and 1993 on whether facilities had access to the National EDL. The 1993 data asked separate questions for the EDL and Standard Treatment Guidelines. Although our analysis above does not focus on this question (we focused more on whether that facility had a separate local EDL), we did ask facilities if they had an updated copy (2000) of the National EDL. Over time, more facilities have a National EDL on hand in the facilities.

Table 18.4 Use of National EDL 1993, 1999 and 2002

Facility type	1993 (STG)		1993 (EDL)		1999		2002	
	Claimed	Seen	Claimed	Seen	Claimed	Seen	Claimed	Seen
Yes	45	29	7	6	40	32	9	45
No	4	---	2	---	9	---	2	

These findings do not clearly show a direct impact of decentralization on stock outs or purchasing over time. There are many other explanations for the changes that we observed for which we are not able to control, such as training and the change in financing. However, **the significant improvement in the indicators of stockouts suggests at least that decentralization, combined with the other changes did not make the situation worse and may have contributed to the reduction in stockouts.**

**The changes in purchasing are also significant with increased purchasing from the private sector and increased purchasing of generics. Again this may be the result of decentralization and the other changes in the system, and suggests at least that decentralization did not prevent these positive changes.**

## Comparison between Guatemala and Ghana

This study is the second in a series of studies of decentralization of logistics systems being implemented by DELIVER. The first study of Guatemala was completed in October 2003 and the results offer the possibility of comparison with the current study of Ghana. While the logistics systems in both countries had similar functions and could be analyzed using the “decision space” framework, each had significantly different country contexts, and each had unique features. Guatemala is a larger country and this contributed to the larger sample and to the greater variation in responses to the questionnaires – giving more power to the relationships we reported there. Guatemala’s organizational culture based on a Latin American bureaucratic culture is likely to be different than Ghana’s heritage of British colonial bureaucracies. General economic conditions are relatively similar but Guatemala is classified as a lower-middle income country and Ghana is classified as a low income country in the World Bank classifications.

Specific to the logistics systems, there were significant differences in two important innovations: the “open contract” system in Guatemala and the “cash and carry” system in Ghana. We have described Ghana’s “cash and carry” system in this report. Guatemala’s “open contract” system allowed local drug purchases from pre-selected suppliers at relatively low, fixed prices. The Ministry of Health had open bidding for the right of suppliers to provide essential drugs to the public health system and allowed districts to procure their drugs directly from these suppliers.

The following table 19.1 compares the levels of general decision space for the two countries. The two countries had the same level of decision space for medicine, contraceptives, and vaccines for product selection, needs quantification, human resources/personnel, and organizational support. All the other functions had different degrees of decision space between the two countries. For example, Guatemala had a higher decision space in budgeting for medicines and procurement for medicines. Ghana had a higher decision space in other areas such as financing for medicines, budgeting for contraceptives and vaccines, inventory control, storage, transport for contraceptives, LMIS, supervision, training, quality control, and client contact and use.

Table 19.1 Comparison of General Decision Space for Guatemala and Ghana

Function	Guatemala	Ghana
Financing	Low (centralized) (m,c&v)	Moderate (m) Low (c&v)
Cost Recovery	No cost recovery	Moderate (m&c) Low (v)
Budgeting	High (m) Low (c&v)	Moderate (m,c&v)
Product Selection	Low (m,c&v)	Low (m,c&v)
Needs Quantification (Forecasting)	High (m) Low (c&v)	High (m) Low (c&v)
Procurement	High (m) Low (c&v)	Moderate-High (m) Low (centralized) (c&v)
Inventory Control	Low (m,c&v)	Moderate (m,c&v)
Storage	Low (centralized)	Moderate (m,c&v)
Transportation	High (m) Low (c&v)	High (m&c) Low (v)
Logistics Management Information System	Low (m,c&v)	Moderate (m,c&v)

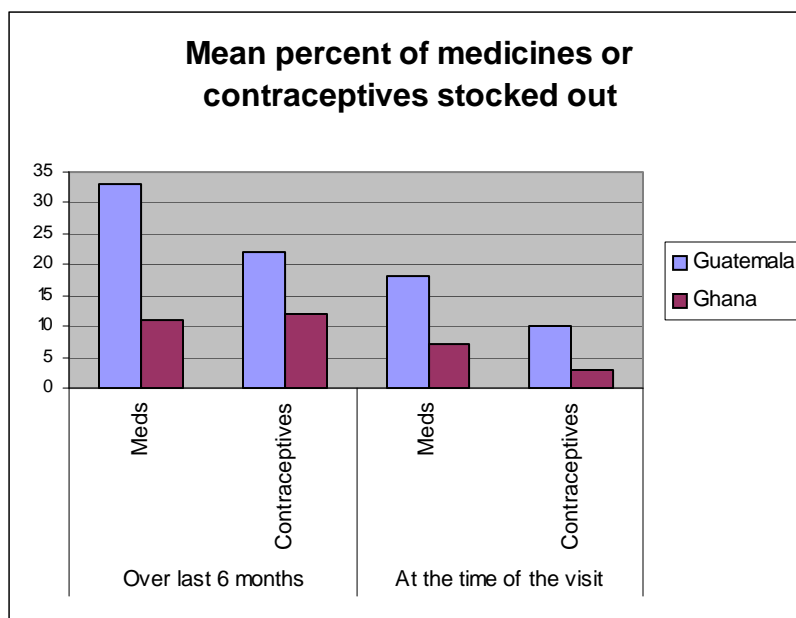


(LMIS)		
Human Resources/Personnel	High (m,c&v)	High (m,c&v)
Supervision	Medium (m,c&v)	High (m,c&v)
Training	Low (m,c&v)	Moderate (m,c&v)
Organizational Support	High (m,c&v)	High (m,c&v)
Quality Control	Low (centralized)	Moderate (m,c&v)
Client Contact and Use	Low (m,c&v)	Moderate (m,c&v)

## Stock Outs in Ghana and Guatemala

Graph 19.2 show the level of stockouts of medicines and contraceptives over the last six months and at the time of the visit for Guatemala and Ghana. Ghana has lower stockouts for both medicines and contraceptives both at the time of the visit and over the last six months.

Graph 19.2. Stockouts over the last six months and at the time of the visit for Guatemala and Ghana



While it might be tempting to suggest that the lessons from Ghana's process of decentralization are more potent for reducing stockouts, this comparison is not valid. The data does not allow us to compare changes in the systems over time that might contribute to the differences we found for surveys done in 2001-2. The differences in stockouts before decentralization and before the unique open contract and cash and carry innovations may have been similar to the differences we find from the surveys.

The surveys show however, that Ghana's system is currently more effective in the major indicators for stockouts and that other countries should look carefully at the Ghana system for possible policy lessons for improving stockout rates. It is likely that the cash and carry system provides motivation and skills that reduce stockouts and the extent to which moderate decision space for financing, cost recovery and planning/budgeting are associated with the cash and carry system suggests that others consider this model

for improving stockout rates. However, this study was unable to assess the impact of these systems for other objectives such as availability of medicines at prices that are affordable to patients.

## Decision Space and Performance in Guatemala and Ghana

While all cross country comparisons are subject to caveats about the significant differences between the country contexts and the special differences such as the unique “cash and carry” system in Ghana and the “open contract” in Guatemala, the comparison of Guatemala and Ghana show some tentative conclusions relevant for policy recommendations about decentralization of logistics systems. Table 19.3 highlights the positive and negative performance by function for both Guatemala and Ghana.

Table 19.3 Higher Decision Space Association with Performance by Function

Function	High Performance	Lower Performance
Financing (modifications)	Ghana	
Cost Recovery	---	---
Budgeting	Guatemala*, Ghana	
Product Selection	---	---
Needs Quantification	Guatemala	
Procurement	Guatemala	Ghana
Inventory Control	Guatemala <sup>c</sup>	Ghana, Guatemala <sup>m,v</sup>
Storage		Ghana
Transportation	Guatemala <sup>m</sup>	Guatemala <sup>v</sup>
LMIS	Guatemala <sup>v</sup>	Guatemala <sup>m,c</sup> , Ghana
HR/Personnel	Guatemala	
Training		Ghana
Supervision	Guatemala**	Guatemala***
Organizational Support	---	---
Quality Control	---	---
Client Contact and Use		Ghana

\*DAS and Hospitals only

\*\*number of visits by DAS

\*\*\* reported quality of supervision visits

<sup>m</sup>=medicines, <sup>c</sup>=contraceptives, <sup>v</sup>=vaccines

First, it seems relatively clear that there are some functions in logistic systems that should remain centralized and local authorities should not be allowed much “decision space”. In both countries we found that granting higher variable decision space to local authorities for inventory control and LMIS led to poorer performance of these functions. These findings are logical. Inventory control and information systems may be functions that have relatively limited range of options for being effectively implemented and there should be a single centralized technical decision about how to manage inventory control and information. While we were unable to assess the performance of the storage function in Guatemala, our findings from Ghana suggest that this is a function that also has a limited range of effective options and perhaps should be centralized.

While we were not able to find relationships between decision space for product selection and performance, we did find that both countries had implemented a national essential drug list that significantly limited the decision space for this function. Many other studies on essential drug lists suggest that it is likely that this function also should remain centralized.

We also find consistent evidence for at least one function to be decentralized with a moderate range of decision space. In both Guatemala and Ghana we find evidence that moderate to high decision space for planning and budgeting should be granted to the local levels. Again there is a logic to this finding that is consistent with the argument that centralized logistics systems do not have sufficient information to plan for the local demand for medicines, vaccines and contraceptives.

For other functions we were not able to assess differences because there were no relationships found in one or the other country. It should be noted here however, that the Guatemala study found evidence that higher decision space was consistent with higher performance for budgeting, procurement, LMIS, and personnel and some aspects of supervision. It is particularly important to note that in contrast to Ghana, higher decision space was associated with better performance for procurement in Guatemala and may have been associated with the particular characteristics of the “open contract” system.

## Summary and Conclusion

The Ghana study shows some significant findings for logistic system decentralization. The facilities that used more of the moderate decision space for the financing and planning/budgeting function were associated with higher performance for these functions. This finding supports the general logic of the cash and carry system. Within the moderate range of choice generally allowed to decentralized authorities for financing and budgeting, those facilities that exercised more choice had better performance. The study showed that this emerges from a “commercial logic”. Those facilities that generated higher cash-stock balances and higher capital were associated with lower stock out rates. However, we also found that those facilities that made more use of their procurement choices were more likely to purchase drugs not on the National Essential Drug List – an outcome that is not desired. This finding suggests that Ghana enforce its NEDL in order to improve the effectiveness of local procurements

The comparison with Guatemala suggests additional tentative policy conclusions. There are some functions that should remain relatively centralized. Inventory control and LMIS functions probably should be limited by central guidelines and these guidelines should be enforced. Storage, which has similar limited effective requirements probably also should be centralized. The studies also suggest that product selection, using enforced national essential drug lists, should remain centralized.

However, reinforcing the findings for planning and budgeting in Ghana, we found that moderate decision space in Guatemala was also associated with better performance. It is likely that planning and budgeting require greater flexibility to respond to local information.

These studies show the importance of looking at decentralization in terms of the decision space allowed for different functions. No logistics system is fully centralized or decentralized. What we have found are tentative conclusions about the advisability of granting more local choice over some functions and retaining central control over other functions. This study of Ghana has contributed to that knowledge by suggesting that moderate ranges of choice over financing and planning/budgeting are associated with higher performance for those functions. It also shows, along with the findings in Guatemala, that inventory control, LMIS and storage should remain centralized.

## Annex A. Detailed Degree of General and Variable Decentralization and Logistics System Performance, Ghana

FUNCTIONS (N)	GENERAL DECISION SPACE	VARIABLE DECISION SPACE	POTENTIAL PERFORMANCE INDICATORS
Financing	Moderate (Drugs)  Narrow (Contraceptives and Vaccines)	Modify guidelines for the Revolving Drug Fund (High=17%)	-Percent Increase in Stock and Cash Balances 2002 -Total Capital 2002 Adjusted for Outstanding Payments (Equity of Facility in Stock) - Stockouts at the time of the visit (drugs) - Stockouts over the last six months (drugs)
Cost Recovery	Moderate (Drugs and Contraceptives)  Narrow (Vaccines)	-Include additional criteria in the GHS/HQ guidelines on exemptions as a result of local needs/circumstances (High = 57%) - Percent price mark-up of drugs purchased from Medical Stores (Mean = 36%) - Percent price mark-up of drugs purchased from Private Sector (Mean = 32%)	-Percent Increase in Stock and Cash Balances 2002 -Total Capital 2002 Adjusted for Outstanding Payments (Equity of Facility in Stock) - Stockouts at the time of the visit (drugs) - Stockouts over the last six months (drugs)
General Planning and Budgeting	Moderate (Drugs, Contraceptives and Vaccines )	- Prepare own annual plans and budgets (High = 70%) - Did not Change work plan/budget after it is reviewed (High = 35%)	-Percent Increase in Stock and Cash Balances 2002 -Total Capital 2002 Adjusted for Outstanding Payments (Equity of Facility in Stock) - Stockouts at the time of the visit (drugs) - Stockouts over the last six months (drugs)
Product selection	Low (Drugs, Contraceptives, and Vaccines)	- Having a Separate Local EDL (High=17%) - Having a Shorter EDL based on disease patterns (High=50%)	-Percent of total products purchased from Medical Stores that were generic or brand - Percent of total products purchased from the private sector that were generic or brand - Purchased drugs off of the EDL (we are assuming this is National EDL)
Needs Quantification/Forecasting	High (Drugs)  Moderate-High (Contraceptives and Vaccines)	-Forecast annual requirement of essential drugs <sup>13</sup> on their own (High: 81%)	- Forecasting Accuracy - % of Facilities using Logistics Data to Forecast requirements - Stockouts

<sup>13</sup> Results for contraceptives and vaccines in Annex

FUNCTIONS (N)	GENERAL DECISION SPACE	VARIABLE DECISION SPACE	POTENTIAL PERFORMANCE INDICATORS
Procurement	High (Drugs) Low- (Contraceptives and Vaccines)	- Purchase from Private sector if 100% of Order not Provided (High=46%) - Reprimanded for Buying From Private Sector (High=90%)	- Purchase Drugs off the EDL
Inventory Control	Moderate (Drugs, Contraceptives, and Vaccines)	- Not Given Guidelines on Inventory Control (medicines only) (High=30%) - Not using stock cards (High- 45%)	- Discrepancy between stock cards and physical inventory - Percent of facilities with stock between max-min levels - Stockout Rate at the time of the visit - Stockout Rate over the last six months - Mean Number of Days of Stockout Duration
Storage	Moderate (Drugs, contraceptives, vaccines)	- Make their own Guidelines (High: 31%)	- Percent of Facilities meeting 100% Warehouse Compliance - Percent of Facilities meeting 100% Cold Chain Compliance
Transportation	Wide	-Use the Revolving Drug Fund to Pay for Transport (High=58%)	- % facilities with facility-managed vehicle for product pick-up/delivery - Average Order Lead Time - Stockout Rate at the time of the visit - Stockout Rate over the last six months
Logistics Management and Information Systems	Moderate	Develop own LMIS forms (High=20%)	- Submit Quarterly Forms for Essential Drugs - Submit Quarterly Forms for contraceptives - Submit Quarterly Forms for vaccines - Submit Monthly drug availability forms
Human Resources/Person nel	High	-Transferring Staff without Approval (High=12%) -Using Internally Generated Funds to Motivate Staff (High=63%)	- % staff trained in logistic functions

FUNCTIONS (N)	GENERAL DECISION SPACE	VARIABLE DECISION SPACE	POTENTIAL PERFORMANCE INDICATORS
Supervision and Staff Development	Wide	-Design their own Supervision Guides (High=31%) -Create their own Supervision Schedules (High=71%) -Assign Staff on their own to Supervision (High=81%)	- Made Supervisory visits in the last month - Received supervisory visit within the last month - What facilities accomplish during supervisory visit
Training	Moderate	-Identify Training Needs (High=89%) -Use own Resources (High=31%) -Select their own participants (High=28%)	– % staff trained in logistic functions
Organizational Support	High	No Indicator	– % whose management teams met regularly – % who solved problems during meetings
Product Quality Assurance	Moderate	-Percent of facilities that disposed, sent a report, and/or returned (as opposed to doing nothing damaged, near expired drug, wrong product, or poor quality product (High=88%) -Percent of facilities that kept a product with less than 18 months of shelf life in stead of returning it (High=77%)	-Percent of facilities that had received a damaged good -Percent of facilities that had received an expired good -Percent of facilities that had received the wrong product -Percent of facilities that had received a product of poor quality -Percent of facilities that had received a product with less than 18 months of shelf life -Percent of facilities that had had a good damaged in their facility
Treatment Protocols and Client Contact	Moderate	-Percent of facilities with national protocols for Drugs (High=86%) -Percent of facilities that are able to modify national protocols to suit local conditions (High=51%)	-Percent of facilities that have received complaints from clients

## Annex B

### Forecasting/Needs Quantification for Contraceptives and Vaccines

Facility type	Decision Space indicator (Contraceptives)	Decision Space indicator (Vaccines)
	Quantify own annual needs	Quantify own annual needs
Regional HA	100% (5)	100% (5)
Regional Hospital	50% (1)	80% (4)
District HA	87% (20)	91% (20)
District Hospital	45% (5)	8% (50)
Total (N)	75(31/41)	77% (37/48)

There was no relationship between decision space indicators for contraceptives and vaccines and outcome indicators for forecasting (stockouts and forecasting accuracy).

### Inventory Control for Contraceptives and Vaccines

Facility type	Decision Space indicator (Contraceptives)	Decision Space indicator (Vaccines)
	Percent not using stock cards	Percent not using stock cards
Regional HA	0% (5)	40% (2)
Regional Hospital	80% (4)	80% (4)
District HA	47% (7)	67% (10)
District Hospital	27% (6)	45% (10)
Total (N)	36% (17/47)	55% (26/47)

Those that do not use stock cards for contraceptives were more likely to not have stock levels within max-min levels and to have stockouts of contraceptives at the time of the visit and over the last six months. Stockout were of less duration. Similarly to the results for essential drugs, this suggests that inventory control should remain centralized.

Guidelines on inventory control	Percent within Max-Min stock level for Contraceptives	Percent Stockouts of Contraceptives at the time of the visit	Percent Stockouts of Contraceptives over the last six months	Mean no. days stocked out for each stock out (among those reporting stock outs) <sup>14</sup>
Not using stock cards for contraceptives (High DS)	10% (17)	8% (8)	27% (6)	4 (2)
Using stock cards for contraceptives (Low DS)	31% (30)	1% (30)	8% (24)	24 (6)
Ttest	t= 2.5 p= 0.01 N=47	t= -1.9 p= 0.06 N=38	t= -1.9 p= 0.06 N=30	t= 2.2 p= 0.06 N=8

<sup>14</sup> There were too many missing values to report figures for vaccines

Similarly to contraceptives, those that do not use stock cards for vaccines also had a lower percent of stock within max-min levels.

<b>Guidelines on inventory control</b>	<b>Percent within Max-Min stock level for Vaccines</b>
Not using stock cards for vaccines (High DS)	6% (26)
Using stock cards for vaccines (Low DS)	26% (21)
Ttest	t= 2.7 p= 0.0085 N=47



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