HMIS and decision-making in Zambia: re-thinking information solutions for district health management in decentralized health systems

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At the onset of health system decentralization as a primary health care strategy, which constituted a key feature of health sector reforms across the developing world, efficient and effective health management information systems (HMIS) were widely acknowledged and adopted as a critical element of district health management strengthening programmes. The focal concern was about the performance and long-term sustainability of decentralized district health systems. The underlying logic was that effective and efficient HMIS would provide district health managers with the information required to make effective strategic decisions that are the vehicle for district performance and sustainability in these decentralized health systems.

However, this argument is rooted in normative management and decision theory without significant unequivocal empirical corroboration. Indeed, extensive empirical evidence continues to indicate that managers’ decision-making behaviour and the existence of other forms of information outside the HMIS, within the organizational environment, suggest a far more tenuous relationship between the presence of organizational management information systems (such as HMIS) and effective strategic decision-making. This qualitative comparative case-study conducted in two districts of Zambia focused on investigating the presence and behaviour of five formally identified, different information forms, including that from HMIS, in the strategic decision-making process. The aim was to determine the validity of current arguments for HMIS, and establish implications for current HMIS policies.

Evidence from the eight strategic decision-making processes traced in the study confirmed the existence of different forms of information in the organizational environment, including that provided by the conventional HMIS. These information forms attach themselves to various organizational management processes and key aspects of organizational routine. The study results point to the need for a radical re-think of district health management information solutions in ways that account for the existence of other information forms outside the formal HMIS in the district health system.

Key words: HMIS, information forms, decentralization, strategic decision making, district health systems

Introduction

Since Alma-Ata in 1978, most developing countries have implemented health sector reforms. In almost every case, a central feature of the reform strategy has been a process of structural decentralization: the aim being to vest greater decision-making responsibility in the district health systems. The underpinning primary health care notion is that decentralization thrives on the essential involvement of primary-level health management units in the delivery of health services (WHO 1978). Although the geo-politics vary from country to country, the district tends to be the last formal unit of local government and administration (Mills 1990). Across the variations of decentralization in developing health systems (Mills 1990; Vaughan 1990), the success of decentralization has predominantly been considered to rely significantly on the capability of the district health system to effectively exercise its assigned authority and play its role in the reformed health structure. Thus, there has been a deliberate movement to strengthen the management capacity of district health systems (for instance, Cassels and Janovsky 1996).

One area of focus in district health management strengthening programmes has been health management information systems (HMIS) at the district level (for instance, Acquah 1994; Ankrah and Djan 1996; Lippeveld et al. 1997; Bodart and Sapirie 1998). There are challenges in clearly defining what is meant by HMIS (Lippeveld and Sauerborn 2000). In this study, HMIS is used to refer to the predominant concept of a formal and structured health information system set up to support and facilitate health management decision-making at different levels of any health system (for instance, Ankrah and Djan 1996; Danish Bilharziasis Laboratory 2002; Gladwin et al. 2003). In that light, HMIS is designed to carry both
epidemiological information (health prevalence, incidence, mortality, morbidity statistics) and administrative information (resource inputs and service utilization).

The rationale for HMIS has been that the availability of operational, effective and efficient health management information systems is an essential component of the required district management capacity. The logic is that effective and efficient HMIS will provide district health managers with the information required to make effective strategic decisions that support district performance and sustainability in these decentralized health systems.

However, the arguments for HMIS are not based on unequivocal empirical evidence, or tested theory, that the information carried in HMIS makes a difference, but rather represents a normative view of management capacity. A review of empirical literature reveals a prevalence of HMIS failure problems across a range of country situations in the developing world (Lippeveld et al. 1997), as well as in developed health systems (for instance, Southon et al. 1999; Snyder-Halpern 2001).

Other specific difficulties with far more conceptual implications pertain to the widely recognized problems with the decision-making behaviour of managers in organizations in general, at least when that behaviour is set against normative theories of management and decision-making practice. For instance, empirical studies suggest managers use information for political capital, using information to seek legitimacy for their decisions rather than to make or clarify those decisions (Feldman and March 1988; Guldner and Rifkin 1993). More crucially, it is widely acknowledged that managers use information other than that provided by formal organizational information systems such as HMIS; and this other information may take verbal and observational forms, or may be embedded in the training and experiential background of managers (for instance, Mintzberg 1975).

This paper, therefore, addresses the challenge of reconciling the rhetoric for HMIS in district health systems with observed problems that contradict it, threaten its very integrity, or, at minimum, recognize its limitations in relation to management tasks. The paper describes a comparative study of two district health systems in Zambia, and its main intention is to highlight one major implication of the study findings. The paper describes the core research problem, key objectives of the study, the methods and key findings. It then concludes with a discussion of the major practical implication of the study findings, for HMIS design in developing health systems.

**Background**

The key research problem confronted by the study was that the interaction between theory and empirical evidence so far indicates that organizations, public or private, still understand little about the nature and behaviour of information within the organizational environment.

This problem has to some extent been acknowledged in existing literature. For instance, Liebenau and Backhouse (1990) have pointed out how little we understand about what information is and how it affects us in organizations. More fundamentally, March (1988) and Mintzberg (1975) noted the general gap that exists between findings of research on decision-making and the assertions of classical normative decision-making theory that underpins the current argument for information in organizations. March (1988) argues that this gap is ‘partly attributable to limitations in the theories, rather than limitations in the (decision-maker) behaviour’.

The implications of these critical observations for developing health systems ought to be appreciated sensitively. These are resource-poor economies where new technologies should be continuously and rigorously evaluated in terms of value creation for the health system, for each dollar invested. Yet, the theory-practice gap being flagged up by empirical literature on information and decision-making presents potential problems for cost-benefit analysis in these developing health systems. With divergent trajectories or outcome-projection functions, between theory and actual practice, there is an absence of the necessary agreement on the measurement of benefits, success or indeed failure. The result has been a landscape replete with a plethora of frameworks for measuring information system failure or success (Skok et al. 2001). This condition has not been helpful to practitioners in developing health systems. Developing health systems often set out to strengthen their HMIS based on normative decision theory principles (Acquah 1994; Gladwin et al. 2003), but later have to deal with measuring theoretically unanticipated informational phenomena in evaluation stages of their HMIS programmes.

The theory-practice gap that constitutes the root of this problem is essentially defined by the way in which information is ‘problematic’ in the organizational environment. An expeditious review of literature on information and decision-making reveals three major forms of this ‘problematic’ presentation of information. These three forms of presentation are briefly outlined here.

**Functional versus symbolic use of information**

The principles of normative decision theory are predicated on the functional use of information by decision-makers where, since the onset of Frederick Taylor’s (1911) ‘scientific management’ paradigm, decision-makers use information objectively in making rational decisions. Yet, such works as those by Feldman and March (1981), Feldman (1988), and Dean and Sharfman (1993) represent now common knowledge that people distort and manipulate information for their own goals, and that this is a pervasive phenomenon in organizational life. Information is often used as a symbol of competence, or merely as a signal of appropriate decision-making to secure legitimacy for decisions made. Guldner and Rifkin (1993) observed from their field observations in Vietnam that data were being widely used to justify rather than clarify decisions.
Thus, the symbolic use of information directly defies the traditional logic of the functional value of information to the production process. From the perspective of health systems, information is hence manipulated for goals not necessarily compatible with the explicit aspirations of decentralization.

Use versus non-use of information

Embedded within the logic of normative decision theory is the presumption that decision-makers actually do use information when it is made available, and they behave that consistently towards it. However, for decades now it has been well acknowledged, from observations, that decision-makers gather information and ignore it; they make decisions first and look for the relevant information afterwards (for instance, March 1982). A study by Finau (1994) in the South Pacific highlighted similar problematic behavioural tendencies, that local decision-makers ignored installed formal health information systems and, instead, preferred ‘“gut feeling”, hearsay and ad hocry’.

Again, this is a condition that poses HMIS evaluation problems for the health system planner. How credible would any form of systemic performance attributions to the installed HMIS?

Formal HMIS versus other forms of information

Contemporary philosophy of organizational management information systems (including HMIS) is centred on formal structured information systems with, among others, specified formal encoding, transmission and decoding rules that govern those structures (Liebenau and Backhouse 1990; Ward and Griffiths 1996; Boman et al. 1997). As Simon (1957) pointed out, formal information systems are based on formal channels of information which may be characterized by ‘hard’/paper and/or electronic forms of transmission in the organization. In the study, these forms were collectively referred to as the written form of transmission or information, which includes HMIS.

However, other forms of information have been identified in empirical literature as being present in the organizational environment. In his study of managers, Mintzberg (1975) found that apart from formal management information systems, managers used ‘soft’ information and favoured verbal over written information. The above-mentioned study by Finau (1994) points to similar observations. Mintzberg’s study further indicated that managers also use observational information in their work. Experiential and training forms of information are widely acknowledged in the literature as well (for instance, Simon 1976; Melone 1996). All these forms of information are significantly recognized in naturalistic decision theory (a perspective on how decision-making occurs in real world situations). Yet, there still remains conspicuous ignorance of how these information forms operate within the organizational environment. Hence, presently, their practical recognition in HMIS design considerations has been insignificant. This study focused particularly on this third problematique, with a fairly confident theoretical hunch that the informational phenomena presenting the first two problems would still be explainable from this perspective that recognizes the existence of other forms of information outside the formal HMIS.

Study objectives

The aim of the study was, first, to establish the presence of written, verbal, observational, experiential and training information forms in the strategic decision-making process. The focus on the strategic decision-making process represents a major concern for the management capacity of decentralized district health management systems and their sustainability. Local strategic decisions are central to the definition of district health management capacity and the determination of district health system sustainability, in decentralized health systems (Mutemwa 2001).

Secondly, the study aimed to establish the nature of the micro-processes through which the above five information forms influence the strategic decision-making process. The third and final aim was to determine the implications of these findings for HMIS design and operational considerations. However, this paper will not cover the second objective due simply to the complexity of the dynamics involved in the micro-processes. The subject of micro-processes should be better examined in a dedicated, separate paper. Yet, such exclusion does not at all undermine the visibility of overall policy implications from the study, in the findings presented in this paper.

Method

Study design

The study was exploratory. The study did not exclusively set out to only search for the different forms of information identified in the objectives above, but rather the researcher set out with an ‘open mind’. The basic reasoning was that there was still the possibility of finding other forms of information not yet identified in existing literature, or indeed discovering new interesting insights into the strategic decision-making process.

The study was designed as a multi-level, qualitative comparative case study and was conducted in Zambia, where health sector reforms have involved a significant delegation of decision-making responsibility to district health systems (Mutemwa 2001). In Zambia’s decentralized health system structure, there is separation of policy and executive functions in health service provision. At decentralization, the Ministry of Health retained the national-level sectoral strategic functions of health policy and planning, finance and budget, legislation, advocacy and international co-operation (Bergman 1996; MOH 1996).

The government then created a parastatal, the Central Board of Health (CBOH), and delegated to it all the
executive functions of service provision: commissioning health services in the sector, performance support, monitoring and evaluation, national human resource development, and national health facilities planning (Bergman 1996). Responsibility over actual delivery of services was further delegated to district health systems, which were re-constituted into District Health Boards (DHBs). DHBs are legal entities established under the Zambia National Health Services Act of 1995 (MOH 1995). They operate on an annual contractual relationship with the CBOH, and annual service delivery benchmarks are evaluated and reviewed each year-end, against which funding is negotiated and allocated (MOH 1992, 1996).

DHBs have extensive strategic and operational decision-making discretion at that primary level, including the legal mandate to raise and manage their own resources. A district can engage in profitable investment activities that it may deem beneficial; plan, recruit and manage its human resources; and engage in any activities that may aid the sustainability and prosperity of the district health system.

For the study, the first level of comparative cases was the district health system context. Zambia’s district health system profile consists of two main types of district groups: rural district health systems, and urban district health systems. A rural district health system in Zambia has a district health service structure that serves a considerable urban population of the district town, and further extends to rural village communities situated outside the town but still falling within the geo-political boundary of the district. A rural district health service will typically comprise a district health office, a referral hospital, at least one urban clinic, and a considerable number of rural health centres and community health posts distributed among the village and farming communities.

Conversely, an urban district health system in Zambia carries a district health service structure that serves an urban community only. An urban district health service will typically comprise a district health office, one or more referral hospitals, and a significant number of urban health centres distributed among the urban and peri-urban communities.

These two groups of district health systems experience distinct epidemiological and health management problems and challenges, set within their equally varied respective local socio-economies. Based on the understanding that a number of strategic decision-making processes were to be studied from each district case selected, the researcher estimated that two district health system cases would be sufficiently representative for the study: one rural district and one urban district. These, it was felt, were sufficient to provide empirical insights into how the rural and urban contexts differentially affect managerial decision-making and decision-making processes, particularly in terms of information variety and volume, and decision-making activity.

The second and primary level of comparative cases was the strategic decision-making processes sampled from within the two districts selected for fieldwork. The strategic decision-making processes or cases were compared within each district to establish the degree of intra-district consistency, and across the two districts to determine the degree of inter-district variation in the behaviour of information.

Data collection

Ethical clearance

Ethical clearance was obtained from the national ethical clearance committee, and administrative clearance obtained from the Central Board of Health acting on behalf of the Ministry of Health in Zambia, to conduct the study. Consent was also sought and granted by the selected districts to conduct the study and access written, verbal and observational data sources. Consent to access data sources was also a continuous part of the research process, and was obtained both institutionally, whenever necessary, and from individuals whose personal insight on specific issues was sought through interviews from time to time.

Selecting district cases

One urban district, Lusaka, and one rural district, Monze, were purposively sampled from the national sampling frame of 72 districts in Zambia. The selection process involved several progressive rounds of scoring all the districts in the country on the basis of: whether a district had a functional District Health Management Team (DHMT) and DHB; whether the district was willing to be hospitable to the study; the final two districts had to be located in different provinces to control for regional cultural bias; and a district could not have more than one donor-funded project running during the time scheduled for the study, to control for interference from artificial human and financial resource capacities that accompany such health programmes. Donor programmes were considered not a reliable indicator for long-term district health system sustainability for two main reasons: first, the short-term and definite life-span nature of international development aid; and secondly, the characteristically indeterminate nature of outcome possibilities of development assistance.

On the basis of these four criteria, the list was eventually reduced to the two districts. Lusaka is the capital city of Zambia; while Monze is a rural district in Southern Province, about 200 miles south of Lusaka.

Selecting strategic decision cases

The strategic decision cases were also purposively sampled in a process that was closely guided by the methodology chosen for collecting data on the decision processes. By design, it had been decided that data on the strategic decision-making processes were to be collected using the tracer methodology (Mutemwa 2001). Tracers are concerned with the elucidation of processes and are generally...
associated with the description of activities over time (Barnard et al. 1980; Hornby and Symon 1994). Basically, all the strategic decision processes selected for study were going to be traced, from beginning to end, for each decision-making process. Tracing can be done retrospectively on decision cases that have already occurred, or prospectively on decision cases that are concurrent with the study. In retrospective tracing the researcher is often guaranteed complete decision processes that have beginnings and ends, while in prospective tracing it is never assured that a decision process being traced will have resolved before the research project winds up its fieldwork. The particular advantage with prospective tracing is that the researcher is able to witness the decision process as it unfolds, evolves and develops, which offers a different and more intimate experience of decision process reality from that of recalled eye-witness reports or experiential accounts in retrospective tracing. Thus, to optimize the richness of data collected in each district, it was felt some of the strategic decision cases selected for the study were to be historical, for retrospective tracing; while others were to be concurrent with the study, for prospective tracing.

Three criteria were invoked for selection of strategic decision cases in the two districts. A decision process case had to have evidence of availability and reliability of information sources on it; in the case of historical decision processes, there had to be evidence of the process having reached some form of end or resolution; and, the district health office had to give full consent to the study of a selected decision case. To succeed on these criteria, the exercise of selecting strategic decision cases for study in the two districts was deliberately participatory. DHMT members, as executive custodians of strategic decision-making at district level, were involved in the discursive process of recalling, suggesting and listing strategic decision-making processes, historical and on-going, which would be traced in each district. The three selection criteria served as a backdrop to the participatory process. A total of eight strategic decision-making processes were selected for tracing in the study, four from each district. In each district, two of the decision cases were historical, the other two current or concurrent with the study.

Collecting the data
Retrospective tracing of historical strategic decision processes was done through unstructured in-depth interviews and review of organizational documentation. Unstructured in-depth interviews were conducted with key informants on each strategic decision case traced. Key informants were mainly those members of the DHMT or of the broader district health office that had participated in the process. In addition, organizational documentation relating directly and indirectly to the decision process was requested and reviewed. This involved meeting minutes, memos, letters, personal notes, strategic and operational plans, reports and policies. Validation of data was achieved through multi-informant and methodological triangulation (Pettigrew 1990; Mutemwa 2001).

Prospective tracing of on-going or concurrent strategic decision processes was done through unstructured in-depth interviews, review of organizational documentation, and direct observation of decision-making business in the district health office. Observation notes were recorded in field notebooks and a diary. Direct observation took the form of participant observation, the researcher attending and witnessing decision-making sessions without taking active part, but with his status as a researcher known to the actors. To facilitate participant observation, the researcher negotiated for office space within the district health office and focused data collection in each district for 6 months each; that is 12 months in all.

Data analysis
Data analysis was multi-stage. In the initial stage, data on each traced strategic decision were brought together to reconstruct the story of the strategic decision-making process, bringing out, as much as the data could allow, the reality and chronology of its mechanics. The process of data interrogation to reconstruct decision process stories started as part of data collection, in many instances shaping follow-up interviews, documentary reviews and observations. These reconstructed decision process stories were then verified with key informants for validation, and any inconsistencies or misrepresentations corrected.

In the second stage, the eight constructed decision process stories were structured. The search for structure was a search for a common regularity in the decision process cases, which would enable cross-case comparison and meaningful subsequent abstraction. To elude a common structure of the decision process from the eight decision case stories, the emergent theme approach (Mintzberg et al. 1976; Nutt 1984) and critical events principle (Poole and Baldwin 1996) were deployed. Decision process stories were examined using the emergent theme approach, with intuition used to organize the stories into patterns that describe the nature and sequence of key phases and within-phase steps. The critical events principle helped identify key milestones or turning points in the decision case stories, which were used for constructing the frame of the structure.

The last stage of data analysis involved individually breaking down the structured decision stories for, among other aspects: the presence of written, verbal, observational, experiential, training and any other information forms; the source of the present information forms and channels through which the information forms entered the decision process.

Results
Strategic decision-making processes selected for study
As Table 1 shows, a total of eight strategic decision-making processes were traced in the two district health systems. All the four decision processes from Monze were
Problem recognition emerged as the first stage of the decision-making process. It covers dynamics by which the decision process is triggered, including the ensuing activities up to the point where the managers arrive at some definition or understanding of what the real or basic problem behind the indicators is. In this stage, managers tended to be pre-occupied with making sense of the presenting problem situation and identifying the problem that they then adopted for targeting.

Investigation

An investigation stage emerged as the second stage of the decision-making process. It covers activities through which the managers get to understand the root cause of the problem, and how much the problem may have impacted on their organization or other aspect of their service. Here, managers or their assigned proxies actively searched for information relating to those aspects of the problem. The investigation stage typically ended at the point where the managers had gained full or part answers on those aspects and they had some general conceptual ideas about the attributes of the ideal solution to the problem. These ideal-solution attributes then provided a reference ‘blueprint’ for the next and final stage of ‘solution development’.

Solution development

Solution development is the third and last stage of the decision-making process. It covers activities about the development of a solution, which in some decision cases came in the form of a relatively complex programme design in bound hardcopy print. In other cases, the solution was nothing more than a simple list of inter-related intervention activities on a one-page internal memo on file (or even listed in meeting minutes as recommendations for action). It is significant that, according to the study findings, solution development does not include implementation of the solution because it was felt ‘implementation’ posed a different set of questions.

A few empirical observations should be made about the three stages of the decision-making process delineated above. First, the structure also recognizes the transitional linkages between the stages, and the activities that constitute these linkages. These transitional activities perform specific functions that ensure the relationships between the stages, and hence provide continuity to the structure.

Secondly, each of the stages is amenable to analysis as an episode with a distinctive set of activities that differentiate it from the other stages in the process. This was particularly useful to the task of breaking down the individual decision-making processes in the search for information in its various forms.

Presence of information in the strategic decision-making process

Firstly, all the five forms of information discussed earlier were found to exist in the strategic decision-making process: written, verbal, observational, experiential and training. District health managers referred to a variety of information forms in the course of strategic decision-making. Table 2 shows, in a comprehensive manner, the information profile across the three decision-making process stages for each of the eight strategic

Table 1. The eight strategic decision-making processes in the study, by type and district

<table>
<thead>
<tr>
<th>District</th>
<th>General management</th>
<th>Health programmes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monze</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Lusaka</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>
decision-making processes traced in the study. For instance, in the ‘transport policy’ decision case, the district managers used verbal, written, experiential and training information to recognize the ‘transport’ problem in the district. The managers then used written and observational information to investigate the problem and arrive at some understanding of what the ideal solution to the problem would be. Finally, to develop the ‘transport policy’ as the solution to the problem, the managers again used written, verbal, experiential and training information. Note that although the set of information forms used in the ‘problem recognition’ and ‘solution development’ stages seem identical, their particular contents were different due to the different goals targeted at these stages. For instance, the written information used in the problem recognition stage was different in content to the written information used in the solution development stage. Both are identified as ‘written’ for the reason that both of the information pieces were obtained from written paper and electronic documents.

Tables 3, 4 and 5 present the sources of the information forms identified at each of the three decision process stages in Table 2, for each decision case. For the ‘transport policy’ decision case, Table 3 indicates that, in the problem recognition stage, the managers obtained written information from the HMIS, whereas verbal, training and experiential information were obtained through management meetings. What this simply means is that management meetings served as arenas in which previous experience and professional expertise were pooled and shared, and then applied to understand the transport problem being discussed. This information in management meetings was pooled and shared in verbal form. Note that, in all decision cases, the exact dynamics of this pooling and sharing of information was a subject beyond the remit of the study.

Similarly, Tables 4 and 5 present the sources of information identified in Table 2 under, respectively, the ‘investigation’ and ‘solution development’ stages of the decision process, for each decision case.

Secondly, there was no regular pattern in the presence of these information forms, either across decision-making processes or across the stages within each strategic decision-making process, as illustrated in Table 2. Each decision-making process was informationally distinct; as was each decision-making stage within a process. Thus, as the decision-making process progressed, information in its various forms entered the process for a specific purpose, and exited the process as soon as the purpose was achieved.

In Table 2, the ‘Fuel’ decision process case is listed as having ‘corrupted’ following its first stage, to illustrate the fact that the decision process lost its initial formal focus in the subsequent stages due to political conflict that emerged and preoccupied the process. Thus, the original problem which the ‘Fuel’ decision case set out to address...
Table 3. Routines associated with information types in the problem recognition stage, across the eight studied strategic decision cases

<table>
<thead>
<tr>
<th>Decision case</th>
<th>Information type</th>
<th>Experiential</th>
<th>Intuition</th>
<th>Observational</th>
<th>Training</th>
<th>Verbal</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport policy</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td>Supervisory visits: meetings with health centre staff</td>
<td>HMIS: HIS and AIS</td>
</tr>
<tr>
<td>SEATS De-linkage of outpatients department</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td>–</td>
<td>HMIS: HIS</td>
</tr>
<tr>
<td>Fuel</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td>1. Formal reports</td>
<td>HMIS: AIS</td>
</tr>
<tr>
<td>Health centre in-charge programme</td>
<td>–</td>
<td>By DHMT members in sense-making meetings</td>
<td>Supervisory visits: observation of staff behaviour in health centres</td>
<td>–</td>
<td>2. Informal reports Supervisory visits: meetings with local community members</td>
<td>HMIS: AIS routine quarterly reports, special reports directly from communities</td>
<td></td>
</tr>
<tr>
<td>Strategic environmental health plan</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td>Supervisory visits: meetings with some DHMT members</td>
<td>HMIS: HIS</td>
</tr>
<tr>
<td>Health centre staff recruitment programme</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td>Supervisory visits: meetings with local community members</td>
<td>HMIS: AIS</td>
</tr>
<tr>
<td>Human resource policy</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td>Supervisory visits: observations of administrative practice</td>
<td>–</td>
</tr>
</tbody>
</table>

Notes: HMIS = health management information system; AIS = administrative information system; HIS = health information system; DHMT = District Health Management Team; SEATS = Service Expansion and Technical Support.
Table 4. Routines associated with information types in the investigation stage, across the eight studied strategic decision cases

<table>
<thead>
<tr>
<th>Decision case</th>
<th>Information type</th>
<th>Experiential</th>
<th>Intuition</th>
<th>Observational</th>
<th>Training</th>
<th>Verbal</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Observational investigation conducted by DHMT</td>
<td>Shared by Admin. Man. in meetings</td>
<td></td>
</tr>
<tr>
<td>SEATS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De-linkage of outpatients department</td>
<td>Fuel</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HMIS: AIS</td>
</tr>
<tr>
<td>Health centre in-charge programme</td>
<td>Fuel</td>
<td>Corrupted</td>
<td>Corrupted</td>
<td>Corrupted</td>
<td>Corrupted</td>
<td>–</td>
<td>HMIS: HIS (pilot)</td>
</tr>
<tr>
<td>Health centre staff recruitment</td>
<td>programme</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HMIS: AIS</td>
</tr>
<tr>
<td>Human resource policy</td>
<td></td>
<td>Shared by task team in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Notes: HMIS = health management information system; AIS = administrative information system; HIS = health information system; SEATS = Service Expansion and Technical Support; DHMT = District Health Management Team.

Table 5. Routines associated with information types in the solution development stage, across the eight studied strategic decision cases

<table>
<thead>
<tr>
<th>Decision case</th>
<th>Information type</th>
<th>Experiential</th>
<th>Intuition</th>
<th>Observational</th>
<th>Training</th>
<th>Verbal</th>
<th>Written</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport policy</td>
<td></td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Consultative meetings with health centres, WaterAid, filling station, other staff at district health office</td>
<td>HMIS: AIS</td>
<td></td>
</tr>
<tr>
<td>SEATS</td>
<td></td>
<td>Shared by FHSTF in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HMIS: HIS and AIS (pilot)</td>
<td></td>
</tr>
<tr>
<td>De-linkage of outpatients department</td>
<td>Fuel</td>
<td>Corrupted</td>
<td>Corrupted</td>
<td>Corrupted</td>
<td>–</td>
<td>–</td>
<td>HMIS: AIS</td>
<td></td>
</tr>
<tr>
<td>Health centre in-charge programme</td>
<td></td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HMIS: AIS</td>
<td></td>
</tr>
<tr>
<td>Strategic environmental health plan</td>
<td></td>
<td>Shared by task team in planning workshop</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HMIS: AIS (research)</td>
<td></td>
</tr>
<tr>
<td>Health centre staff recruitment</td>
<td>programme</td>
<td>Shared by DHMT members in meetings</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>HMIS: AIS</td>
<td></td>
</tr>
<tr>
<td>Human resource policy</td>
<td></td>
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</table>

Notes: HMIS = health management information system; AIS = administrative information system; HIS = health information system; SEATS = Service Expansion and Technical Support; DHMT = District Health Management Team; FHSTF = Friendly Health Services Task Force.
remained unresolved by end of the decision-making process.

Thirdly, as Tables 2, 3, 4 and 5 indicate, written information was either from routine HMIS or occasionally commissioned formal investigative research or enquiry report documents that are in circulation within the district health office. For instance, in the ‘Strategic Environmental Health Plan’ decision case, managers engaged investigative research in the investigation and solution development stages to gain required information. The solution development stage of the ‘SEATS’ case involved a pilot study. In some of the traced decision processes, written information took the form of formal one-off letters or informal anonymous notes, as in the following quote from an interview with the District Administrative Manager on the ‘Transport Policy’ decision case:

"...Sometimes somebody would just come and push a note under the door to say transport is not being used as meant for. In fact, not only from the health centre staff but sometimes also from the community. They used to come with a letter to say he (EHT) takes it to Mapanza where he comes from... So we had to decide to put up a measure."

Again, in this study, routine HMIS was taken to constitute two components: routine epidemiological health information and routine administrative information.

Verbal information equally had formal and informal attributes. Verbal information tended to be shared in formal gatherings, mostly as spoken reports to managers during formal supervisory visits to health centres and visits to local communities. Other formal verbal information reached district managers through consultative meetings with affected constituencies and/or stakeholder organizations during the process of decision making. Informal verbal information was reported to be mostly in the form of informal intimacies about the problem situation; for instance, consider the following interchange between the researcher and the District Administrative Manager during an interview:

Administrative Manager: "...sometimes we used to get the information from (junior) health centre staff that transport is being misused."

Researcher: “Verbal reports?”

Administrative Manager: “Yeah. Verbal reports. Some of them personal reports to me, that I should consider private and in confidence.”

Experiential and training information existed in the memory stores of the district managers making the decisions. This information was typically ‘downloaded’ and shared in management meetings, during moments of reflecting upon or analyzing the problem at hand. Whereas, observational information reached the managers through direct or vicarious observation or witnessing of organizational activity related to the problem being addressed. In vicarious observation, management typically assigned a member of staff within the district health office to conduct the observation on their behalf.

Fourthly, Table 6 shows the number of times each information form was used in each of the strategic decision-making processes for a specific process activity or purpose. At the bottom of the table are the corresponding crude totals of the information types, indicating their respective contributions to the combined information profile of all the decision cases in the study. Note that, although these figures cannot be taken beyond the eight decision cases in the study, information from formal HMIS was not the top contributor to the traced decision process cases. HMIS was certainly a commonly used source of information, but the most common basis for a decision was experiential information.

Further, there was no ‘observed’ or detected difference, between the two studied districts in the way information behaved in the strategic decision-making process.
Finally, no new significant information form was discovered in the study.

**Discussion and conclusion**

From the perspective of health system decentralization, this study has shown that decentralized district health systems do engage in decisional activity on matters that affect their long-term survival or performance as health system organizations at that primary level. The study has also demonstrated that different forms of information are brought to bear, in district decision-making, through different channels and from a variety of sources in the district health system. HMIS is only one of those channels or sources. The study has confirmed the presence of written, verbal, observational, experiential and training information forms in managerial decision-making, just as extant decision-making literature has insisted for decades. Yet, this study has gone further to locate these various information forms within the process of decision making, and establish how they tend to be distributed over the decision process space and time.

Probably of most significance for policy is the indication from the study that information in the district health system exists not only in formal HMIS, but is also embedded in and is brought into the decision-making process through the whole process of management and key aspects of organizational routine. In both Lusaka and Monze districts, information also flowed through other channels apart from the HMIS. For instance, routine and other management decision-making meetings were fora for recalling and sharing experiential and training information. Routine supervisory visits to health centres provided a channel for gaining verbal and written information. Routine and specially commissioned monitoring of activity provided the channel for observational information in the district. In addition, task forces specially convened for the decision process also became channels for not only pooling information from various stakeholder experiences and expert knowledge, but also served as entry points for that information into the decision-making process. Commissioned investigative research and pilot testing of prototype solution designs were channels for more written information. For some of the decision processes, consultative meetings with stakeholders and routine communication activities with local communities also provided channels for verbal information.

Thus, information entered the strategic decision-making process through people (district health managers/staff directly participating in the decision process); management/organizational processes (management meetings, supervisory visits, task forces, consultation and communication with local communities); organizational structure (which legitimizes informational contributions); and the HMIS (as currently conceptualized). From this collective of aspects of organization emerged written, verbal, observational, experiential and training information.

It is worth noting that the labels of written and verbal information relate to the formats in which information was delivered or exchanged, while observational, experiential and training pertain to the method or way by which information was gained. Yet, these hints represent some of the fundamental aspects of any information system: collection and delivery of information to the users (Finlay 1994; Ward and Griffiths 1996; Boman et al. 1997). Here, then, it becomes evident that the actual health management information system for a decentralized district health system is by far more integrated and complex than the formal HMIS, and carries organization-wide implications. The study results suggest that the actual health management information system involves all aspects of organization: human resources, management/organizational processes, organizational structure, and organizational systems. The HMIS is only one of the systems in a typical organization (Hardy 1996). In this study, therefore, the realistic informational status of the formal HMIS within the district health office has been revealed.

One immediate practical implication is that when deciding on installing a new HMIS, diagnosing problems in a troubled existing HMIS, or indeed merely evaluating the performance of an established HMIS, practitioners ought to take into account the informational contribution of existing human resources, management/organizational processes and the organizational structure to the total information profile in circulation within the district health office or system. The study findings suggest that each of these three organizational elements must be appreciated as a source and/or conveyor of information. HMIS will not likely succeed in supporting district performance, irrespective of success in adoption rate, if these other components of the organization are not strengthened and aligned for their informational contribution. The very design of HMIS must take into consideration the nature of the information ‘gap’ it is coming to fill in the district health organization, and not only future interactions with prospective users – as predominant practice currently stands. Thus, sponsors of HMIS in district health systems should be concerned not only about technology adoption, as has been the tradition, but also about successful technology ‘docking’ into the complex system that the district health organization is, informationally.

Note that the notion of technology ‘docking’ should not be confused with the systems approach to technology adoption already argued in the literature (for instance, Gladwin et al. 2003). Technology ‘docking’ relies on the identified information gap to be filled by the HMIS in the district health system, and hence necessarily views the other key aspects of the organization as components of the broader management information system. This in itself suggests a need for a radical re-think of the concept and practice of ‘HMIS’.
References


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The opinions expressed in this paper are those of the author alone and do not necessarily reflect formal views of the institutions mentioned.

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