

Challenges and Opportunities of Integrating Primary Health Care Information System: Northern State, Sudan

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ABSTRACT

This paper discusses outcome of studying challenges and opportunities of integrating Health Information System. The study was conducted in the settings of Primary Health Care programs in Northern State, Sudan. Qualitative case study was employed and data were collected through interviews, analysis of relevant documents, and observation of the settings. The results were analyzed using interpretive approach. The study findings indicated that fragmentation of Primary Health Care programs' Information System is a major problem affecting system performance.

Our study also showed that efforts to integrate Primary Health Care programs' Information System might be challenged by the existing structural, socio-cultural and political contexts of the organization. On the other hand, opportunities for integration of the programs' Information System lie in the existence of Health Information Center, which receives collected health data from all parts of the state and formulate common reports. Besides, most of the study participants were expressing optimism at outcomes of Information System integration.

The need of considering structural, socio-cultural and political contexts of the organization is emphasised in order to address the identified challenges related to integrating Health Information Systems.

1. BACKGROUND

1.1. Health Information Systems in Developing Countries

Evidence-based decision making is a core issue in health sector management. This is obviously the case since information is central part in the process of measuring health systems performance⁽¹⁾. Thence, one cannot deny the crucial need for Health Information Systems (HIS), which is capable of providing sound information to support management in the sector⁽²⁻⁴⁾.

Despite the critical need for health information, as mentioned by different researchers, HIS of developing countries fall shortly before meeting expectations of providing sound information to support health sector management^(2,3). The issue is a hot spot since sound information is needed for making evidence-based decisions and for monitoring progress towards the national and international goals such as the Millennium Development Goals⁽⁵⁾. Although lack of resources is usually mentioned as a reason

for problems associated with HIS of the developing countries, in reality, the problem is also attached to lack of wise investment of the available resources. This is indicated by the presence of fragmented, duplicative and un-coordinated efforts due to presence of un-integrated vertical health programs⁽³⁾.

Therefore, it is widely believed that integration of HIS is critically demanded for proper functioning of the system. Integration of HIS into a unified system can provide means for information and resources sharing. Consequently, unnecessary resources expenditure is cut off and an environment for cooperation is created⁽⁶⁾. This could have positive impact on overall health sector performance.

However, failure of implementing integrated HIS, in developing countries in particular, has been associated with narrow minded approach towards merely integrating health data⁽⁷⁾. Therefore, it is important to develop wider perspective to consider organizational factors, which might challenge IS integration. As described by outcome of the survey

assessment of HIS of Sudan, HIS was found to be poorly performing and unable to deliver good quality information⁽⁸⁾. The issue is also addressed by the Federal Ministry of Health (FMoH) as to be studied and investigated⁽⁹⁾.

Therefore, the main aim of this study is to identify challenges and opportunities for integrating Primary Health Care (PHC) programs Information System (IS) in the Northern State of Sudan that may contribute for the effort of formulating unified HIS in Sudan and other developing countries with similar working conditions.

2. RESEARCH SETTINGS AND METHODS

2.1. Research Setting

The study was conducted in the Northern State, Sudan. It has an area of 348, 697 square kilometers and about 621, 000 populations according to projection for the year 2008. The state has its capital "Dongola" and consists of seven localities; Wadi Halfa, Dalgo, Al-Burgaig, Dongola, Al-Golid, AL-Dabba and Marawi. Health care facilities in the state include one referral hospital, 25 rural hospitals, 82 health centers, 173 basic health units, 45 dressing centers and 8 primary health care units (PHCU).

The state was seen as a better choice as site of the study because it is one of the politically stable states of Sudan. In addition, the area is easily accessible for one of the investigators since he lives and works there. Based on the concept of "purposive sampling", two (Dongola and Al-Golid) out of the seven localities of the Northern State of Sudan were selected as research sites. Silverman put forward the importance of theoretical sampling in order to enhance validity of qualitative study⁽¹⁰⁾.

In each locality the main hospital that are used as a referral for the localities and one health center were picked out for the study. The settings of PHC programs; Expanded Program on Immunization (EPI), Nutrition Program and Reproductive Health Program in the mentioned facilities were selected as the targets of the study. In addition, locality and state administrative levels of PHC programs were also included in the case study. Besides, Health Information Center (HIC), which is located at the state level, was also taking part in the study in order to come up with more complete picture of the context.

2.2. Research Approaches

In this study, we have adopted qualitative case study design. Information system is a social system that entails behavioral, cultural and political elements. Therefore, qualitative approach was chosen to have

better understanding of such context. Furthermore, different researchers argue that integration of IS means integration of people with the social, cultural and political elements embedded⁽¹¹⁻¹⁴⁾.

In order to maintain data validity, combination of different data collection methods (triangulation) is considered utile⁽¹⁰⁾. Therefore, in this study, data from different sources were collected through interviews, observation, and documents review and analysis. We carried out 15 Interviews with HIC manager, state PHC manager, directors of PHC programs (EPI, Nutrition Program, Reproductive health program at the state and locality levels, and health workers of the programs at health facilities in the selected sites. Data were gathered through field work within a focused period in between July-December 2009. Field notes were taken throughout and analysis of the study finding was done through framework analysis method using some concepts from organizational validity theory as put forward under the following section.

2.3. Conceptual Framework of the Study

"Information System Integration and Organizational Validity Theory"

Schultz and Slevin-1975-cited in Markus and Robey, are the first authors accredited for introducing the concept of organizational validity⁽¹²⁾. They have first conceptualized it as the accomplishment of a degree of changes in organizational settings needed for successful implementation of a system. Thereafter, Ginzberg Markus and Robey, had introduced the concept to management information system and had modified organizational validity definition as to be the degree of match between organizational context and the system⁽¹²⁾.

Many IS researchers emphasized that the organizational context, where integration of IS takes place, is extremely important. Wainwright and Waring stated that organizational factor, as one of the major domains of IS integration, is extremely important to address in order to explore possible challenges in the process of integration⁽¹⁴⁾. The authors mentioned that the domain has been overlooked by many IS researchers and implementers resulting in failures of implementing integrated IS. Likewise, Solotruk et al, Weber and Pliskin, Chilundo and Aanestad, Lafond and Field, and Romain-Rolland et al have emphasized the importance of developing wider perspective that consider organizational issues such as structural, socio-cultural and political aspects in attempts to implement integrated IS⁽¹⁵⁻¹⁷⁾.

We, therefore, considered organizational validity theory as a framework for analysis of study data in order to be able to draw predictions about changes that might happen as a consequence of HIS integration process.

3. STUDY FINDINGS

3.1. Fragmentation of HIS

Primary health care programs in the Northern State were found to be an example of vertically run programs. As for the implications of presence of the non integrated reporting system, a participant at state management level emphasized its impact on data quality and exhaustion of the available resources. He stated that some data elements are sent to the federal level twice through two reporting channels and this may results in presence of conflicting data for the same item.

Analyzing relevant documents showed that the concept of "Essential Data Set", which implies the minimum set of data that satisfies the needs for decision making, was not applied for data collection. The same data were included in all data collection and reporting formats starting from the collection sites up to the state level.

Concerning fragmentation of HIS in the state, for example, one of the managers of the EPI mentioned that it is the result of fragmentation of the service itself. He then suggested that if there is coordination at the service delivery sites, it will automatically be accompanied by coordinated IS.

Nevertheless, a degree of coordination was observed between PHC programs at service delivery sites. For example, distribution of vitamin (A) and folic acid was taking place in immunization sessions and Reproductive health program respectively, while it is supposed to be distributed by the nutrition service. Concerning data on the mentioned activities, respondents working in the relevant programs mentioned that redundancy of data was experienced due to reporting of data repeatedly.

3.2. Stakeholder's Perception about Integration of HIS

The purpose of HIC located at the state ministry is to be the single store of all health data in the state and to be the coordinating body for an integrated IS. An important personnel at the center asserted that; *"The policy of the centre is to have an integrated IS with health data repository at each level that everyone can take information as required and we are working in this direction"* ... He continues *"a prove for that is the unified annual report that we*

prepare, albeit we could not reach to consensus with different institutions in the health system in order to have an integrated IS" (August 2009).

In this regard, an PHC state manager stated that *"I see good opportunity for integrating the HIS at the lower (locality) level, since there is corresponding government. This kind of integration will help providing information for all health programs in one place and it gives opportunity to information sharing between stakeholders"* (October 2009).

A respondent working in the EPI at the state level, on the other hand, spelled out his opinion about integration of HIS as follow;

"HIC at the state ministry of health is now collecting and analyzing all health data in the state, but this does not mean that we rely on it, because I think it is good to coordinate the work vertically since we can assure accuracy of our data. We cannot rely on others who do not have enough resources to operate the HIS ...He continued... "I think integration is good as it permits information sharing between the different programs, though I do not see problems with the existing EPI IS" (September 2009).

One of Reproductive health program managers at the state level looked at the reason behind fragmentation of HIS, as it is the result of presence of vertical programs and he mentioned that the potential for making unified system lie on enhancing coordination at the level of service delivery.

4. DISCUSSION

Wainwright and Waring have identified three domains; technical, strategic and organizational, as important factors for IS integration⁽¹⁴⁾. As for the findings of this study, we consider only the organizational domain, since it has shown more significant correlation with PHC program IS integration in Sudan. The organizational issues are discussed in the order of; structure, social and historical, power and politics, and cultural components, as follows;

Structure

The studied PHC programs have demonstrated verticality in terms of IS where reports are sent separately to higher levels directly to the specific vertical programs. Each program has its own IS infrastructure and procedures. In this regard, integration might bring up changes associated with emergence of new functions in the system. This could accompany efforts for procedural standardization and infrastructure sharing incorporated in the process of IS integration.

State PHC manager was found to be serving management coordination for PHC programs at the state level. This can be looked down upon it as a positive point that might support integration of IS of these programs since coordinated management bridges the structural gap among PHC programs.

Social and historical

Social context implies the manner of interaction of individuals within communities of organizations⁽¹⁴⁾. The social situation of an organization is to be analyzed in order to come up with understanding of the social context and how it could be improved to serve IS integration.

In our study, a degree of sense of ownership was observed among the staff of PHC programs. In PHC programs with better resources, such as the EPI, study participants were expressing their satisfaction about their respective program IS functioning. Therefore, they wanted to maintain the existing systems and consequently, may not support implementation of new integrated IS. However, in the context of PHC programs, cooperation in service delivery was noticed to some extent. An example for this is distribution of vitamin (A) and folic acid. A degree of social integration could be concluded from the coordination and collaboration among health workers at service delivery points. This could be extended to involve coordination at the level of IS in terms of data collection, reporting and decision making, which might have desirable impact on HIS integration.

Power and Politics

As stated by Wainright and Waring, introduction of integrated IS cuts horizontally-through in an organization and might hence necessitates redistribution of staff power and their inter-relationships⁽¹⁴⁾. In this regard, studying PHC programs IS has revealed a degree of conflicting opinions among the study participants. Most of the participants were showing optimism about HIC being the leading body in dealing with HIS in the state. On the other hand, only few of them were mentioning disadvantages of integrating the HIS through HIC. They rather consider coordination of work vertically as a better means to IS improvement. This was probably due to fear of losing power and responsibility they take when HIC is strengthened to be the leading body of the process of making an integrated HIS in the state. In this regard, Markus and Robey stated that interests of IS user may sometimes be based on benefits of sub-units in an organization rather than the total benefits of organizations as a whole⁽¹²⁾.

Culture

The concept "organizational culture" was introduced by Pliskin et al to imply the shared beliefs and values in an organization⁽¹⁸⁾. The elements impeded in organizational culture are described by the authors to include; how swift organizations respond to changes, the degree of taking risky practices, the extent of cooperation among individuals, the power relationships and the degree of autonomy.

Although the overall impression favors integration of the PHC programs IS, some of the study participants considered the degree of coordination and relying on HIC to operate integrated HIS may bring some kind of unfavorable effects. This might have been precipitated as a result of HIC being considered by them as not resourced enough to operate the HIS in the state. Therefore, they prefer to stick to their program specific IS.

Another factor that might have cultural implications is adoption of essential data set policy as part of HIS integration, since experiences showed that most health managers do not agree on minimizing data elements in their programs. Therefore, stakeholders might show some resistance to agree on applying the essential data set policy in order to facilitate HIS integration. The kind of resistance has been emphasized by many authors as a true obstacle for IS integration in the context of developing countries⁽¹³⁻¹⁹⁾.

5. CONCLUSION AND RECOMMENDATIONS

One of the main obstacles that disabled HIS, as identified by the findings of this study, was lack of integration. Primary health care programs' IS in Northern State, Sudan was found to be vertically run with no coordination at any level. This has created redundancy in data, as well as, wasting of time and resources.

A green light for integration comes from the presence of HIC at the state level, which receives health data on all health activities in the state, as well as, the center has a policy of making integrated HIS. Besides, interests and motives of health workers about implementing integrated IS are mostly supportive for integration.

On the other hand, HIS Integration is challenged by the potential of power redistribution introduced by the process. Besides, PHC programs stakeholders might turn up resistant to the need for shift of the responsibility of HIS to HIC. Likewise, new introductions called-for by IS integration, such as developing essential data set, can also be challenged by the existing organizational cultural and political contexts.

The organization domain of integrating HIS was taken to analyse our findings that allowed us to reach explanations about the challenges and opportunities associated with integrating HIS from structural, social and historical, power and politics, and cultural point of view. We, therefore, suggest that stakeholders who are participating in the integration process of HIS should consider these organizational factors. The implications of this analysis of integrating PHC IS can be applied more broadly for other health services, in Sudan and other developing countries with similar working conditions. Hence, we recommended the following issues as applicable suggestions that should be considered upon HIS integration;

1. Empowerment of HIC through further funding of the center and scaling-up staff technical capacity.
2. The center could be a good hub to build a Data Warehouse that receives health data of the state.
3. Standardization of procedures, especially through application of EDS concept is also important.
4. The process of integration should mind commitment and participation of all stakeholders through improving their awareness about importance of HIS integration.
5. Introduction of changes in a piece-meal fashion starting from the installed base.
6. Further research is required to give more highlights on issues of HIS integration in Sudan.

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