

From Multiple Register to Family folder: The Transition of Data Collection and Reporting Tools for Health Extension Workers in Ethiopia

Zufan Abera DAMTEW^{a,1} and Amsalu Shiferaw MOGES^{b,2}

^aUniversity of Oslo, Informatics Department

^bUNICEF Amhara field office, Ethiopia

Abstract. Absence of unified data collection tools and over reporting to the higher levels are major problems in the health management information systems (HMIS) in many developing countries. Building on the notions of boundary objects and knowledge boundary, this study examined the challenges and opportunities for developing unified data collection tools and health reports. To do so, an interpretative case study was conducted in Ethiopia during the inception of HMIS reform in order to improve the quality of health information. The reform process includes standardizing data collection and reporting tools for all health facilities across the country. The focus of this study is a family folder that is designed to capture the community health data by the health extension workers of Ethiopia. The findings indicate a tendency to use multiple registers and reports at the health facilities to fulfill the information demand of different partners. This challenge needs to be dealt through discussion, negotiation and convergence of conflicting interests among stakeholders to address the identified deficiency.

Keywords: HMIS, data collection tools, health reports, boundary object, knowledge boundaries.

Introduction

Availability of reliable, relevant, comprehensive and timely health information is widely recognized and recounted as an essential foundation for any public health interventions. Improved data and monitoring tools are also crucial for devising appropriate policies and interventions needed to achieve the Millennium Development Goals (1). Hence, the development of appropriate HMIS has become a common agenda for most developing countries. Yet, studies showed that absence of standardized data collection tools and the tendency of over reporting to the higher levels are major reasons for poor data quality in the HMIS in many developing countries (2). The study conducted in Tanzania showed that the use of un-standardized registers created no coordination of the data collected and reported by voluntary health workers (3). (4) also pointed out *the major restraints on the HMIS in Ethiopia that included problems related to data collection tools, basically manual and characterized by high fragmentation and cumbersome data elements with duplication of efforts.*

¹ Corresponding Author ZufanAberaDamtew is a PhD student at the University of Oslo, Department of Informatics, P. O. Box 1080, Blindern 0316 Oslo, Norway. Email: zufana2003@yahoo.com

² AmsaluShiferawMoges. UNICEF Amhara field office, Ethiopia
Email: AmsaluShiferaw <amsalushif@yahoo.com>

Other studies indicated that developing standardized data collection tools with minimum data set was difficult because of the diverse interest of various health program managers and partners(5). The principle of minimum data set encourages to collect only the must know information needed by the health facilities to monitor and evaluate the health programs (6).

Through evaluating a unified data collection and reporting tool for health extension workers (HEWs) called “family folder”, this study identifies the opportunities and challenges to develop unified data collection tools and health reports that facilitate knowledge communication across the health care system hierarchy in Ethiopia. For this purpose, we have conducted qualitative case study using interviewing, observation and document analysis. The boundary objects literature that examines how tools span work boundaries within organizations (for example 7, 8, 9) were used to elaborate the importance of data collection tools and health reports to share information and knowledge. The lessons drawn from this study can also be used by other developing countries with similar working situation.

1. Data Collection Tools and Health Reports as Boundary Objects

Data collection tools and health reports are used as tools for sharing of information and as an interface between the different levels in the health care system hierarchy. Objects become boundary objects when they are used at the interface of organizations [7, 8]. Boundary objects are defined as, “flexible epistemic artifacts that inhabit several intersecting social worlds and satisfy the information requirements of each of them” (10: p393). According to the authors, not every artifact is a boundary object per se; artifacts become boundary objects if they are meaningfully and usefully incorporated into the practices of actors working in diverse fields. For a tool to appear as a boundary object, it must be sufficiently well known that multiple actors can recognize and use it, at the same time as having sufficient flexibility that multiple actors can attribute different meanings and interests to it (11).

Boundary objects can be an important means of achieving collaboration, promoting the sharing of knowledge between diverse groups (12). They are artifacts that enable and constrain knowledge sharing across boundaries [7]. As [8, 9] put it, the boundary object bridges the community’s avenues to communicate, coordinate and collaborate across the knowledge boundaries. However, tools sometimes block the sharing of knowledge, particularly across hierarchical levels. For example, (13) found that strategy tools can complicate information sharing, particularly between top and middle management, due to the way that they structure and shape information.

Carlile identifies three levels of boundary-crossing: syntactic, semantic and pragmatic—each managed by a different process—transfer, translation and transformation [8, 9]. He described the boundary objects carry information and context that can be used to transfer, translate, and transform knowledge within and across organizations. The syntactic level is an information processing level, which is about knowledge and things to store and retrieve; the semantic level is interpretive, which focuses on common learning; and third, at the upper level, a pragmatic (political) level, which is concerned with how different interests impede knowledge sharing. In the case

of a boundary object, a shared syntax or language of representing knowledge at the boundary is a required characteristic for dealing with any type of knowledge boundary. When the syntax is shared and sufficient, knowledge can be transferred across the syntactic boundary. Semantic knowledge boundaries are more complex. Though there is a shared syntax; common meanings need to be developed through discussion and dialogue in order to translate knowledge. Finally, pragmatic knowledge boundaries are the most socially and politically complex, as common interests need to be developed to transform knowledge at a pragmatic level [8, 9]. This requires repeated negotiation and convergence of interest among actors.

Information technology artifacts have long been viewed as boundary objects intended to support information systems and the integration of expertise situated in diverse fields (14). However, these ideas have not been widely applied to paper based data collection tools and health reports, which is the concern of this study.

2. Research Approach and Methods

Within this research, we took an interpretative qualitative case study. The aim of interpretative studies is then not to develop an objective account, rather a relativistic one based on shared and inter subjective understanding (15). Data were collected by the first author two times from January to February, 2010 and from May to June, 2011 that helped to follow changes. The methods used for data collection include interviews, observation and document analysis.

2.1. The Research Context

The empirical setting for this research is Ethiopia which is located in the horn of Africa. Ethiopia has more than 85 million population, where about eighty five percent of the population lives in rural areas. It is a federal state incorporating nine regions and two chartered cities. The regions are further divided into zones within which there are about 802 weredas (districts) and over 18000 *kebeles* (the lowest government administrative unit).

The health care delivery system in Ethiopia is three- tier system. Level one is district health system comprising of primary hospital to serve 100,000 people, health center serve for an average of 25,000 and the health post (lowest level) cover an average of 5,000 people. Level two is a general hospital covering population of up to 1.5 million. Level three is specialized hospital for about 5 million people.

The Federal ministry of health of Ethiopia (FMOH) recently embarked the health extension program across the country for the expansion of primary health care. Mostly two HEWs are deployed at the health posts and provide basic health service for about 5000 population. Collecting, compiling and reporting community health data is also key task for HEWs. HEWs completed grade 10 formal education and have one year training in public health. Currently, more than 34,000 HEWs are deployed all over the country. As part of HMIS reform, FMOH introduced the “family folder” initially as a pilot project at four health posts nationally: two were located in Amhara region, and

two in Southern region. The researchers have visited six health posts in Amhara region, including the two HMIS pilot health posts.

2.2. Data Collection Methods

Interviews

Interviews were conducted with 12 HEWs, 4 health center staff, 4 district supervisors, and 2 HMIS officers working at Amhara region health bureau and FMOH. More individuals interviewed were from community level because the focus of this research was the data collection tools and health reports generated at this level. Interviews were interactive and semi-structured, and were used in an attempt to have an in-depth understanding of the situation.

Observation

In some cases, respondents would give accounts of the way things are supposed to be done, not what they actually practice. Through observation, what they actually did in their respective work assignment areas could be found. We observed data collection tools, and how HEWs and the health center staff recorded data during the provision of health services and compiled reports. Observation gave us firsthand information on the problem domain.

Document analysis

We reviewed several documents that including Health Sector Development Plan three (HSDP III), and HMIS and monitoring and evaluation strategic plans to further enrich the data collected in interviews and observations. We also reviewed different registers and reporting formats at the health posts and health centers.

2.3. Data Analysis

Data collection and its analysis go hand in hand in interpretive research with no clear demarcation between the two processes (16). Accordingly, the analysis began throughout the data gathering. Detailed hand written notes were taken during data collection and were assembled, organized, indexed into categories and analyzed. The data collected were then grouped into related aspects to identify emerging patterns and themes. The theoretical concepts of boundary object, and knowledge boundaries and communication were used to analyze our findings. These concepts allowed us to describe the data collection tools and health reports as an interface that enable communication across the intra-organizational boundaries in the health care system hierarchy. This in turn helped us to draw conclusion from the empirical materials collected in the field. The following section presents the findings of this study.

3. Case Description: HMIS in Ethiopia and the Reform Process

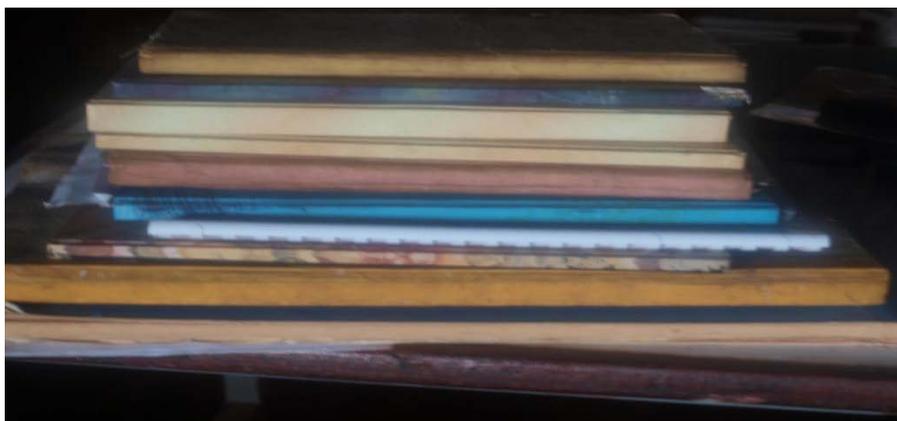
Mengistie (2010, p15) summarized the feature of routine paper-based HMIS in Amhara regional state, where this research is located as follows: *fragmentation of data collection tools and reports, inconsistency and redundancy of reports and no feedback mechanism....* (17). To overcome these problems, the HMIS reform is taking place in Ethiopia. One of the main tasks of the HMIS reform was to establish client/patient encounter recording formats (18). This case study gives more emphasis on the data collection and reporting tools used by HEWs at community level.

3.1. Data Collection and Reporting Tools for HEWs

3.1.1. Registers at Health posts

Registers that used to capture data at the visited health posts were either given from the district health office and other health partners or HEWs were supposed to tailor registers from bare exercise books. HEWs gather data both at the health post and during the house to house visits. It was also noted that HEWs have notebooks used to record the health service given during home visiting. They transfer data from their notebooks to the main register at the health post.

In the visited health posts, there were many registers ranging from 7 to 12 to document different health services. For instance, in one of the visited health posts, there were 10 registers of which only three were readymade to document specific health services whereas others were bare exercise books that need to be tailored as a register (see picture 1). There is redundancy of data elements among the registers within the same health post and the registers were not uniform across the visited health posts and districts.





Picture 1: Register books used at Gayita Health Post, Photo taken in June, 2011

3.1.2. Report Forms at Health Posts

During the inception of the health extension program, the report forms for HEWs in Amhara region were first developed by the HMIS team at the regional health bureau. The HMIS team comprised various experts from different health programs and this was required to accommodate the information need of each section. The HEWs report form then conveyed to zonal and district health offices where they duplicate and distribute to HEWs in their respective territories. However, the finding of this study showed that some HEWs in visited health posts did not use the report form that the regional health bureau circulated and few health posts were using additional report forms developed by the district or other partners.

As some health tasks are added to the health posts through time, the previous report form was not able to accommodate all the required data to be reported. Hence, the district health offices and other partners tended to prepare their own report form. The report forms vary across the visited health facilities and districts, and it was observed that some HEWs prepare hand written report forms from plane papers. A number of reports that HEWs submit also differ from district to district and even within the same district. In the visited pilot community HMIS health posts, HEWs were using the report forms parceled with the family folder, and also those given from the district.

3.2. Communicating Health Reports

3.2.1. The Flow of Health Reports

HEWs report to the nearest health center, district health offices and other partners. Subsequently, the districts compile reports and send to zonal health offices, then to the regional health bureau and FMOH. Other relevant organizations get reports from the respective levels. HEWs report the service provided mainly monthly and quarterly.

However, in case of health emergency and any other urgent issues, they also report weekly. After the district level, the report flows quarterly except the integrated disease surveillance report (IDSR) that needs to be reported monthly.

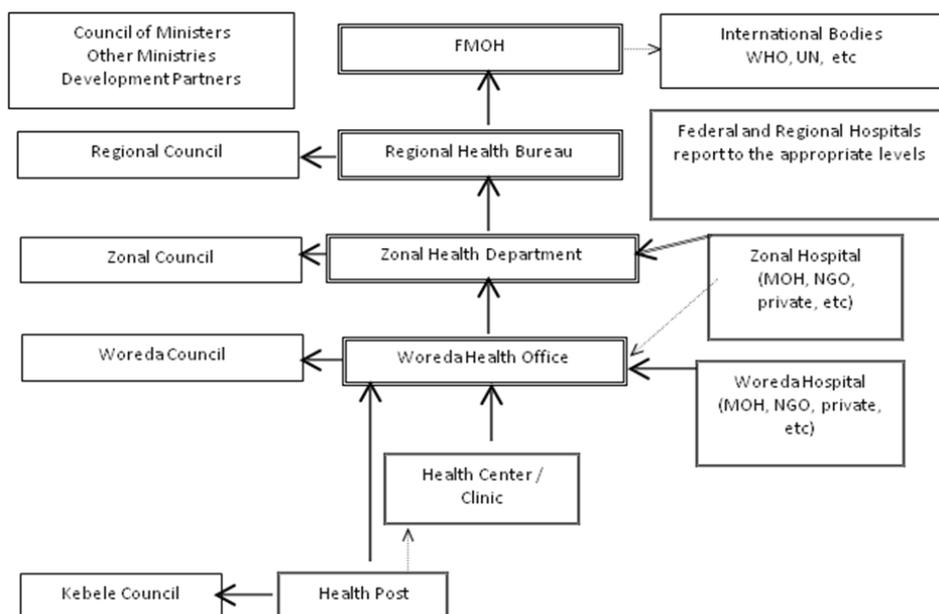


Figure 2: The flow of reports across the hierarchy in the health care system of Ethiopia.

3.2.2. Conversations on Health Reports

The staffs at all levels of the health care hierarchy and other partners presented and discussed the health report periodically. HEWs meet with community volunteers and health center staff monthly and discuss their performance. The report from health centers includes the performance of health posts, which are under their supervision. The health centers staff provides technical, administrative and supply support to health posts. The head of Chara health center said: *Our performance report includes the performance of health posts; thus when the performance of health posts diminished, the service coverage of health centers also diminished, hence we are trying to build the skill of HEWs.*

There is also quarterly meeting at the district level that includes the staffs from the primary health care unit (health posts and health centers). Sometimes, the population data given from the district administration to the health facilities are high; hence, the reports that are calculated using the inflated target as denominator may not show the real picture. Thus, other criteria are sometimes devised to evaluate performances; *“When our performance report decreases for a given month, the district staff persuade us to recheck, and we mostly do it in collaboration with the community volunteers. Sometimes, officers from the district and higher level health facilities check in randomly selected households to verify our report”* one of interviewed HEWs.

“When the performance report of HEWs in a given health service decreases, the responsible person from the district will go and identify the reason” staff from Bahirdarzuria district.

Besides, HEWs also meet with the staff of partner organizations working in their specific areas. These partner organizations usually need the report for the services they support and they mostly prepare report forms which can capture the data they need. After the district level, the reports are submitted in aggregated form and it is difficult for the upper levels to identify the performance of each health facility.

3.3. A Move from Multiple Register to Family Folder

The HMIS reform was initiated by FMOH and other health partners in 2008 all over the country. The family folder was developed as a data collection tool to be used at the health post level to collect household health data. It was designed as a comprehensive data collection and documentation tool to be used by HEWs (18).

3.3.1. Pilot Community HMIS Health Posts in Amhara Region

The two pilot community HMIS health posts (Chewusa and Gimbaha health posts), which are located in Amhara region, started to capture the family health data in a family folder since July, 2010. Accordingly, each family will have a family folder that holds all the required health information of the whole household and it will be kept at the health post. The family folder will contain cards where every family member will have their own card. The visited pilot health posts have got wooden shelves from FMOH and family folders are arranged on the shelves properly. HEWs at Chewusa and Gimbaha health posts and their district supervisor have received two days trainings before they started to use the family folder. Besides, they get supportive supervision from the staffs of FMOH, regional health bureau and district health office.

HEWs, who are working at the pilot health posts, mentioned that family folder is good for following the history of the whole family simultaneously. They have also continued to document data using additional registers for Integrated Management of Childhood Illnesses (IMCI), Prevention of Mother to Child Transmission of HIV/AIDS (PMTCT), Voluntary Counseling and testing for HIV/AIDS (VCT), Tuberculosis (TB) follow up and Trachoma. It was requirement for them to record data in the separate registers side by side to the family folder.

As indicated by the findings of this study, the family folder has some drawbacks. HEWs perform most of their activities through home visiting and family folder is not convenient for field work. When the number of families increases, the folder becomes more bulky. The folder is breakable and can be destroyed by rain when HEWs move from village to village. HEWs revealed that they sometimes take the field book rather than the family folder during home visiting. Hence they transfer the data from field book to family folder at the end of the day. The family folder is prepared in English. As to the HMIS officer at FMOH, the family folder is prepared in English for all regions, hence the standardization may face problem if it is prepared in different languages.

3.3.2. Expansion of the Family Folder

As to the FMOH and Amhara region HMIS officers, each health post will start to use the family folder in the near future. There are about 3,200 functional health posts only in the Amhara region and more than 17,000 throughout the country. Hence, it will not be unchallenging to scale the community HMIS to all health posts throughout the country. However, the interviewed HMIS officers noted that the health sector is seeking support from partners for the expansion and shelves will be made from local materials to minimize the cost.

4. Discussion

4.1. Dealing with Multiple Data Collection Tools and Reports, and Implications to HEWs Work

The drawbacks of multiplicity of health data collection tools and reporting channels in many developing countries have been discussed by different authors [2, 5]. This study pointed to two important features related to data collected and reported at the community level in Ethiopia: : i) multiplicity of data collection and reporting tools and ii) the efforts of FMOH and other health partners to reform the existing HMIS and standardize the data collection tools to all health facilities.

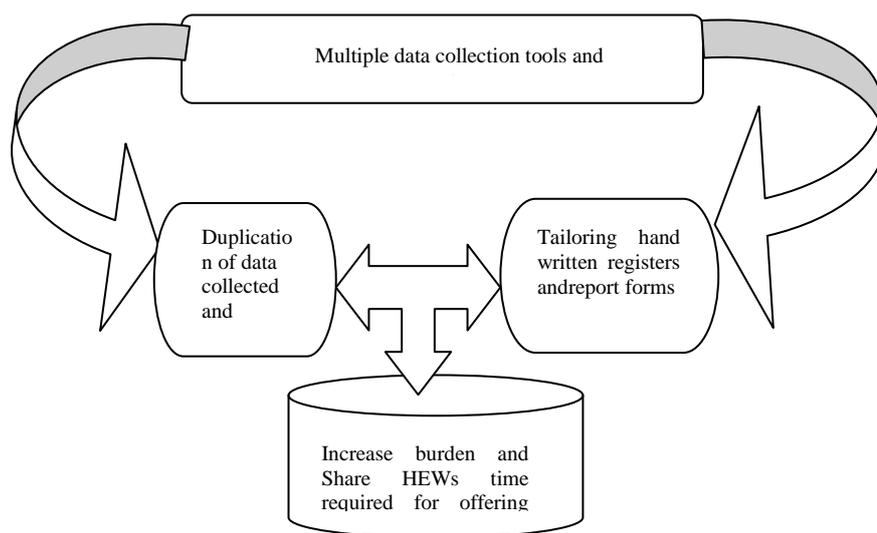


Figure 3: Impact of multiple data collection tools and collecting and reporting enormous amount of data

The findings of this study showed that HEWs use different data collection tools to document and report the community health data. Districts within the same region also develop their own documenting and reporting tools and conveyed them to the health facilities under their supervision. Mostly, HEWs are expected to tailor registers and submit different reports to health centers, districts and other partners working in their villages. Redundancy of data elements across the registers is also common. HEWs are mostly busy working in scattered rural villages, mainly through home visiting (19) and they are spending time in collecting and reporting redundant data instead of serving the community (see picture 2).

The findings showed that HEWs working at the HMIS pilot health posts were supposed to collect additional data using different registers besides to the family folder. They then transfer the required data from those registers to the family folder. If this trend is continued, the data collection tools for HEWs ended up “being” family folder plus multiple registers. Despite the strong aim of strengthening HMIS and standardized data collection tools with minimum data set [18], there is still a tendency to use multiple data collection tools and reports. The previous study conducted in Ethiopia also showed that the efforts of developing a common shared minimum data set for data collection and reporting has faced problem; because health managers tending towards adding new data elements rather than reducing the already unwieldy datasets [5]. The assessment done by (20) at the four pilot health posts also revealed that health managers were concerned on how data from various health programs could be captured in the family folder. The authors suggested that this concern of the health managers needs to be addressed.

Offering extra data collection and reporting tools for HEWs, other than the family folder, will create an additional burden to their regular work and the new unified and simplified HMIS tools will not have added value to elude the use of multiple registers. Thus, improvements cannot be introduced in the community HMIS merely by introducing the family folder as a data collection tool, but also through discouraging the multiple registers and redundant data elements to be collected and reported by HEWs.

As expressed by participants of this study, the expansion process of the community HMIS to all health posts will not be undemanding. Capacity building is important prior to using the family folder, hence cascade trainings to the entire HEWs (about 34,000) and their supervisors is required, which will not be easy for a resource constraint country like Ethiopia. This calls upon the collaboration of all stakeholders working in the area.

Another major finding of this study revealed that data collection tools and health reports were liable to discussion through which information is shared within the health care hierarchy. We pretend that these practices can be deeply understood through the concept of a boundary object as discussed below.

4.2. Conceptualizing Data Collection Tools and Health Reports as Boundary Objects

Different artifacts can be considered as boundary objects that facilitate and sometimes constrain communication across the knowledge boundaries [8, 9, and 13]. The present

research identified that data collection tools and health reports have significant boundary implications. Their liability to interaction and their distributed nature across the health care system hierarchy make them crucial tools for spanning intraorganizational boundaries. The boundary objects literature also helps us to explain why artifacts may be used differently in different contexts [12], as the same tool may be attributed different meanings by different groups. Both data collection tools and health reports can be interpreted differently. For example, health reports notify the HEWs and community volunteers the service they are providing, for instance, the presence of defaulters for a given health service in their vicinity. The health centers are also concerned about the health reports from the HEWs, since the performance report of HEWs can affect the performance report of health centers. Districts use the health reports to see the overall health status of the population in the district. However, above the district level, the health report from each health facility has no direct implication. At the upper levels, reports from different health facilities will be compiled together and used to generate regional and national indicators. The health report, on the other hand, allows other health partners to evaluate how the support they rendered is implemented on the ground.

Boundary objects are not always effective at generating shared understandings [13]. Findings indicate that health reports sometimes were not sufficient to reach to consensus during discussions at meetings, since the performance of each health facility should be calculated against the given target population as a denominator, which is high in most cases. The study conducted by (21) also showed that the health reports may not show the reality at the ground, for example, due to the higher target population given to the health facilities. Grant (2003) pointed out that tools may also hamper shared meaning, particularly across hierarchical levels. Data collection tools also may not be well understood by health workers who are unfamiliar with that specific language. Hence, the use of data collection tools and health reports can also constrain effective communication across organizational boundaries.

Considering the three knowledge boundaries by Carlile, innovation, in this case the HMIS reform through the introduction of unified data collection tools and reporting channels, requires incrementally breaking boundaries at the three levels. The syntactic boundary requires the presence of shared syntax [8,9]. In the present study, a syntactic level can be achieved by creating a common language/syntax, such as minimum or “must know” data to be collected and reported from health facilities. All stakeholders can have a shared syntax about the minimum data set.

However, it is not easy to create a common meaning among the different health program managers at the semantic level. A semantic approach recognizes that even if a common syntax is present, interpretations are often different which makes communication and collaboration difficult [8, 9]. Hence, conversation is required among health managers to make agreement on which data elements need to be incorporated to develop unified HMIS tools with minimum dataset. The findings of this study indicated using of various registers and report forms across the visited health facilities and districts, rather than the one developed by the regional health bureau. Braa et al. (2007) also stressed health managers within different programs had different interests about the data collected and reported that consequences disagreement on the proposed minimum data set [5]. Hence, the engagement of various health managers

might create difficulty at the pragmatic level. The transition from a semantic to a pragmatic boundary arises when interactions uncover different interests among actors that have to be resolved [8, 9]. In this case, the different health managers need negotiating and defining common interest to exclude redundant data and develop unified data collection tools and reporting channels.

Following the notion of “communicating knowledge across boundaries” [8, 9], this paper recommends negotiations and convergence of interest among the different health partners in order to develop a simple and unified data collection tools and reports. Accordingly, establishing a shared syntax/language for individuals to represent their knowledge is the first step. This shared syntax serves as a basis for identifying what was consequential and that additional problem-solving is still required [8]. For instance, creating a minimum dataset is the concern (shared syntax) of all individuals participating in developing data collection tools. However, discussion is required to develop a common understanding on which minimum dataset need to be incorporated to formulate a simplified data collection tools. This leads to the next (semantic) boundary. The problem then shifts from just processing information to learning the differences among stakeholders [9]. At the semantic level, when an individual represent the data that his/her health program is collecting, other participants can identify the differences and similarities with their program data. This process may allow stakeholders to recognize which data elements are collected repeatedly through different health programs that may pave a way to determine or eliminate redundant data from the data collection tools. However, excluding data elements that need to be collected is not insignificant, since most health managers want the data for their health program to be included in the dataset [5]. Hence, it requires the pragmatic boundary, where individuals involved must be able to alter or transform their “current” ways of doing things to accommodate or accept the change to their program data in order to collaborate at a boundary. This knowledge transformation process demands repeated negotiation and consensus among stakeholders [8, 9].

In the nutshell, this study emphasizes that dealing across the knowledge boundaries and negotiating of conflicting interests among stakeholders may create an avenue to develop simple and unified data collection tools and reports. The empirical examples drawn from the process of HMIS reform in Ethiopia can provide lesson to other developing countries.

5. Conclusion

This research emphasized the need for discouraging using multiple data collection tools and redundant data elements to be collected and reported at the health facilities. It has identified the opportunities for developing unified data collection tools and health reports that include the need for sound HMIS at the international level, and the HMIS reform efforts in Ethiopia and other developing countries. Conversely, the repetitive nature of the data registration and reporting processes at the health facilities to satisfy the information demand of different health partners was considered as a challenge. In order to address these challenges, this study suggests negotiation of conflicting interests among the different stakeholders. This can be achieved through establishing a shared syntax in which all stakeholders can agree at the syntactic level, creating a

common meaning through discussion at the semantic level, and negotiations and convergence of interests among stakeholders at the pragmatic level. This process can help to develop a simple and unified data collection tools and health reports.

The findings were theoretically analyzed using concepts of boundary objects and knowledge boundary and communication. These theoretical concepts allowed us to reach explanations about the problems and the possible resolutions associated with developing unified data collection tools and health reports in developing countries. While our analysis has been developed based on empirical work carried out in Ethiopia, we believe that the study has broader implications also for other developing countries with similar working situation.

References

- [1] World Health Organization (WHO), Millennium Development Goals. 2013, http://www.who.int/topics/millennium_development_goals/about/en/index.html
- [2] Chilundo B., Sundby J. Aanestad M., Analyzing the quality of routine malaria data in Mozambique. *Malaria Journal, BioMed Central*, 2004. <http://www.malariajournal.com/content/3/1/3>, accessed on 12/05/2012.
- [3] Negoma, C., Igira, F., Contradictions in Collecting and Recording Maternal Health Data at the Community Level: A Case study from two Districts in Tanzania. *Journal of Health Informatics in Developing Countries*, 2012; 6(2): 509-520.
- [4] Damtew, Z., Miscione, G., Molla, S., Østmo, I.E., Staring, K., Sæbo, J., Sun, V., Globetrotting health information systems. *Journal of Health Informatics in Developing Countries*, 2010; 4(1): 27-38.
- [5] Braa, J., Hanseth, O., Heywood, A., Mohammed, W., Shaw, V., Developing Health Information Systems in Developing Countries - the flexible standards strategy. *MIS Quarterly* 2007, 31(7): 381-402.
- [6] Heywood, A., Rohde, J., Using information for action – a manual for health workers at facility level. *The EQUITY project*, 2002.
- [7] Bechky, B.A., Sharing Meaning across Occupational Communities: The Transformation of Understanding on a Production Floor. *Organization Science*, 2003; 14(3): 312-330.
- [8] Carlile, P. R., A pragmatic view of knowledge and boundaries: boundary objects in new product development. *Organization Science*, 2002; 13 (4): 442-455.
- [9] Carlile, P.R., Transferring, Translating, and Transforming: An Integrative Framework for Mapping Knowledge across Boundaries. *Organization Science*, 2004; 15(5): 555-568.
- [10] Star. S. L, Griesemer. J. R., Institutional ecology, ‘translations’ and boundary objects: amateurs and professionals in Berkeley’s museum of vertebrate zoology, 1907-1939. *Social Studies of Science*, 1989; (19): 387-420.
- [11] Seidl, D., General Strategy Concepts and the Ecology of Strategy Discourses: A Systematic-Discursive Perspective. *Organization Studies*, 2007; 28 (2): 197-218
- [12] Sapsed, J., Salter, A., Postcards from the Edge: Local Communities, Global Programs and Boundary Objects. *Organization Studies*, 2004; 25(9): 1515-34.
- [13] Grant, R.M., Strategic Planning in a Turbulent Environment: Evidence from the Oil Majors. *Strategic Management Journal*, 2003; 24(6): 491-517.
- [14] Boland. R. J, Tenkasi. R. V., Perspective making and perspective taking in communities of knowing. *Organization Science*, 1995; 6 (4): 350-372.
- [15] Walsham, G. *Interpreting Information Systems in Organizations*, Wiley, Chichester, 1993.
- [16] Myres, M. D., Avison, D., *Qualitative research in Information Systems: A reader*. Sage publications, London, UK, 2002.
- [17] Mengiste, S. A., Analyzing the challenges of IS implementation in public health institutions of a developing country: The need for flexible strategies. *Journal of Health Informatics in Developing Countries*, 2010; 4(1): 1-17.
- [18] FMOH. Health Management Information System (HMIS)/Monitoring and Evaluation (M&E) Strategic Plan for Ethiopian Health Sector. *Federal Ministry of Health*, Addis Ababa, Ethiopia, 2008.
- [19] FMOH. The Health Sector Strategic Plan (HSDP III). *Federal Ministry of Health*, Addis Ababa, Ethiopia, 2005.
- [20] Lemma et al., Information tool for better health care in rural communities: Making Family Folder Operational. *Quarterly Health Bulletin*, 2010; 3 (2): 27-34.

- [21] Damtew, Z., Kaasbøll, J., Target Setting procedures for Immunization Services in Ethiopia: Discrepancies between Plans and Reality. *Journal of Health Management*, 2011; 13(1): 39-58.