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Diversity of Health Information Systems in Developing Countries

The need for harmonization in planning and implementation

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Acronyms

ID	Identification
IT	Information technology
HIS	Health Information System
HMIS	Health Management Information System
JMIR	Journal of Medical Internet Research
MPS	Mobile payment system

Executive Summary

This paper focuses on the operational side of social health protection implementation in developing countries, explaining how harmonization of social health insurance schemes benefits all stakeholders, and why monitoring and evaluation are occasionally not successful or lead to wrong results. The relationship between improperly working operational aspects of data management, and the difficulties that arise from this situation, are also examined. Lastly, the reasons for high fragmentation rates among social service implementers are discussed.

Specific focus and key findings

There is a need for harmonization of all information technology (IT) related systems among social health protection implementers. Fragmentation has occurred during the move from paper-based files and records to electronic, IT-based solutions, because the needs and functions of all relevant stakeholders have not been taken into account.

The focus of IT projects in health systems has been on data extraction, monitoring and evaluation, and not on improving the operational side of social health protection implementation. However, social security organizations (e.g., social health insurance funds), and health service providers (e.g., hospitals) need to manage their data properly, and with a harmonized approach. Lack of harmonization in data handling can result in redundant or incorrect data being used for strategic planning purposes.

Due to ingrained attitudes and misinterpretations, governments need to understand that good collaboration among all social health protection institutions is necessary in order to receive accurate data for policy planning. Data exchange and harmonization among health system implementers are both areas that require government commitments, because these actions are often misinterpreted as losing or sharing power. Mutual understanding of both the terms of use and the organizational requirements of stakeholders are important issues to address in order to develop sustainable national solutions.

In addition, the establishment of social health protection master plans at governmental levels is insufficient. The complex systems involved in social health protection require excellent management capacities among the IT staff. Therefore, all elements of IT and data sharing, exchange and unification need to be a part of a national master plan for social security implementation

Despite countries facing similar challenges, and possibly having working solutions in place already, there is little exchange of ideas and practices between countries. A good example is the establishment of biometric data systems for clear and unique member/patient registration. India has allocated significant resources to establish a nationwide biometric identification system, which currently serves 70 million health insurance members. On the other hand, Cambodia, a much

smaller country, has not been able to provide national ID cards to all of its 14 million citizens. There is also a serious problem with information sharing between IT projects and social security schemes. This lack of cooperation is not only between governments, but can also be seen among the supporting international development agencies.

To make the advantages of harmonization clear, an approved and funded regional project should be undertaken. The terms of reference should include a study of the current situation, taking into consideration all potential issues that have been raised in this discussion and elsewhere. Such a regional project will, by its detailed, in-depth recommendations, prove to be the catalyst for regional, if not global, harmonization in e-health.

Introduction

Public health care is a concept of modern society, and exists in most countries in some form. In developing countries, the availability of medical services in public and private facilities is occasionally insufficient, although the situation has improved within the last decade. While the availability of services is gradually increasing, the ability of individuals to pay for these services is still an issue.

Many developing countries in Asia, such as Vietnam, Laos, Indonesia and the Philippines, have already introduced social health insurance schemes to different extents, but are now dealing with highly fragmented IT applications among health care implementers. The same issues are found in several African countries.

Other developing countries have yet to implement health insurance programmes, or are in the final planning stages, and their governments would like to avoid making the same mistakes as neighbouring countries. Cambodia, Bangladesh and Nepal are good examples of countries which are beginning technical implementation of social health insurance systems.

These developing countries require better coordination, as they have not fully assembled the frameworks for social health protection implementation. That coordination is best provided by the state, as the governments of these sovereign countries. How governments can offer such coordination is a difficult question to answer.

In addition, planning and experimentation happen in isolation within each country, when viable solutions may have already been implemented in other countries. It is necessary for progressive leaders to monitor the progress, or lack of it, in other countries and learn from them. The lessons may be negative, but will accelerate the introduction, implementation, and improvement of social protection mechanisms in less developed countries.

Progress in achieving health care goals in developing countries is still an issue of great concern. Apart from many practical concerns, one of the main operation challenges is the use of IT in health services, and the harmonization of approaches to planning, developing and implementing solutions.

Globally, action is being taken to implement operational functions of social health protection organizations by using IT components. Public and private health insurance funds in Germany and France, for instance, allocate significant resources to developing state-of-the-art IT infrastructure, in order to maintain smooth daily operations and ensure secure data transactions with health care providers. These countries may claim to have computerized health service systems, but in reality the systems are often developed for other purposes, and then applied to the social health sector. Thus, expensive systems may be in place, but fail to meet the needs of the stakeholders. The

problem is compounded by the use of multiple different IT systems across the sector. Thus, instead of the IT systems increasing efficiencies, they are actually causing inefficiency and inaccuracy.

To suggest solutions to these issues, it is necessary to first take a look at which terms confuse or complicate the situation. The first such term is "e-health" itself.

Understanding E-health Terminology

E-health is a comparatively recent term, arising around 1999. It is defined as a healthcare practice which is supported by electronic processes and communications. Usage of the term varies, but in a broad sense it is mostly interchangeable with health informatics and covers all electronic/digital processes in health, while a more narrow definition restricts the term to healthcare practice using the Internet. Despite these differences, the boom in data digitization, computerization and digital networks has led to a diversity of e-health applications.

Terminology changes have occurred, too. Health applications that were once recognized as health telematics or "telemedicine" are now considered e-health. For purposes of administration and management, the broad definition of e-health can cause confusion. For example, e-health is not the same as telemedicine; telemedicine is only one aspect of e-health. Thus, an initial focus of any social health protection programme should be to define and divide each aspect of implementation into clearly defined areas.

Another prominent aspect of this confusion is the use of acronyms. Here the same, or similar, acronyms are used to define different aspects and when cross departmental information is needed, may give totally wrong impressions. One such example is the use of HMIS, which means one thing in health care and something else in the related fields of social security and IT. For clarity, in health care HMIS stands for "hospital management information system". Within the framework of social security, it is more broadly defined as "health management information system". There is nothing wrong with using different abbreviations for the same system, as long as all stakeholders actually have the same understanding of all terms. Among social security implementers, HMIS is also sometimes confused with HIS, and involved stakeholders might have even other explanations for these abbreviations. Clarification of the terms in advance is therefore a basic need before the planning and design stages of those systems.

The "e" in e-health stands for "electronic," but also implies a number of other "e's", which together best characterize what e-health is, or what it should be. All of these issues are addressed by articles published in the Journal of Medical Internet Research (JMIR).

The e's in e-health as seen by the editor of the JMIR:¹

Efficiency. One of the promises of e-health is to increase efficiency in health care, thereby decreasing costs.

Enhancing quality of care. Increasing efficiency involves not only reducing costs, but at the same time improving quality. E-health may enhance the quality of health care by, for example, allowing comparisons between different providers, involving consumers in the quality assurance process, and directing patients to the best providers.

Evidence-based. E-health interventions should be evidence-based in a sense that their effectiveness and efficiency should not be assumed but proven by rigorous scientific evaluation. Much work still has to be done in this area.

Empowerment of consumers and patients. By making the knowledge base of medicine and personal electronic records accessible to consumers over the Internet, e-health opens new avenues for patient-centred medicine, and enables evidence-based patient choice.

Equity. One of the promises of e-health is to make health care more equitable. At the same time, there is a considerable threat that e-health may deepen the gap between the rich and the poor. People who do not have the money, skills, and access to computers or mobile applications cannot use e-health information systems effectively. As a result, these patient populations (which would actually benefit most from this information) are least likely to benefit from e-health advances, unless political measures can ensure equitable access for all. Access to e-health resources is currently divided between urban and rural populations, rich and poor, young and old, male and female, and common and rare/neglected diseases.

In addition to these 10 essential E's, e-health should also be:

- **Easy-to-use;**
- **Entertaining** (no one will use something that is boring);
- **Exciting;** and, it should definitely
- **Exist.**

¹ Eysenbach G. *What is e-health?* Journal of Medical Internet Research, 2001; 3(2):e20.
<http://www.jmir.org/2001/2/e20/>. Cited July 2013.

National Perceptions on IT in Health Protection

In recent years, developing countries have been making investments in the fields of health education, health financing and health systems development, often with the help of international organizations.

It is the responsibility of the partners, politicians, professionals and users to make decisions on IT investments for social health systems. However, the roles of each stakeholder are often unclear. Further complications arise from insufficient products in local languages and a lack of localized adaptation. In addition, there is resistance from health care providers themselves to contribute to, or create, a transparent e-health environment, in which every stakeholder can access the relevant data, at the relevant time, and for the relevant user.

Planning and managing the implementation of an e-health system is very complex. In this complexity, clarity on the functions of such a system is a primary need. That clarity is essential to the system's performance. Consultative planning and design are necessary for the success of the system. This planning process must focus first on the problems that need to be solved, and then on the technology that will be used to best address those problems. Although modern project management tools are easily accessible nowadays, there are shortcomings in the mapping of business processes into sustainable IT infrastructure.

It is pertinent to note that a technological solution can be fully integrated into a system only if it is accepted by those using it. This successful integration of a technological solution into the workflow of an organisation is strongly dependent on the perceived or actual benefits for all persons using it.

Many stakeholders in the social security sector see IT as an unneeded and expensive accessory, and therefore underestimate its value. This view is often influenced by past experiences with expensive IT solutions which did not fully serve their purpose. These negative views can cause serious problems in the introduction of a new IT system, from lethargy to active resistance to the system by users.

There are many reasons for these negative views. IT systems can be seen as unsuitable for one or more of the following reasons:

- Lack of interoperability and uniform data standards;
- Inappropriate techniques in the context of the country;
- Inadequate IT skills in the project management team;
- Failure to understand the costs of running an IT system in the mid to long term, at the planning and pre-implementation stages of the project;
- Perceived loss of power or influence by health care providers, through harmonized approaches to systems or data sharing with other health care and government institutions.

Areas of Concern

Theoretically, social health protection schemes should have no problems implementing IT systems. Data transfer rates have increased, and hardware components are developing rapidly. Computer networks and the Internet have removed many of the physical barriers to data access and exchange, even from remote areas. Data exchange standardization should enable health professionals in different areas, with different cultural backgrounds and languages, to understand one another and work together. However, the management, planning and administration of IT systems for social health schemes has not progressed as quickly as the technological developments.

In an ideal scenario, relevant data is available to each stakeholder and provider, in an appropriate data format and without violating individual data property and protection rights. For example, the health care provider has a patient management system, which is linked with health insurance funds so that the display of relevant data is easy and reliable. This is not only to ensure smooth data exchange, but is also necessary to ensure the best possible care for a patient.

This section further highlights common areas of concern in social health insurance implementation.

IT Policies for Health

The implementation of national and regional e-health projects is not easy. Apart from logistical issues, well-designed administrative and regulatory frameworks are needed. These frameworks should clearly state the terms of usage for information exchange, and confine their scope to within the health sector. They need to cover very important but basic issues, such as the respect of human rights, and ensure that personal data is protected. They must also regulate the legal status of electronic documents and signatures, and ensure data security and confidentiality. At the medical level, a code of ethics for health professionals is required, as well as protocols for the certification and approval of medical equipment.²

These frameworks, and the defined standards, should also not replace or contradict existing legal frameworks for IT usage. They should cover health services conducted over websites, as well as more complex issues such as multiple and split liability for services provided through a series of cooperating providers.³ Finally, noting that e-health is a significant and emerging industry, potential trade conflicts should be considered in view of existing competition laws.

Following these guidelines, legal frameworks in e-health should be designed as all-inclusive master plans for IT, social health insurance and social security organizations. Unfortunately, the decision makers in developing countries often do not see a need for wide-ranging e-health legal

² SMART 2007/0059. Study on the Legal Framework for Interoperable eHealth in Europe. Final Report. Brussels: European Commission Directorate General Information Society, 2007, p 14.

³ Ibid. p 10

frameworks. This is because, in these countries only a few aspects of social health care are addressed, and clear definitions of many public health issues are lacking, including e-health issues. This gives rise to the ad hoc practices that are in place.

A comprehensive legal framework for e-health should not be limited to the creation of documents regarding data exchange. It should also clarify the following aspects of the social health system, defined as:

Authorization. Legal frameworks should detail the process of determining, by evaluation of applicable permissions, whether an authenticated entity (e.g., a person or organisation) is allowed to perform a defined action or has access to a specific resource.

Data authentication. Information provided for verification of the origin and integrity of the data, with more or less certainty.

Electronic health records. Comprehensive medical record or similar documentation of the past and present physical and mental health of an individual in electronic form, providing ready availability of this data for medical treatment and other related purposes.

Electronic signatures. Data in electronic form, which is attached or logically associated with other electronic data, which serves as a method of data authentication.

E-prescription. A medical prescription issued by a healthcare professional and transmitted electronically.

Identification. Using claimed or observed attributes of an entity to distinguish the entity in a given context from other entities it interacts with.

Identity management. A broad administrative area that deals with identifying entities in a system (such as a country, a network, or an enterprise) and controlling their access to resources within that system by associating user rights and restrictions with the established identity.

Patient summary. Subset of an electronic health record that contains information for a particular application and particular purpose of use, such as an unscheduled care event or e-prescription.

Registration. Process in which a partial identity is assigned to an entity, and the entity is granted a means by which it can be authenticated in the future.

Telemedicine. The provision of healthcare services, through use of IT, in situations where the health professional and the patient, or two health professionals, are not in the same location.⁴

⁴ Ibid. p 8

Harmonization needs in health insurance schemes

Not being centralized, from an organizational point of view, means that health protection services are not provided by one organisation. That is actually healthy and positive, as having autonomous social health protection institutions is a position of strength, and much better than having a single, government-managed institution. However, there are weaknesses associated with not having these institutions governed by a central authority. Specifically, the IT systems which are necessary to run these schemes are not centralized, and may not even use the same technology for data storage, data extraction and data exchange.

Data input vs. data extraction

In practical implementation, the health information systems (HIS) and health management information systems (HMIS) usually focus on simple functions, such as data extraction.

HMIS is a process by which health data (input) is recorded, stored, retrieved and processed for decision-making (output). In public health programmes, HMIS are primarily concerned with health care delivery issues, such as antenatal care, immunizations, and disease control programmes. However, decision-making broadly includes not just patient care, but many managerial aspects of the process, which affect the planning, organization and control of health care facilities at the national, state and institutional levels. Administrative issues also include: reporting, inventory management, financial management, and vehicle and personnel management issues.

Maintaining a good HMIS is an essential part of running a health system. This can be done manually, as many countries are currently doing it, or through the use of a computerized system. A combination of both manual and computerized maintenance is also possible. In a manual system, data management is often difficult and inefficient, leading to duplicated efforts and a waste of time. On the contrary, a computerized information management system is one way that IT can help improve the health system. In this context, IT can aid health workers by providing data collection, storage, and analysis services, as well as the information dissemination.

The shortcomings of a manual system can seriously affect the work of managers of state and national programmes. These shortcomings are most noticeable when there is a need to complete regular monitoring of the health status of the population, inventories and utilisation patterns of medicines and vaccines, equipment availability, etc. Often, a lack of knowledge on where or how to access existing data leads to additional, time-consuming household surveys.

Access to information must be timely and accurate, and is necessary to formulate and implement effective programmes. Such timely and accurate information is often lacking in health systems in developing countries. This is usually due to constraints in retrieving and storage on the side of the health service provider. There is no lack of data, as health care providers and workers generate a lot of data. It is the flow of this data to the central or planning level that is lacking.

Data extraction is ultimately needed, as it is the focus for policy makers as well as researchers and academics. But, the question is whether the data that is extracted is reliable. If it is not reliable, then policy and planning decisions may be based on inaccurate forecasts.

Uniformity in data handling

Reliability is dependent on accuracy, not only of input, but also of definition. Clearly defined standards and protocols for data storage and data exchange must be in place. Perhaps more importantly, the different stakeholders and the suppliers of information need to practice uniformity. A pervasive sense of responsible reporting must be installed. Thus, all data supplied and used must be closely monitored.

Membership identification

Clear electronic identification of the population is required, but that unique personal identification is not available in every country. The use of state-issued identity cards, valid nationwide, with a unique ID number, passport-sized photograph, fingerprint or other biometric feature, are lacking in many countries. This lack is caused by improperly designed public administration systems on a governmental level. A prime example is the nation of Cambodia: Here, the names of social health insurance members are frequently misspelled in both the national language and in English, making it difficult to identify a person clearly. This lack of identification results in a high amount of redundant and erroneous data in all related social health protection databases.

The move towards universal coverage must include membership records that clearly identify individuals and their health histories, as well as their employment. That clear and unique identification is needed for health protection providers, overseeing governments, and other members, to track changes and needs. The lack of a reliable and unique identification system will increase the possibility of multiple data entry, which will become an ongoing issue, and will eventually lead to erroneous planning and decision-making.

Health protection for specific target groups is often associated with, or allocated to, different ministries or implementing organisations. However, because of a lack of overall coordination and supervision, progress in the implementation of IT solutions has not been fully effective. Globally, there has been a transition from paper files to electronic files over the last ten years, but because of a lack of coordination and supervised effort, the vision of universal coverage has been partially lost.

IT – Support or Hindrance?

The introduction of IT systems should not be unnecessarily time consuming, or greatly increase workloads. Especially in health care organisations, IT should not make the lives of clinicians and hospital administrators more complicated. IT specialists have a tendency to focus on technology, and sometimes do not see things from the user's perspective. For example, a common mistake is

designing IT systems to collect too much information. IT specialists in e-health, but also generally, have to understand local needs and capabilities; these factors should then be matched with technical opportunities or solutions.

In addition, IT systems should be designed so that data flows are not only bottom-up, but also top-down. That is, data must also be given to the people whose health is at stake.

When procurement decisions are made, the sole considerations should be the effectiveness and efficiency of the purchase. Otherwise, it is likely that the products will not solve the problem, or fully serve the needs of the stakeholders.

Prerequisites for IT Projects

Whether countries are building a new IT system from scratch, or buying a system and customizing it to meet their specific needs, IT projects can look very simple in the beginning. However, problems can quickly arise. The budget can quickly become very large, and difficult to control. But, the more difficult issue is how to make sure the new system does what the users and stakeholders expect. Replacing an existing system, the new system should be comparable to, or improve upon, the old system.

Projects succeed or fail due to poor analysis of prerequisites. Project managers need to assess and understand the unique requirements of the project, and adjust the data gathering processes appropriately. In later stages, the continuously evolving project requirements needs to be managed effectively. The purpose of this section is to give a summary of the fundamental requirements to consider when setting up IT projects for health systems.

Political willingness

There has been significant and continuous change in the area of e-health. However, numerous challenges still exist, and are serious concerns for developing countries.

Progress in health care systems is mainly driven by political compromise, and the willingness to expand and reform traditional health systems. Innovators face anxiety and doubts, caused by pressure groups or by powerful decision makers. Many of these entities are afraid of change, and resist the introduction of well-established structures. As such, e-health system implementation is limited by the extent to which institutions, health care professionals and customers/patients are prepared, and willing, to tolerate change.

Most stakeholders are basically convinced of the value of e-health solutions. It is the technical shift from paper-based systems to sustainable implementation of IT-related systems which is needed, and often overdue.

Business plan

Many e-health projects lack proper and comprehensive planning, due to financial constraints. This is usually seen in the initial phase.

Apart from inadequate finances, many cases of failure are due to the isolation of individual project elements. All approaches considered individually are sensible, but do not work together. Coordination must occur in a real time setting, and with all stakeholders in place.

Business plans must be professionally developed for each individual social health protection organisation. In an e-health system implementation, inputs (including risk analyses) must be obtained by economists and accountants, and not only by technicians or doctors. This is part of a multi-stakeholder approach that is essential for the health sector, but which requires a long-term, overall vision of the project.

There is also a risk that too many stakeholders get involved in the implementation process, and no real progress is made. This can transform a simple and easy IT solution into a much more complicated situation.

Evaluation of local health priorities

E-health programmes should be based on the evaluation of local health and medical priorities, and should respond to specific needs, using IT as a tool. This requires strong management and leadership skills, both from national implementing agencies and government authorities.

While lessons learned from other countries need to be considered during the design stage of e-health systems, no solution can be directly transferred from another country due to social, cultural, political and economic differences. This is particularly relevant for social health insurance schemes, which work toward universal coverage through risk pooling and inclusion of all risk groups.

Business process collection

Therefore, an important first step is the identification of the real needs of the involved stakeholders. This business process collection phase is considered the core element in software/IT system design, as it maps the existing business processes in every division of an organisation. This identification is necessary for avoiding problems and frustration at later stages, but during this process, unexpected issues and surprises are normal.

Typical issues that may arise are:

- (a) Health care providers want to see faster reimbursement of claims from the health insurance fund;
- (b) Health insurance providers need the patient records in an appropriate format for proceeding with the reimbursement, in a timely and accurate manner;

(c) Health insurance providers may also require more data for further strategic decisions (e.g., the fund's general risk analysis);

(d) Reimbursement requires a clear identification of patients.

As an incentive to receive the necessary data from the health care providers (hospitals), the health insurance fund can offer a well-designed mechanism of member identification and verification, in order to make patient registration as smooth as possible for the providers.

Qualifications and capacity of national project managers

Local partners should look closely at candidates' qualifications and previous experiences if they hire external consultants to assist with IT support. The project life cycle of health protection implementation (e.g., social health insurance) is complex, and consultants should have strong backgrounds in the organizational processes within a health insurance fund, as well as strong skills in managing and planning IT projects. As with other matters, different interpretations exist on how external consultants can assist local stakeholders. In all the developing countries cited above, the expertise for developing appropriate databases and user interfaces is available on a local level. Excellent programmers are available in almost every capital city in these countries. As such, there is no need to hire expensive programmers from Europe or the United States. The problems, as already mentioned, are in the lack of planning and management skills to effectively manage IT projects. This is where assistance is highly needed and recommended.

Public-private partnerships

The capacity of local project partners and institutions plays a crucial role in an IT system's success. Public-private-partnerships are very useful. However, consideration must be primarily given to the development of a long-term strategy; such partnerships should also include capacity building at both the local and central levels. There are numerous examples of public-private partnerships around the world which seemed successful in the beginning of a project, but did not remain that way. Sometimes problems are caused by private institutions' profit motives, often generated by selling hardware. On the other hand, there are cases where public counterparts were not able to build the necessary human resources to run the project in a sustainable manner.

Initiating teamwork

The level of involvement by local partners is critical for successful project implementation. This includes their willingness to change mindsets, both concerning established practices and accepted behaviour patterns.

Information exchange and education are considered primary success factors for behavioural change. Therefore, it is important that all participating stakeholders are able to see benefits to contributing to the new technology, guidelines and processes. Each stakeholder group (e.g.,

doctors, hospital administrators and patients) might require different information conveyance and education methods.

There are many underlying issues and reasons for difficulties in engaging stakeholders. The political willingness, or lack thereof, to collaborate on data exchange is an important issue, but can be enhanced simply. Health insurance organisations, and others, need to realize that only evident mutual benefits will increase collaboration, and the willingness of other service providers to exchange data. Without networking and mutual cooperation, expecting other organisations to provide you with “free delivery” of data usually does not work.

Challenges in Implementation

This section will highlight some of the challenges that arise when implementing IT systems for health protection, and are not only related to technology issues. Some problems can be minimized by carefully analysing the above mentioned prerequisites. A comprehensive approach to implementation is required to effectively introduce an e-health IT system, including technical support, personnel management, effective training, and cultural sensitivity.

Weak project management skills

Project size and staffing is a common area of concern. The inadequacy of human resources can quickly increase costs within IT projects, as external consultants or private companies are hired to compensate for internal weaknesses. These external resources are often expensive, even for short periods of time to fix urgent issues.

Project managers must also have appropriate resources for crisis management. There are usually unforeseen difficulties in every IT project, such as hardware problems, personnel changes, unavailability of decision makers, and other unexpected events. Project managers should ideally maintain good relationships with relevant government stakeholders, and key people, to ensure the continuity of political commitment during the design and implementation phases of the project.

Capturing accurate data

Health information systems are fully integrated and comprehensive. They are intended to improve individual health outcomes and public health performance, and optimize resource utilisation.

Making patient-based data available to authorized users anywhere in the country, almost as soon as it is entered into the system, is a technical issue. As such, it can be solved through different technical approaches. Whatever technical solutions are found, hardware and software configurations will require multiple levels of security, to protect confidential personal and health-related information.

An IT infrastructure usually includes several interconnected modules, considered the “heart” of the system. From insurance providers, the system includes membership verification data and contribution collection monitoring, as well as fraud and abuse control. From health service providers, this includes patient admissions, transfer and discharge data, as well as screening, laboratory and medical treatment data. Because these health records are electronic or computerized, they are portable and can be accessed by authorized users from anywhere in the country.

Employers are an additional party in this system. Their role may be a major one, as in the formal sector they deduct the required health insurance contributions from an employee’s salary.

All sources of information have a part in integrated health information systems. When designing a technical system, the needs of all stakeholders who supply and receive information should be considered, including integrating all lab and supply chain data, and capturing accurate data from the private sector. In addition, standardized solutions, uniform practices and technical exchange should be encouraged.

Surprisingly, it is developing countries that can take the lead here. In creating solutions for potentially complex information exchange and data standardization, developing countries can have an advantage. Systems in these countries are often new and not very fragmented, as the number of IT implementers (hardware providers, software developers, mobile phone operators, etc.) is limited.

Measurable results

The initiating party's motivations, and its expectations, from the proposal must also be clarified. In the preliminary phase, a reference document should first be developed, setting out the objectives of the project together with its estimated duration. Ideally, the contents should be based on facts and quantitative research. This document must set clear health targets, and the expectations of any e-health solutions that are proposed. Measurable targets, or indicators of achievements, should be established at this time. These metrics can then be used to evaluate the project when it is implemented.

A secondary goal of this phase is an in-depth analysis. All assumptions and plans, from the public policy environment, to the available resources and needs, to the risks must be looked at closely. This process will validate and refine the initial reference document, establishing the main requirements for success.

At this phase, initial discussions with health sector stakeholders should begin. The discussions should be based on objective and quantitative data. Such data should accurately include the number of patients, disease prevalence statistics, the availability of human resources, and also the estimated costs of development and operations.

Initially, from these discussions an outline of the underlying public health vision should be made and agreed to. This understanding of the underlying objectives should come before the application of "technology-driven", media-focused solutions, which are not medically focused. Here also, medium to long-term projections must be made. These projections define the prerequisites that ensure project sustainability beyond the development phase.

E-health systems are not practical solutions for all situations. Therefore, the added value created by e-health solutions should be compared with possible alternative actions. Without added value, user acceptance of the e-health system will be low. The reasons for e-health solutions may be quite simple, such as the lack of other feasible solutions for isolated areas or communities. Combined solutions can also be considered, as long as the most effective data collection system is developed.

Added value

The added value of establishing an e-health solution should be seen and realized. From this point in the planning process, lessons learned from similar systems can be studied. Case studies and research should be conducted, as it may provide vital information for the project, as well as assist in creating benchmarks. These benchmarks should be formed on evaluation metrics, and information gathered on the infrastructure and human resources required. The actual costs and administrative environments of similar projects should also be studied.

At this stage, research into similar projects conducted in other parts of the world will definitely help. Staff who will be involved in any proposed e-health initiative should allocate time to learn from the experiences of other similar projects. While the specific needs and other issues may differ, and the implemented technologies may have evolved or changed, the overall learning experience will benefit any new project. Key sources of information are generally on the Internet. Of particular interest are the International Telecommunication Union (ITU), World Health Organization (WHO), and European Union (EU) websites.⁵

Investments in hardware

In developing countries, financial and technical resource constraints may exist. Thus, the costs of implementation, and especially the need for expensive hardware, will be foremost in the minds of decision makers. Although some investment in hardware is often needed, the focus should not be on purchasing hardware. This is often the reason for project failure. The procurement of hardware should be the last project step.

Lessons learned from other projects show that abuses can occur with funds allocated to hardware purchases. Donors providing direct financial support for hardware have seen many non-transparent, or even illegal, hardware purchases. Thus, a clearly defined funding and procurement process should be in place. One common funding condition is that all hardware is purchased

through a public bidding process, monitored by international partners. Although donors are satisfied with such a process, sometimes it may not be acceptable to the implementing partners, usually governments or social health protection institutions. In such cases, donors may not be willing to provide direct financial support for hardware purchases, making it the financial responsibility of the local partners.

Private health care providers

It should also be noted that privately run, high-quality hospitals are increasing throughout Asia. They serve the national and international demand for high quality medical services of those who can afford it. These facilities are also stakeholders within the national social health framework, but are not accessible to most of the national population. As these private hospitals are business oriented, they invest in effective and modern e-health technology, but only for internal use. Public health care funds cannot usually provide access to those health facilities, as they are too expensive. However, public health managers can most definitely learn from their management approaches, and maybe even adapt some of their e-health solutions to the national system.

Tools for implementation

Project management standards

International standards for project management of large-scale projects are available already. For instance, Prince2, PMP and ITIL2 are proven project management methods, and are implemented on many international projects. These methodologies are related to classical project management methods, which include several stages: project initiation, project planning, project execution, project closing, and project (impact) evaluation. These methodologies consider project lifetimes and lifecycles, feasibility studies and implementation planning. The corresponding instruments include risk management, total quality management, cost-effectiveness studies, and related assessments.

Very often, e-health projects have to be integrated within existing healthcare processes and systems, where they have no direct mandate. There may be other e-health projects planned, or already underway. Furthermore, e-health projects have so many variables that general project management solutions are not directly applicable, and have to be adjusted to each case.

All sources of information need to be viewed as part of an integrated HIS. When designing a HIS, all stakeholders who supply and receive information need to be considered. Health partners need to create standardized solutions and encourage technological exchange. The standardization of data is often a time consuming activity, as all relevant stakeholders need to be involved in this process. Highly fragmented systems have often existed for many years already, and the willingness to

⁵ www.who.org; http://ec.europa.eu/health/index_en.htm; www.itu.int

standardize data is limited. As previously mentioned, this standardization can be seen as a negative event that limits the power of well-established organizations, thus causing resistance.

External IT consultants

As seen above, decision makers at the very top generally lack in-depth IT knowledge, and are either reliant on younger IT staff or external consultants to make their choices. Although theoretically this dependency is not harmful, in reality it can be. Internal IT staff and external consultants usually recommend products within their personal area of expertise, or that they had used before. A more damaging scenario includes product vendors providing rewards for recommendations of their products. And, in the worst case scenario, e-health implementation projects would actually employ consultants from the private companies that sell these products. These consultants would naturally be biased toward their company's own products.

Innovations for developing countries

Despite the challenges in implementing e-health systems, IT will play an increasingly important role in social health protection schemes in the near future. In view of this, e-health professionals in South Asia and Southeast Asia have begun to organize themselves into a collaborative community. This is a strategic move, designed to improve planning and implementation activities, accelerate innovation, and coordinate improvements in health outcomes across countries.

Health care networks, such as the Asia e-Health Information Network (AeHIN), the Joint Learning Network (JLN), and the Health Metrics Network (HMN), are increasingly addressing e-health topics. This is to help countries measure improvements in health information systems. Nevertheless, there is still a need to promote better use of IT by addressing the fragmented operational aspects of health protection implementers, rather than focusing too much on the monitoring and evaluation aspects. Dr Sally Stansfield, Executive Secretary of the Health Metrics Network, summarised this view during a conference on e-health:⁶

There are probably more commonalities than differences, but there is a tendency to wallow in contextual exceptionalism – so vendors and donors alike try to create the impression only they know what is happening in a country, and that it is completely different to all others. What we need to concentrate on is innovation, on the true frontiers, instead of forcing countries to reinvent the wheel.

⁶ Quoted in e-Health for Development: A Conference Documentation. GTZ: Berlin, Germany, 29-30 October 2009. <http://www2.gtz.de/dokumente/bib-2010/gtz2010-0158en-e-health-conference.pdf>. Cited 03 July 2013.

Patient information and review systems

Many projects being implemented for health protection have, or must have, a complaint mechanism in place. Besides addressing the complaint, such mechanisms should also protect the complainant and encourage them to come forward.

Although complaint management systems already exist in some systems, these may be limited to a basic database which stores complaints from patients, but does not manage fraud and abuse on the health care provider side. Some health insurance institutions follow up on complaints quickly, and try to solve the complaint.

Nevertheless, the real situation is rarely seen, as there is no way to know how many patients are afraid to report complaints about doctors and health care providers for a number of reasons. One reason for this fear is socio-cultural. In both developed and developing countries, the social status of a doctor is very high. In developing countries, this status is contra-indicative for complaints, and patients are not willing, or even afraid, to give negative feedback on the performance of a doctor.

Another cause of reluctance to report complaints is being required to physically report any complaints. However a solution to this problem exists, and if implemented, may increase feedback rates. This is the possibility of a doctor rating portal via the Internet, or through mobile phone applications.

Mobile payments for health

Mobile phone applications for health care, generally referred to as “m-health”, have received a lot of attention recently. This is despite the availability of a large variety of e-health solutions. The global download volume for mobile phone applications is already well documented, and does not need more statements and interpretation here. It can be assumed that social media tools, as well as high performance customer service applications for mobile electronic devices, such as phones and tablets, will gain even more popularity within the next few years.

The establishment of mobile payment systems (MPS) can benefit m-health efforts as a whole. The usefulness of MPS can be seen in all aspects of health care, at the levels of the patients, the providers, and the administrators.

At the patient level, MPS enables and greatly empowers patients to access their money and pay for health care quickly in times of medical need, or even to receive money transfers from family members or friends. MPS also facilitates the utilisation of new financial instruments, in the form of micro-savings, micro-insurance, and micro-credit. Mobile money accounts are accessible through these services, and allow or enable patients to easily pay for transportation and health care services.

At the provider level, mobile money payments enable rapid settlement of financial issues. The use of remote payments simplifies supply chains for health care products and services, as well as quickly settling billing vouchers from providers of health services.

At an administrative level, mobile money enables payments to recipients, without the use of traditional bank accounts. With MPS, payments can be easily made to health workers who may not have bank accounts, as well as casual or per diem payments, and expense reimbursements that are usually paid in cash. MPS also enables the disbursement of performance-based funds and conditional cash transfer programmes, such as programmes that encourage facility-based deliveries for pregnant women.

Thus, many opportunities to develop innovative ideas, create new solutions that solve existing problems, or support further improvements in healthcare, are now available for health and IT entrepreneurs. Apart from the Asian countries discussed, many African countries are in need of assistance, as they are not meeting the UN's health-related Millennium Development Goals. The need for innovation has never been greater in this area.

Despite being leaders in modern electronic development, and the miniaturization that drives the mobile industry, Asian countries are not leading innovations in mobile payment systems for social health protection schemes. There are many reasons for this, but they can be summarized and limited to a few very valid issues.

One common issue is the lack of strong and experienced project management leaders. This issue is seen in the overall development of e-health as well, and the establishment of mobile payment systems may actually require even stronger project management skills. The lack of project management skills within the sector needs to be addressed.

Another very pertinent issue is that, although the collection of payments or premiums via mobile phone is seen as a very positive development, in reality it will only happen smoothly and effectively if the social health protection institution (e.g., a social health insurance agency) is already organized and efficient. At the very least, a clear membership identification and verification process should already be in place. The overall lack of these systems has been one focus of this paper.

Due to the availability of technology, many technical solutions are already available and in use. However, the exchange of knowledge and experiences between countries is not happening as much as it should, and data sharing is even less common. If exchanges do occur, the focus is on the technical aspects of setting up mobile payment systems. No other exchange of information occurs, especially not on the linkage of these technical solutions to the operations of social protection institutions.

Conclusions

The number of involved stakeholders, the diversity of participants, and the range of objectives, as well as political, administrative and legal constraints, make it difficult to implement e-health in developing countries. In particular, health information management systems, necessary for the planning of health financing strategies at the government level, are not yet aligned with health care implementers.

The actions and recommendations proposed in this report are based on the need for collaboration and cooperation, and the international sharing of expertise, products and best practices in e-health. General recommendations and actions are outlined below.

First, a team of international experts could help resolve misunderstandings and facilitate effective information exchange among countries which face the same level of fragmentation within their health systems. The international team of experts would be backed up by key national staff, with a broad level of IT and management skills.

Sharing best practices is generally seen as an important step in moving towards universal coverage facilitated by modern IT solutions. While most international conferences, consultancy missions and expert meetings focus on “what should be done”, health protection funds and implementers at national levels still struggle with how to implement the activities. As harmonized IT systems for health protection should ideally be developed by national staff, sharing the lessons learned and best practices of other countries should be encouraged, with further assistance on planning and management, and guidance of the entire lifecycle of IT projects.

Currently, there is a need for an approved and fully funded pilot project examining IT implementation in health care. The terms of reference must include a study of the current situation, taking into consideration all of the possible and potential issues that have been raised in this paper. Regional experiences should also be considered, as a way to encourage inter-country cooperation, for the benefit of the overall development of the region and e-health projects. Such a project should focus on the harmonization of existing IT solutions in social health protection, the clear identification of members, and the assessment of IT project management skills at the local level.

Case Study: Cambodia

In many developing countries, such as China, Cambodia, Lao PDR and Mongolia, different government ministries manage different funds. However, other countries, such as the Philippines, are introducing a unified regulatory framework for IT systems, to harmonize the rules that govern these funds.

Cambodia, in particular, has a high fragmentation of social health insurance operators. The Social Health Protection Master Plan, established by the Royal Government of Cambodia, will help to assess the political feasibility of integrating and harmonizing these schemes in the medium term, while ensuring maximum coordination and alignment among all schemes. A decision currently needs to be made about which social security stakeholder could bring the various funds together.

Although a national ID policy is in place, every citizen does not yet have a national ID, and therefore a unique identification of health system members or patients is not possible. Although different health insurance operators can create a unique ID number for every member, a physical linkage between the numbers from different systems and the person is not yet available.

A unified biometric identification system could be the first step in harmonizing the IT infrastructure, with clear advantages for health insurance implementers, health care providers and patients. Aligning membership records, without sharing sensitive data across all funds, would strongly support the development of individual membership records for tracking patients' health insurance fund affiliation at any time. However, the Social Health Protection Master Plan does not yet consider IT as a key factor for advancing universal coverage.