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Integrating Information and Communication Technology for Health Information System Strengthening: A Policy Analysis

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Abstract

Despite the high costs involved and the lack of definitive evidence of sustained effectiveness, many low- and middle-income countries had begun to strengthen their health information system using information and communication technology in the past few decades. Following this international trend, the Malaysian Ministry of Health had been incorporating Telehealth (National Telehealth initiatives) into national health policies since the 1990s. Employing qualitative approaches, including key informant interviews and document review, this study examines the agenda-setting processes of the Telehealth policy using Kingdon's framework. The findings suggested that Telehealth policies emerged through actions of policy entrepreneurs within the Ministry of Health, who took advantage of several simultaneously occurring opportunities—official recognition of problems within the existing health information system, availability of information and communication technology to strengthen health information system and political interests surrounding the national Multimedia Super Corridor initiative being developed at the time. The last was achieved by the inclusion of Telehealth as a component of the Multimedia Super Corridor.

Keywords

Agenda setting, case study, health information system, health policy, Malaysia, Telehealth

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Introduction

The role of information and communication technology (ICT) in health information system (HIS) strengthening, particularly in low- and middle-income countries has been emphasized by many.[1,2] As such, since 1990s, the Malaysian Ministry of Health (MoH) incorporated strategies to integrate ICT into the national health policies as an effort to strengthen its HIS.[3] In 1997, the MoH introduced the National Telehealth initiatives (Telehealth), which was a part of the federal Malaysian government's ICT project—the Multimedia Super Corridor (MSC).[4] Teleheath was to transform the way health care is managed and delivered in Malaysia, a deemed necessity in the face of increasing health care demands and limited resources. It comprises several components namely the Lifetime Health Plan (LHP), Teleconsultation (TC), Mass Customised Personalised Health Information and Education (MCPHIE), and Continuing Medical Education (CME). Incorporating ICT as the enabling technology, Telehealth was envisaged to improve the quality of health education, diagnosis, and treatment across distance, engaging the people to work as partners with health care professionals in maintaining their own health, or managing their illnesses.[3]

One of the proposed strategies is to create the Lifetime Health Records (LHR) to store the longitudinal personal health records in an integrated centralized national repository. The LHR will generate personalized care plans as well as collating health information for health planning and management. To achieve this, federal MoH's administrative departments were to be electronically linked to all public and private hospitals and clinics.[3-6] There have been several studies on the implementation of Telehealth in Malaysia, which showed limited progress of ICT integration in the delivery of health care services.[7] A study by Abd Ghani et al[8] highlighted that only 18% of the overall ICT systems in MoH hospitals and clinics have the potential to contribute to the collection and generating information for LHR. Furthermore, there are problems such as data completeness, timeliness, and quality of reporting and lack of harmonization and integration between various public and private health data sources.[9,10] To date, Telehealth has involved heavy financial investments.[11] Previous studies have tended to focus on the implementation of Telehealth components,[7] the policy contents and its technical appropriateness.[3,5,8] However, the agenda-setting process of this far-reaching and costly project has not been conducted so far.

The aim of this study was to explore the factors that underpin the development of Telehealth policy and its implementation. Although MoH introduced strategic plans and guidelines for Telehealth,[3,5,6-8] its implementation did not follow as expected. This study does not aim to fully describe the complex problem of integrating ICT for HIS in Malaysia. Rather, it seeks to describe the process for developing and implementing Telehealth policy in Malaysia. The use of the term "Telehealth," unless otherwise stated, refers to MoH-owned ICT initiatives (and its components) which emerged from the federal government MSC projects. We wanted to explore how Telehealth appeared on the national health policy, focusing on agenda setting and policy formulation. It is argued that the nature of the policy process, including how policies were formulated and by whom (policy actors), affects their implementation. A better understanding of these processes could help policy makers to design more appropriate and effective processes to assist policy actors in engaging with these processes. The analytical framework suggested by Kingdon[12] is used to understand the policy process.

Conceptual Framework

According to Kingdon's framework, there are 3 separate policy streams: the problem, policy, and politics streams. Each stream concerns different aspects of a particular policy issue. The problem stream highlights the weaknesses of existing policies that may require remedial actions. The policy stream revolves around potential and available solutions to problems. The politics stream

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refers to the broader political context within which the policy is made, including changes in public disposition and within government agencies. A critical event may lead to a "policy window" in which all 3 streams converge, when the problem is recognized, feasible solutions are available, and there is sufficient political will to support change.[12] This provides an opportunity for "policy entrepreneurs" to advance a policy issue onto the agenda.

Methods

We conducted a case study for policy analysis and gathered qualitative data through key informant interviews (KIIs) and document reviews. Both KIIs and document reviews explored the following: What were the Telehealth approaches to strengthen HIS; how the policies were formulated, and what are the factors affecting the Telehealth policy processes. We selected the key informants through purposive sampling to include MoH officials who were responsible for leadership or policy, and their experience in Telehealth. In addition, we also used snowball sampling[13] (asking participants if they knew other informants who were knowledgeable about the research topic). Out of the 13 key informants approached, 12 had agreed to be interviewed (see Table 1). We also reviewed public documents relevant to the formulation of Telehealth policies. All reports, studies and other materials on Telehealth policy in Malaysia were included.[3-8,14-17] The period studied was from 1996 to 2012 (from the year when MoH first introduced Telehealth policies till the time of data collection).

All interviews were digitally recorded and transcribed by the first author. Data were managed using ATLAS.ti software. Analysis was both inductive and deductive in approach. Firstly, transcripts were open-coded to allow themes to emerge from the data. Then, we used Kingdon's political agenda-setting theory framework[12] to analyze and present the results. The theoretical propositions were used to refine the codes and explore relationships between themes. As proposed by Walt et al,[18] the explicit attention to a theory does not imply a reductionist approach to analysis but rather provides coherence and potential avenues for linking themes and concepts. We use these frameworks to explore why Telehealth was incorporated in the national health policy, examining particularly on the issues for national HIS strengthening.

Relevant approvals were obtained from the Medical Research Ethics Committee, MoH, and the University Malaya Medical Centre Institutional Review Board. Written informed consent was obtained from each respondent and anonymity was assured.

Results

The rationale put forward by respondents as to why Telehealth was incorporated in the national health policy for HIS strengthening was in line with the 3 streams in Kingdon's framework. In the early 1990s, there was acknowledgment that the existing HIS was fragmented, resulting in the lack of data quality for meaningful use (problem stream); advances in ICT had the potential to overcome these issues and there was existing organizational support to build on such ideas (the policy stream); and senior officials of the federal government and MoH were "lobbying" for ICT use (pressure in the politics stream).

Analysis of the Problem Stream

The problem stream centered on the fact that there was no integrated system for health data collection to allow for timely and meaningful information for health planning and management in MoH (Box 1, *Quote 1*). Contributing to this were a number of factors: the physical size and diversity of the health sector (public and private, serving nearly 28 million people nationwide); various administrative divisions and a hierarchical and centralized structure of working; and

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Table 1. List of Key Informants.

Key Informants Initial	Description
KI 1	A doctor who held senior management position in MoH. Has 15 years' experience in formulation and implementation of ICT policies in MoH, including Telehealth; particularly in computerization of MoH hospitals.
KI 2	A doctor who held senior management position in MoH. Has 16-years' experience in formulation and implementation of ICT policies in MoH. Was in charge as the project manager of one of the components of Telehealth projects from 1997 to 2003.
KI 3	An IT technical specialist who held senior management position in the MoH. Has 15 years' experience in formulation and implementation of ICT policies in MoH, including Telehealth
KI 4	A doctor who has 7 years' experience in formulation and implementation of ICT policies in MoH; particularly computerization at government clinics.
KI 5	A doctor who held senior management position in MoH. Has 20 years' experience in formulation and implementation of ICT policies in MoH, including Telehealth.
KI 6	An IT technical officer, who has 3 years' experience in formulation and implementation of ICT policies; particularly computerization at government clinics.
KI 7	An assistant medical officer, who has 15 years' experience in formulation and implementation of ICT policies in MoH; particularly computerization at government clinics.
KI 8	An assistant medical officer, who has 3 years' experience in formulation and implementation of ICT policies in MoH; particularly computerization at government clinics.
KI 9	A nurse manager, who has 5 years' experience in formulation and implementation of ICT policies in MoH; particularly computerization at government clinics.
KI 10	A doctor who held senior management position in the MoH. Has 15 years' experience in formulation and implementation of ICT policies in MoH, including Telehealth. Was head of a division in the MoH, in which directly coordinated Telehealth Project implementation from 1997 to 2003.
KI 11	An IT technical specialist, who has 15 years' experience in formulation and implementation of ICT policies in MoH, including Telehealth.
KI 12	A doctor who held top management position in the MoH when Telehealth initiative was introduced. Has more than 20 years' experience in formulation and implementation of ICT policies in MoH, including Telehealth; particularly in computerization of MoH hospitals.

Abbreviations: ICT, information and communication technology; MoH, Ministry of Health.

various staff functions each dealing with different kinds of data (involving multiple returns) for various health programs (Box 1, *Quote 2*).

Based on recommendations from the World Health Organization, the MoH established a Health Management Information System (HMIS) modeled on the hierarchical pyramid structure of the Malaysian health care system. The HIS data were sourced from patient's information records, aggregated in periodic summary reports, and coordinated at the national level by MoH's Information and Document System Unit (IDS).[10] In order to accomplish data collection and collation, MoH had begun to computerize its clinics and hospitals during the 7th Malaysia Development Plan (1996-2000).[14] However, data collection systems were noted to be fragmented, and timely analysis was limited (Box 1, *Quote 3*).

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Box 1. Selected Illustrative Quotes.

Problem Stream

Quote 1: (HIS) is significant when the public health department is able to use the data that is generated from XYZ to facilitate in making projection, looking at incidences and what's not. The system is able to do so. But unfortunately, the collection of data has not been complete, there's a lot of vacuums (KI 5)

Quote 2: At that time, we were doing manually. So, it's quite difficult. At the end of the month, we need to return everything (forms), it's quite impossible to dig up everything. So, the best way is to do it with ICT (KI 7)

Quote 3: There are several health information system but, there are all standalone (systems) . . . (KI 4)

Quote 4: The other thing (problem) is because of the funding. Somehow, the core business of Ministry of Health is still health services. They're still making sure that there's enough drugs to the patients, making sure that there's enough reagents to do all those laboratory testing. So, somehow ICT becomes less of priority as compared to this other activities. It is not seen as a core activity. (KI 8)

Policy stream

Quote 5: Previously, we used to have about 42 disease registry. So, you don't need different systems for each disease registry, but we actually have 42 different system. (KI 4)

Politics stream

Quote 6: The politicians who have power . . . (programmes which) are started by the politicians, it's a directive. So just we had to do it. We did it. (KI 3)

Quote 7: I think, we had the champion (for Telehealth). The Honourable Tun (Dr) Mahathir was the champion, and it rippled downwards to our (former) Director General of Health, Tan Sri (Dr) Abu Bakar. (KI 10)

Consequently, MoH championed the provision for an integrated HIS using ICT in the national health policies. The top MoH management officials further formulate the Information System Strategic Plan (ISSP) in 1996. The ISSP approaches included creating a centralized HIS, building a network between the major hospitals, district and state health departments, and federal health divisions. However, problems still arise due to the disparity in infrastructure and competing demands in funding (Box 1, *Quote 4*). The Telehealth initiative was established in 2000 with the federal government's sponsorship of the National ICT initiative called the Multimedia Super Corridor (MSC).[8]

Analysis of the Policy Stream

This second stream falls within a context in which ICT integration initiatives had been carried out in MoH since the ISSP in 1996. This comprised either solely government initiatives or through the public-private partnerships. Analysis of this policy stream revealed that the integration of ICT for HIS strengthening was possible through provision of 3 major programs: (*a*) public-private partnership of MSC's Telehealth initiatives at the selected pilot clinics and hospitals in 2000-2003[6,8]; (*b*) through the 5-yearly Malaysia Development Plans (7th, 8th and 10th Malaysia Plans), which includes infrastructural development of new hospitals with built-in HIS (eg, Selayang and Putrajaya Hospitals), and computerization of the health care facilities (hospitals, clinics, and regional health departments) along with other federal government ICT initiatives[14–17]; and (*c*) MoH's internal policies to develop system registries based on proposals from the head of the various health programs and disease-specific groups during its technical meetings (eg, cancer registry, diabetes registry, etc) (Box 1, *Quote 5*).

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Analysis of the Politics Stream

In this third stream, the role of stakeholders and the levels of power responsible for exercising authority in Telehealth was instrumental. MoH is managed through a hierarchical institution—at the federal, state, district, and local hospital, or clinic level. In general, the top management officials at the federal level have enormous power to enforce new initiatives (Box 1, *Quote 6*). As regards to ICT use for HIS, MoH top management officials has had a program through the ISSP and the 7th Malaysia Development Plan. When the federal government's MSC initiatives introduced in 1997, this gave rise to political pressure for Telehealth to be incorporated in MoH's existing strategies (Box 1, *Quote 7*).

Coupling of the 3 Streams and Opening of a Policy Window

At a particular moment, these 3 streams converged. ICT was recognized as an enabler for HIS strengthening, allowing an integrated and a full-functioning HIS. Technology advancements in ICT had made it possible to improve data quality, timeliness reporting, and analyses. In addition, international experiences with ICT use for HIS strengthening had also supported the feasibility of policies, such as the ISSP and Telehealth. Furthermore, proposals by clinicians and researchers representing the various health programs within MoH had been issued to develop disease registries in Malaysia. These proposals, however, gave rise to the fragmented HIS, where multiple disease registries were developed and managed by the different departments in MoH. Policy makers were aware of the problems in the existing HIS (due to disparity in technical infrastructure, fragmented data collection systems), and when the federal government introduced and funded the MSC initiatives, it was in a context of policy opportunities with regard to HIS strengthening using ICT. By the year 2000, these different streams converged during the ministerial meetings to propose and request the funding required for Telehealth implementation during the 7th and 8th Malaysia Development Plan (1996-2000 and 2001-2005, respectively).[14,15]

Discussion

Ideological, political, and economic factors are decisive in the formulation of proposals and the progress of the initiatives decided upon.[20] Indeed, before the policy window opened, various issues were identified, which resulted in the agenda setting and decision for Telehealth. As can be seen from the Telehealth story told in this paper, the top MoH management officials became policy entrepreneurs, managed to exploit an important window of opportunity (the MSC agenda) leading to a solution for HIS strengthening. What was evident was the creation and subsequent transfer of Telehealth strategy, and the idea was taken up by those with the power within the federal government and MoH to influence ministerial decision and to establish legitimacy. Once the legitimacy to act was established, the idea of what to do was sold in a simplified, branded, version to the public (Telehealth-MSC initiative). The reasons behind this decision to allocate funding may not be disclosed; as what we all had already known is that policy decisions are rarely made in public and are not systematically the result of a rational process, as the context is often highly political.[21]

The study was unable to include all the relevant policy actors. Although efforts were made to interview all the 13 key informants, only 12 KIIs were conducted as one respondents was unreachable during the study period. Other policy actors such as industrial players and private health sector representative were not included in the study because this study focused on Telehealth policy in MoH. Lack of inclusion of these stakeholders is a limitation as they could have given some important perspectives of the process. Despite these limitations, the rich description of the policy process in this study provides a valuable contribution to the knowledge base on policy process for integrating ICT for HIS strengthening in low- and middle-income countries.

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Conclusion

By applying Kingdon's framework, it is possible to document the agenda-setting process that led to the introduction of Telehealth in the MoH. Some factors were identified as not concerning the MoH while others resulted directly from the MoH and were related to the context and situation studied. The combination of all of these factors created a context conducive to the political agenda setting and policy decision, demonstrating evidence-informed health policy making. A better understanding of these processes could help policy makers to design more appropriate and effective processes to assist policy actors in engaging with policy processes in the future.

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