

E-health Readiness among Four Middle East Countries: Implications of SWOT Analysis

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Abstract

This paper seeks to provide an assessment on the capacity of three GCC countries (UAE, Oman, and Saudi Arabia) and a non-GCC (Jordan) to embrace e-health opportunities, challenges, and innovation by assessing the national performance indicators of the ICT and healthcare sectors using SWOT analysis. This is an exploratory analysis of secondary data obtained from World Bank, WHO, ITU, UN-ESCWA, EMRO and UNPAN to compare national performance and best practices so as to model e-Health strategies and policies across the region. The drivers for e-health readiness included national health expenditure, ICT sector performance, telecommunication cost, ICT governance, e-health connectivity, national knowledge capabilities, and human capital supply. The analyses showed unique practices and performance in each country which can be used to model a unified regional development program towards e-health cooperation.

Introduction

The advent of rapid growth in the Information and Communication Technology (ICT) in the Middle East Region has resulted to innovations in the delivery of healthcare services. The most notable of these is the provision of e-Health services that promise efficient and convenient healthcare delivery to key stakeholders. The World Health Organization (2007a) has defined e-Health as the “cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research”. Al-Shorbaji (2006, p. S239) mentioned that health information has become an essential factor of the national healthcare systems. In addition, technology will increasingly be integrated and used by healthcare professionals especially among five stakeholders: ICT learners, clinicians, educators, managers, and researchers (Al-Shorbaji, 2006 pp.S240-S241). With this, the allocation of funds for development projects would then be a necessity to implement e-health goals across the region (Al-Shorbaji, 2001, pp. 13-17).

Due to varying healthcare priorities across nations, countries within the region have adopted e-health services differently. In fact, the Middle East and North Africa (MENA) countries have experienced diverse inequalities which should be given attention to encourage regional cooperation through knowledge sharing among policy makers (Borthwick and Horton, 2006, p.961). In, 2000, the MENA countries signed the Millenium Development Goals (MDGs) which covers targets for healthcare improvements. However, challenges remain formidable and are mostly under “health-transition and health systems issues”. To assess e-health preparedness, this paper seeks to provide a SWOT analysis on the readiness of four countries in the Middle East (UAE, Jordan, Oman, and Saudi Arabia) to embrace e-health opportunities, challenges, and innovation by assessing the national and regional performance indicators in the ICT and healthcare sectors.

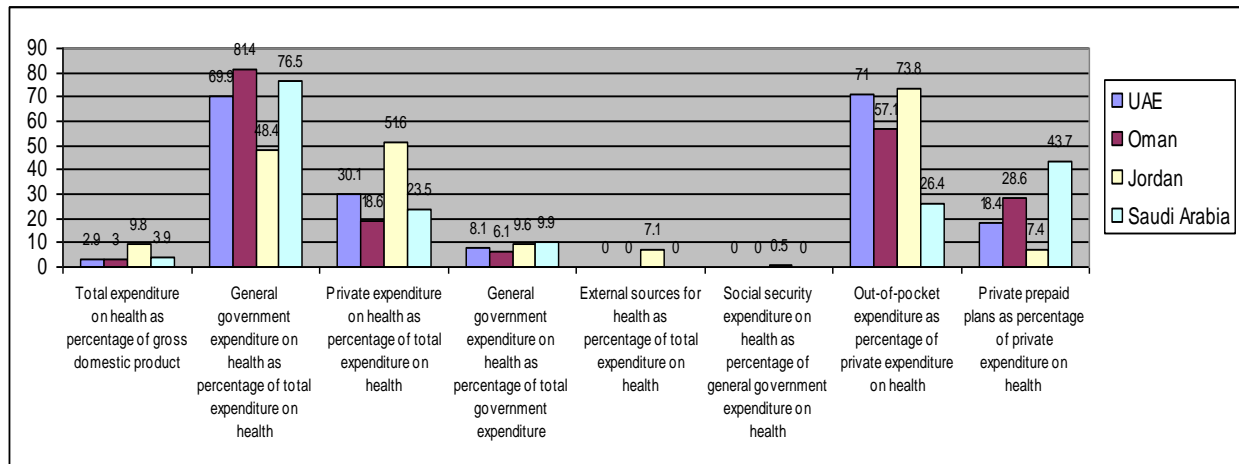
Methods

This is an exploratory analysis of secondary data on four countries of Middle East particularly three Gulf Cooperation Council (GCC) members (UAE, Oman, Saudi Arabia) and a non-GCC (Jordan) obtained from World Bank (2007a/b), WHO (2007a/b), ITU (2003), UN-ESCWA (2005), EMRO (2005) and UNPAN (2005). Only four countries were assessed to limit the analysis. The Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was used to estimate the relative performance among the countries. This was based on the indicators used for healthcare cost and spending as well on ICT cost, expenditure, performance, governance, innovation, knowledge economy and human capital indicators. These indicators for e-health were based from the previous studies of Kirigia et al (2005, pp. 138-140), WHO (2006, p5) and Dutta et al (2007, pp. 81-93).

Results

The World Health Organization (2007b) provided the National Health Accounts (NHA) composed of expenditure indicators. The results in Figure 1 showed that Jordan has equal (1:1) partnership between the private and public sectors on health financing. However, UAE, Oman, and Saudi Arabia favor a relatively higher government than private spending on healthcare (2:1). GCC countries are more capable of offering comprehensive e-health services due to higher Gross Domestic Product (GDP) based on oil and gas as tradable commodities (Latta and Cummins, 2007, p.49). Thus, the GDP of Jordan (a non-GCC) is the least among the four (Table 1).

Figure 1. Comparison among the Four Middle East Countries across their National Health Accounts

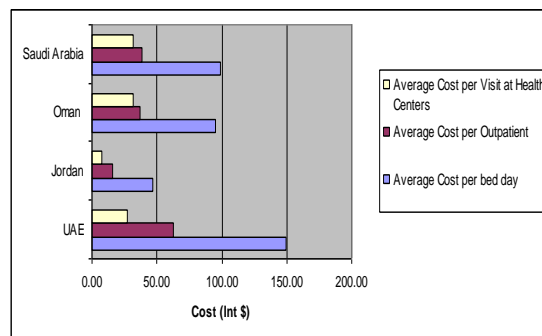


Source: WHO (2007b)

Healthcare spending for Jordan requires shared expenditure between private and public sources due to low gross national budget. As such, Jordan has high private prepaid plans required to accommodate the demand for healthcare services within the country. This predicts that GCC countries remain more readily prepared to adopt e-health opportunities due to the sufficient fiscal capacity and support of the government to acquire a relatively high initial investment to set-up a comprehensive national e-health program.

Diversified healthcare options are necessary to finance hospitalization needs. Figure 2 showed that UAE has the highest cost per bed day and per outpatient suggesting the high cost of health services in the country. Oman and Saudi Arabia have higher cost per visit at health centers than Jordan and UAE.

Figure 2. Hospitalization Cost among the Four Middle East Countries



Source: WHO (2007b)

Table 1. National Health Expenditure among the Four Middle East Countries

Indicators	National Health Expenditure (2005)			
	UAE	Oman	Jordan	Saudi Arabia
GDP in Billions of \$, 2005 (annual growth)	129.7(8.1)	24.3(3.4)	12.7(6.2)	309.8(4)
Population in 2005 expressed in thousands (annual growth rate)	4496(6.3)	2567(1.7)	5703(2.9)	24573(2.8)
GDP -population ratio (2005, by thousands/person)	28.8	9.47	2.23	12.6
Per capita total expenditure on health at average exchange rate (US\$)	711.2	294.6	199.9	412
Per capita total expenditure on health at international dollar rate	502.7	418.9	501.7	601
Per capita government expenditure on health at average exchange rate (US\$)	497.4	239.9	96.7	315.1
Per capita government expenditure on health at international dollar rate	351.6	341.2	242.8	459.7

Note: data came from WHO (2007a)

Table 1 shows that GCC countries could spend and allocate a higher percentage of their GDP to healthcare to implement ICT strategies for the delivery of health services. This means that UAE's fiscal strength is attributed to its lower population and higher GDP which merits its capacity to accommodate a feasible logistical implementation of development agenda such as e-health. However, Jordan has a low GDP-high population ratio compared to Oman and UAE which limits their capacity to embrace extensive e-health projects. Thus, Jordan requires external funding to obtain sufficient fiscal support allocated by the government on healthcare spending. Correspondingly, Jordan follows an almost equally shared government and private funding for healthcare. This then distributes health expenditure on government and the private sectors as well as the acquisition of funds from external sources such as grants and loans to accommodate the increasing demand for healthcare on their increasing populace. Another limitation of Jordan is on its high out-of-pocket expenditure for healthcare. Ideally, Saudi Arabia has the lowest out-of-pocket expenditure owing to the high budget allocated by its government to healthcare since they have the highest per capita total government expenditure on health (Figure 1). However, the increasing population of Saudi remains to be the biggest threat on their development to offer e-health services.

Table 2 shows that Jordan spends the biggest percentage of its GDP for the ICT development. Jordan almost doubled their expenditure for 2005 compared to 2004. The change in ICT spending in UAE and Saudi Arabia was relatively small (2004-2005) while Oman posted the lowest ICT expenditure among the four in 2004. The data also suggests that despite the low GDP of Jordan among the four countries, their aggressiveness to improve the ICT sector remains promising. Such increased spending can be attributed to the high telecommunication revenue generated in Jordan which accounts for its 8.3% of GDP in 2005. This then resulted to increased internet usage among Jordanians. In fact, Jordan ranks second to Saudi Arabia in terms of its

growth rate based on internet population penetration (465.4%) from 2000 to 2007. Such boost on their internet access

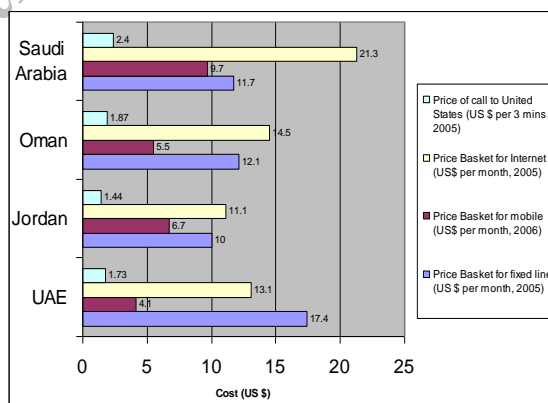
Table 2. ICT Performance among the Four Countries and the MENA Region

ICT Performance Indicators	Performance				
	UAE	UAE	UAE	UAE	UAE
ICT spending (Percentage of GDP, 2004)#	3.08	4.64	2.04	2.47	...
ICT spending (Percentage of GDP, 2005)*	3.6	8.4	...	2.3	3.1
Telephone Main Lines (per 1000 people, 2005)*	273	119	103	164	160
Mobile Subscribers (per 1000 people, 2005)*	1000	304	519	575	229
PCs (per 1000 people, 2005)*	197	56	47	376	48
Secure Internet Servers (per 1 million people, 2006)*	54.4	4.1	3.4	4.6	0.7
International Internet Bandwidth (bits per person, 2005)*	923	58	194	33	9
Broadband Subscribers(per 1000 people, 2005)*	28.3	1.9	3.3	0.9	0.5
Total Telecommunications Revenue (% of GDP, 2005)*	2.7	8.3	2.3	3.2	1.3
Total Telecommunications Investment (% of revenue, 2005)*	12.9	16.7	43.3	12.3	19.8
Total Telephone Subscribers per Employee (2005)*	485	444	583	390	501
Internet Usage in 2007**	1,321,000	719,800	285,000	2,540,000	...
Percent Population Penetration**	33.20%	13.40%	11.60%	10.60%	...
Growth Rate (2000-2007)**	79.70%	465.40%	216.70%	1170.00%	...

Note: * figures were adopted from World Bank (2007b); ** data came from IWS (2007, September 30) # means that the data came from ESCWA (2005, p.34); ... indicates the lack of data

could be the result of a lower telecommunication cost on the internet, fixed line service, and phone call rates which remains lowest among the four countries (Figure 3). However, the mobile phone rate in Jordan remains higher than UAE and Oman but slightly lower than that of Saudi Arabia. This predicts that an affordable telecommunication cost could lead to the boost in the ICT performance in order to increase the rate of revenue to fund ICT projects. The ICT sector remains most competitive in UAE than the other three especially on the access to the internet that

Figure 3. Four Middle East Countries across their Telecommunication Cost



Source: World Bank (2007b)

tends to increase access to tools like telephone mainlines, mobile phones and PCs (Table 2). Such high accessibility led to the boost in the international internet bandwidth per person, number of secured servers, and high broadband subscription which resulted to the highest percent population penetration of internet in UAE than the other three. This predicts that a better telecommunication infrastructure could lead to increased access to the internet. Oman posted a very high telecommunication investment (43.3% of GDP, 2005) due to higher total telecommunication subscriber per employee. Saudi Arabia's strength in the ICT sector is on the very sharp growth rate on internet usage from 2000 to 2007 (1170% increase) though the population penetration of internet remains the lowest (10.6%) among the four. This then predicts that limited number of Saudi citizens have access to the internet. This is due to the high telecommunication cost for internet, mobile phone service, and

Table 3. Performance of the Four Middle East Countries based on ICT Governance

ICT Governance Indicators	Country Performance			
	UAE	Jordan	Oman	Saudi Arabia
Government Prioritization of ICT (scale 1-7, 2005)*	5.6	5.5
E-government Readiness Index (2005)**	0.57	0.46	0.34	0.41
Global E-government Readiness Ranking (2005)**	42	68	112	80
Demand Level for Household ICT Indicators [#]	...	Very High	High	Low
ICT Research Facilities ^{##}	Yes	Yes	Yes	Yes
Detailed ICT Strategy implementation plan ^{##}	No ^{a/}	Yes	Yes	Yes
Explicit ICT Strategy Implementation Plan ^{##}	No ^{a/}	Yes	Yes	Yes
Pace of ICT Implementation ^{##}	...	Good	Good	Average
ICT Incubators ^{##}	Yes	Yes	No	No

Note: * all figures were adopted from World Bank (2007b); ** data came from UNPAN (2005), #data came from World Bank (2007a), ## data came from ESCWA (2005), a/-means that despite the lack of ICT strategies at a national level, there is an excellent pace of implementation at a local level particularly in Dubai; ... indicates the lack of sufficient data

phone call rates in the country which is the highest among the four (Figure 3). Such high cost restricts the access to ICT services. Opportunities to implement e-Health services in Saudi Arabia is promising due to the availability of ICT research facilities as well as the presence of detailed and explicit ICT strategy implementation plan (Table 3). However, the lack of detailed and explicit ICT strategy implementation plan restricts UAE to optimize e-health growth at the national level despite impressive performance on other indicators.

Based on the level of innovation, Jordan, UAE, and Oman ranked 3rd, 5th, and 11th, respectively (Table 4). Jordan's strength for this rank could be due to efficient human capital training among the youth for their national development Saudi Arabia is highest on the level of innovation for software development (rank 2nd). This could be attributed to the low piracy rates, high technical journal articles published, and on successfully granted patents. UAE remains on

the top for the average number of patents granted, and on the exportation of high-tech gadgets where Saudi Arabia is weak.

The biggest threat to e-health is connectivity The impressive connectivity level of UAE (with 5 indicators at grade of 3

Table 4. Country and Regional Performance based on Several Innovation Indicators

Innovation Indicators	Performance				
	UAE	Jordan	Oman	Saudi Arabia	Middle East and North Africa
Patents Granted by USPTO/Million people, avg 2001-2005*	1.17	0.28	0.08	0.63	9.99
Patents Granted by USPTO, avg 2001-05*	4.6	1.4	0.2	14.8	66.6
High-Tech Exports as % of Manuf. Exports, 2005*	10.2	5.2	2.2	1.3	4.06
Technical Journal Articles, 2003*	193	263	1.3	573	786.29
Technical Journal Articles/ Mill. People, 2003*	48.3	50.6	573	25.9	92.1
Innovation (2007)*	6.56	5.67	4.91	3.75	n/a
ESCWA Software Development Ranking ^{##}	5	3	11	2	n/a
Software Piracy Rates ^{##}	34	64	64	52	n/a

Note: * data came from World Bank (2007a), ## data came from ESCWA (2005); n/a-not applicable

and 2 indicators with grade of 2) could account for its Level 3 maturity level on e-health (Table 5). Oman's connectivity at the healthcare sector and development of Arabic (both at grade of 1) remains the limiting factor on its preparedness to implement e- health strategies. Saudi Arabia is restricted by the low government connectivity which

Table 5. Country Performance based on Several Innovation Indicators

E-Health Connectivity	Country Performance			
	UAE	Jordan	Oman	Saudi Arabia
E-Health Maturity Level (2005)*	Level 3	Level 2	Level 2	Level 2
Village Connection**	3	2	2	2
Research Center Connection**	3	3	3	3
Healthcare Connection**	2	2	1	2
Government Connection**	2	2	2	1
Media Services**	3	3	3	3
Development of Arabic Content**	3	3	1	3
Citizen Connection**	3	2	2	2

Note: All data came from ESCWA (2005); *Level 2-existence of plans to use ICTs in the healthcare sector, albeit with limited implementation; Level 3-established databases of national health care, with telemedicine and teleconferencing services in a number of hospitals, and widespread use of healthcare information systems in hospitals and medical clinics; **Grade of 1 indicates weak, with less than 40% of the WSIS objectives realized, 2 indicates average, with 40-60% of WSIS objectives realized, and 3 means good, with more than 60% of the WSIS objectives realized

Table 6. Country Performance based on National Knowledge Capability Indicators

Knowledge Capability*	Performance				Middle East and North Africa
	UAE	Jordan	Oman	Saudi Arabia	
Adult Literacy Rate (% age 15 and above), 2004	77.26	89.9	81.4	79.4	78.37
Gross Secondary Enrollment (2005)	63.8	87.4	87.1	87.6	77.79
Gross Tertiary Enrollment (2005)	22.5	39.3	14.7	28.4	25.79
Public Spending on Education as % of GDP, 2005	1.3	4.9	3.6	6.8	...
Human Development Index (2004)	0.84	0.76	0.81	0.78	0.75
Knowledge Economy Index (2007)**	5.78	5.19	5.12	4.76	...
Knowledge Index (2007)**	5.62	5.15	4.52	4.66	...

Note: *all data came from World Bank (2007a); **The KAM Knowledge Index (KI) measures a country's ability to generate, adopt and diffuse knowledge. The Knowledge Economy Index (KEI) takes into account whether the environment is conducive for knowledge to be used effectively for economic development

restricts efforts to implement e-health. As such, the Omani and Saudi Arabian government should first address the issue on government connectivity (inter-institution wide area network or WAN) before implementing e-health services despite the sufficient access to e-government (Abanumy et al, 2005, p. 99). Also, Jordan should attain a higher level of connectivity on both village and citizen connections (grade 2) to be at a comparable connectivity (grade of 3) with that of UAE. Thus, the connectivity of UAE remains ideal for e-health readiness.

Table 6 shows the high adult literacy rate in Jordan reflecting a relatively higher healthcare manpower density (Table 7). UAE has lowest public spending on education but remains resilient due to high knowledge economy which is dependent largely on the presence of expatriates in the

Table 7. Country Performance Based on Healthcare Manpower Supply

Healthcare Manpower Supply	Country (Expressed as Density per 1000 population, 2004)			
	UAE	Jordan	Oman	Saudi Arabia
Physicians	2.02	2.03	1.32	1.37
Nurses	4.18	2.94	3.50	2.97
Midwives	...	0.30	0.01	...
Dentists	0.33	1.29	0.19	0.17
Pharmacists	0.38	3.14	0.53	0.22
Other health workers	...	1.17	0.43	1.57

Note: all data came from WHO (2007b)

orkforce. Also, Oman and UAE require relatively higher level of workforce for the healthcare sector which would dictate for sustained dependency on expatriates. Saudi Arabia has the highest budget allocated for education but remains relatively low on its knowledge economy which would also require services rendered by expatriates.

Discussion and Conclusion

E-health services require sufficient financial support. Musgrove (2004, p. 47) suggested that the surest source of finance for public health is government revenues. As such, e-health initiatives are best implemented using public funds for better government control and accountability.

Unites Arab Emirates

UAE's strength depends on their impressive ICT infrastructure, internet population penetration, and connectivity among stakeholders. Its greatest weakness is the varying performance among its emirates where only Dubai experienced very rapid ICT development. Such emirate disparities have been addressed for resolution by their 2008-2011 development programs on national strategy (UNDP, 2007, p2). Opportunities for innovation remain viable for UAE across other emirates to increase investment on e-health programs for future developments as well as on their increasing demand for ICT and healthcare professionals to sustain rapid development goals at the local and national level. The biggest threat to the success of e-health in UAE is the lack of comprehensive national ICT implementation plan to drive national development from its local (emirate) improvements other than Dubai. However, e-health programs are strong due to the Arab Telemedicine Network, Egyptian Telemedicine Network, Dermatological Diseases Telemedicine Network and the Pediatric Consultation Network (ESCWA, 2005, p.59). More projects are encouraged across the emirates other than Dubai.

Jordan

Jordan's strength depends on its high aggressiveness for ICT-generated revenues, expenditure and development to improve their ICT infrastructure as well on their cheaper internet and telecommunication that boost ICT performance along with their education sector's involvement for national development. Its weakness is on its low government income which restricts government funded initiatives like e-health. Opportunities remain promising for the country's booming ICT performance brought by their complex fiscal revenues. However, the greatest threat is on dependency on external and private funding which could limit the government's control on e-health policies and public accountability. Despite these barriers, Jordan has provided telemedicine services for more than 10 years through connections to several telemedicine networks which allowed medical specialists across the world to provide consultation services remotely while decreasing the need for citizens to travel abroad for treatment (ESCWA, 2005, p.60). In

addition, programs to increase investment on social services, transparency, accountability, and national youth strategy are underway for its 2008-2012 development goals (UNDP, 2007, pp. 2-3)

Oman

Oman boasts of their economic diversification to increase funding for healthcare through enhancement of private sector involvement using healthcare prepaid plans as well as on their high telecommunication investment. However, the low connectivity and high internet and telecommunication costs limit their capacity to fully embrace e-health opportunities despite presence of strategic plans. The opportunities of increasing the demand for ICT and healthcare professionals are evident. However, the greatest threat is on their low national knowledge transfer which would sustain dependency of skilled manpower on expatriates (Latta and Cummins, 2007, p.49-54). Hence, retention and training of manpower among nationals should remain a priority to achieve sustainable public health function (Rawaf, 2004, pp.37-38).

Saudi Arabia

Saudi Arabia's strength depends on its rapid increase in internet usage and their innovative software capabilities but lags on public access to cheaper internet and telecommunication. Other weaknesses noted were the low connectivity among e-health stakeholders, very low internet bandwidth, lack of ICT incubators and insufficient manpower for e-health implementation despite existence of plans and high education sector expenditure. Opportunities include the high demand for ICT and healthcare workers and the entry of privatization efforts to reduce government burden on healthcare spending for economic sustainability and diversification. The biggest threat is the rapid population growth which would require strategic efforts to further boost government cost-cutting programs and economic diversification to maximize resources despite a relatively high GDP in the region. Musgrove (2004, p. 49) recommended that public alternative is crucial to increase general revenue spending which has been strategically included in Saudi Arabia's 2007-2011 development agenda (UNDP, 2006, pp.3-5).

Generally, the three GCC countries are more capable in making future e-health policies easily integrated into their e-government infrastructure. The relatively low healthcare workforce on these countries should be controlled by improving employment opportunities and training among their nationals. Hence, this analysis could be used for strategic policy planning on e-health development efforts towards national, regional and global e-health cooperation.

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