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HEALTH INFORMATION SYSTEM (HIS)

PALESTINIAN HEALTH SECTOR REFORM AND DEVELOPMENT PROJECT

SHORT-TERM TECHNICAL ASSISTANCE REPORT (FINAL)

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CONTENTS

ACRONYMS

BI	Business Intelligence
ENT	Ear, Nose, and Throat
FY	Fiscal Year
HIS	Health Information System
HR	Human Resources
IT	Information Technology
MOI	Ministry of Interior
MOH	Ministry of Health
MOU	Memorandum of Understanding
NGO	Non-Governmental Organization
PCBS	Palestinian Central Bureau of statistics
PHC	Primary Health Care
PHCD	Primary Health Care Directorate
PMR	Patient Medical Record
PMRS	Palestine Medical Relief Services
Q	Quarter
SOW	Scope of Work
STTA	Short-Term Technical Assistance
USAID	United States Agency for International Development
USAID/WBG	United States Agency for International Development West Bank and Gaza
WHO	World Health Organization
WBG	West Bank and Gaza
Y	Year

ABSTRACT

The overall objective of this consultancy was to assess the current role that the Health Information System (HIS) is taking in management and decision making, and ensure that data generated from the system is being used productively. User rights, user privileges, and patient privacy were also part of the original scope. On the first day of the consultancy, United States Agency for International Development (USAID) funds for the West Bank and Gaza (WBG) were released, creating the need for an immediate assessment of the financial resources needed to bring additional facilities (e.g., hospitals and clinics) online with the HIS.

Original tasks for this consultancy included:

- Assess the current usage of data generated by HIS through the reporting tool in the system, both at department level and management level.
- Identify reports from HIS for each department/managerial position and explain the purpose and benefit of the reports to ensure these reports are utilized properly, with an emphasis on the Human Resources (HR) module.
- Assess the current privileges and access rights given to users at Rafidia Hospital.

Modified tasks for this consultancy included:

- Assess the potential for bringing more facilities on the HIS and assist in the budgeting and planning for future implementation of HIS at additional facilities.
- Assess the current usage of data generated by HIS through the reporting tool, at both the department and management levels.
- Identify reports from the HIS for each department/managerial position and explain the purpose and benefit of the reports to ensure these reports are utilized properly, with an emphasis on the HR module.

SUMMARY OF RECOMMENDATIONS

Within the next month:

- Continue with HIS implementation for the remaining districts (i.e., Hebron and Ramallah) covered under the current scope.
- Although the HIS has predefined data sets that help to minimize human error, the Project should invest more time assessing the quality of data collected in areas where no data sets are defined (e.g., date of birth).
- Reassess the data sets and make sure they reflect the reality on the ground and best practices. In order to promote the HIS at the national level, the system should adopt a single language in its data sets and never mix two languages in the same data set.
- Complete the source code escrow agreement with DataSel; this will constitute a safety net for the HIS in the event of the software provider's total business collapse.

Within the next six months:

- Complete implementation under the current scope.
- Procure additional licenses to connect the central departments at the MOH on the system.
- Monitor the quality of data collected on the system and enforce the completeness of medical records.
- Institutionalize protecting the privacy of patients' health information; this should include patients' knowledge of their health information and understanding of the boundaries on medical record use and release. The Project must ensure the security of personal health information and establish accountability for medical records use and release.
- Capitalize on the current ministerial change and address a very important task, which is linking the HIS with the Ministry of Interior (MOI) demographic database. This task started twelve months ago, all software development has been completed, all required equipment procurement was done and system testing is complete, but the actual linking between the two systems has never been put into effect. Completing this link will enable MoH users after entering the patient ID on the system to query his or her demographic information as stored on the MOI demographic database, which will result in reducing the human errors entered on the system (e.g., age, place of birth).
- Address the system's connectivity issue with MOH and make sure it is resolved permanently for all facilities.
- Create a budget plan that addresses the required financial resources needed for maintaining and supporting the system. This plan should take into consideration the cost of bringing more facilities on the system through using the concept of cost sharing (more facilities on the system will bring the cost of maintaining and supporting the system down).
- Create all required protocols and standards that facilitate other health care providers (e.g., public, non-governmental organizations [NGOs], and private) in joining the system.

Within the next year:

- Continuous USAID support for the coming years in allocating more funds that would bring additional hospitals and clinics onto the HIS.

- Formalize a national committee that includes representatives from all health care providers, different academic institutes, and all donors participating in improving the health sector in the West Bank and Gaza. This committee will assume the responsibility for guiding the national HIS toward better representation of the health status on different levels. The committee must improve the system's data sets for better national representation. For example, the insurance data set in the HIS currently contains two options: one for a patient insured by the national insurance system and one for a patient who is not insured by the national insurance system. Although these might be valid options for governmental health care facilities, they are not valid for Al Makassed Hospital, as this hospital deals with many insurance providers, including the MOH, Israeli insurance system, private insurance companies, and patients who are not insured. In order to have national representation, this data set, and others, must be expanded to include additional options. The committee will also ensure that all facilities connected to the system adhere to and comply with all security and privacy policies developed. The committee should consider securing additional financial resources that would help to maintain and support the HIS, other than bringing more health facilities online. Many other tasks and responsibilities could be set as part of the committee's scope that will improve the health standards in the West Bank and Gaza.

SECTION I: INTRODUCTION

The Palestinian Health Sector Reform and Development Project is a five-year initiative funded by USAID, designed and implemented in close collaboration with the Palestinian MOH. The Project's main objective is to support the MOH, selected non-governmental organizations, and selected educational and professional institutions in strengthening their institutional capacities and performance to support a functional and democratic Palestinian health sector able to meet its priority public health needs. The Project works to achieve this goal through three components: (1) supporting health sector reform and management, (2) strengthening clinical and community-based health, and (3) supporting procurement of health and humanitarian assistance commodities.

Task I: Moving Forward with the HIS (An Assessment)

BACKGROUND

USAID West Bank and Gaza (USAID/WBG), through Contract No. 294-C-00-08-00225-00 for the Palestinian Health Sector Reform and Development Project (the Project), is working to strengthen the institutional capacity of the Palestinian MOH, non-governmental organizations (NGOs), and other health sector groups to implement reforms to increase the provision of high-quality, sustainable health care and to create consistent standards of care.

The Project has confirmed that an integrated HIS will greatly benefit the MOH. In late 2008, the MOH conducted a needs assessment of the Palestinian health system, with the support of the Project. During that assessment, the MOH identified the need for an HIS as its second highest priority. Furthermore, through consultation with the Project, key stakeholders working in the Palestinian health sector verified the MOH's need for a comprehensive HIS and are committed to supporting it.

Following the needs assessment, the MOH, with the support of the Project, developed an institutional development plan in early 2009 that again emphasized the need for an integrated HIS to support data-driven decisions and improve the efficiency and effectiveness of its workflow and services, as well as patient outcomes.

The MOH confirms that a comprehensive HIS, with up-to-date and reliable health information, is a critical component for a functional health system exhibiting good governance and transparency. In addition to providing information for informed planning, decision making, and policy formulation, a comprehensive HIS will improve cost efficiency and resource allocation to ensure that vulnerable groups are able to access the health care that they need. Likewise, computerized information on patient care regimens will improve quality of care and assist in prompt actions that result in positive outcomes. By aggregating data on the disease profile in Palestine, the HIS will help MOH managers to better allocate resources and track disease outbreaks. It will also promote regional health security by enabling the MOH to access timely and reliable health information. Through the HIS, the MOH is able to make informed, decisive actions that promptly address potential epidemics and/or pandemics effectively and control diseases from spreading across borders.

With support from the USAID/WBG mission, the MOH has begun the process of developing and implementing a comprehensive HIS to significantly enhance the MOH's ability to manage and exchange information related to patient care, services, finance, management systems, epidemiological data, and human resources (HR) across all program areas within the Ministry. The HIS directly contributes to the MOH's health sector reform efforts and assists the Ministry with improving service delivery as it promotes the integration and coordination of health care across health facilities. The HIS has also begun to create a culture of knowledge and reduce inefficiencies, thus leading to better planning and strengthening decision making based on real-time data.

In addition, the system will greatly enhance the MOH's ability to coordinate and communicate with all stakeholders, including the private and NGO sectors – who will be encouraged to be part of the national system to standardize and harmonize national protocols and standards of work that would enhance the quality of health care services, which will ultimately lead to better quality of life for the Palestinian people.

USAID/WBG has invested approximately $7 million to fund the procurement and implementation of the initial phase of the HIS in fourteen selected hospitals, clinics, and MOH administrative offices throughout the West Bank (see Table 1 below). This system is the first stage of a national HIS that the MOH will roll out first throughout all MOH health facilities, and at a later stage, to cover all Palestinian health care providers.

Table 1: Initial Roll Out of the HIS to Fourteen HIS Facilities

No.	District	Hospital/Clinic	Name
1	Nablus	Hospital	Rafidia Hospital
2	Qalqilya	Hospital	Dr. Darwish Nazal Hospital
3	Hebron	Hospital	Alia Hospital
4	Ramallah	Hospital	Al Sheikh Zayed Hospital
5	Ramallah	Hospital	Bahrain Hospital
6	Nablus	Clinic Level 4	Directorate of Primary Health Care
7	Nablus	Clinic Level 3	Huwwara Clinic
8	Qalqilya	Clinic Level 4	Qalqilya Primary Health Care Directorate
9	Qalqilya	Clinic Level 3	Azzoun Clinic
10	Ramallah	Clinic Level 4	Central Ramallah Clinic
11	Ramallah	Clinic Level 3	Beit Rima Clinic
12	Ramallah	Hospital	Blood Bank
13	Hebron	Clinic Level 4	Al Karantina
14	Hebron	Clinic Level 3	Tarqumia Clinic

The scope of this procurement includes the software, hardware, training, and support services required for the installation and operation of the system. It also includes the establishment of a centralized data center and a disaster recovery system that will guarantee that the system will run with no interruptions 24/7, 365 days a year. Specifically, the scope includes:

- ***Software***: Software licenses, including enhancements, modifications, systems and control software, and utilities.

- ***Hardware***: Workstations, routers, switches, application servers, database servers, and other hardware required by the HIS.
- ***Project Management***: Project management services, including customization of software as necessary to meet MOH requirements; interface development; and, implementation, including configuration and testing support.
- ***Training***: Software training for business, administrative, and technical personnel, and a train-the-trainer package to support all training modules.
- ***Maintenance and Support***: Software and hardware maintenance and support, documentation, and other directly related professional services.

The introduction of a comprehensive and integrated solution that the MOH is adopting is a cornerstone for a successful national system. The HIS that was procured by the Project introduces many sub-systems, including the following:

- HIS Security & Access Control System;
- Patient Registration and Master Index System;
- Billing and Accounts Receivable System;
- Pharmacy Information System;
- Order & Request Management System;
- Medical Records System;
- HR Management System;
- General Appointment System;
- Maintenance Management System;
- Material Management System (Inventory);
- General Ledger;
- Fixed Assets Management System;
- Budget Management System; and,
- Financial Management System.

These sub-systems will capture all MOH daily activities, from clinical to management to administrative. The HIS, through its comprehensiveness, leads to a more cost effective and efficient system in performing daily activities that will encourage the MOH to introduce the system nationwide.

Followed by a lengthy procurement, preparation, and training process in Year (Y) 2 and the early part of Y3, the HIS became operational at Rafidia and Qalqilya Hospitals, in addition to selected clinics in the same districts. In Quarter (Q) 4 of Y3, the implementation faced some challenges in moving forward to the Hebron district due to a misunderstanding over the coverage of the HIS between the Project and the MOH. Q1 of Y4 began with a USAID stop work order due to fiscal year (FY) 2011 funding limitations. The stop work order ended on January 15, 2012 and later a Memorandum of Understanding (MOU) was signed with the MOH on HIS implementation. Another modification to the HIS contract was signed on April 11, 2012 which solved the issue of HIS coverage in the Ramallah Hospital Complex. Work in Hebron and Ramallah districts commenced, and the project expectations are to complete those two areas by Q4 of Y4.

HOSPITALS UNDER CONSIDERATION FOR FUTURE EXPANSION

➢ AL MAKASSED HOSPITAL

Al Makassed Hospital today is the leading medical center in Palestine, providing secondary and tertiary health services for all citizens of Palestine with a capacity of 250 beds and more than 750 staff.

Figure 1: Al Makassed Hospital

Though Al Makassed hospital began the process of automating their working environment in 1987 by introducing a VAX VMS Cobol system. The current system is falling apart and the hospital is less dependent on it.

Al Makassed Hospital has 100 personal computers; 60 of which have been procured in the past four years. They have invested in their infrastructure by distributing more than 200 network points across all departments. They have a dedicated server room that needs some renovation; the server room also contains 80KVA uninterrupted power supply that is in good condition. The majority of hospital employees, whether they are doctors, nurses, administrators or support, are already acquainted in using computers; thus some of the challenges we face in MOH hospitals and clinics are eliminated.

Al Makassed Hospital is the primary referral hospital for MOH and would be the first NGO hospital to receive the HIS. Patient records could easily be shared with other hospitals on the HIS, thus allowing doctors in the West Bank access to the records of patients receiving treatment at Al Makassed when they return to their primary care doctors.

➢ JERICHO HOSPITAL

The Jericho Hospital was established in 1998 with an overall budget of $7.5 million. The hospital currently has 56 beds and employs more than 170 staff.

Figure 2: Jericho Hospital

Over the past years, Jericho Hospital has worked on its network infrastructure, but it has mainly focused on their administration offices and support services. This network needs to be upgraded and reconfigured. All other working environment elements, such as workflow and procedures within the hospital, are typical of other MOH hospitals.

➢ BEIT JALA HOSPITAL

The National Palestinian Onco-haematology is located at the Beit Jala MOH hospital. The hospital has a capacity of 117 beds and a staff of approximately 296 employees.

Over the past years, Beit Jala Hospital has worked on its network infrastructure, but it has mainly focused on its administration offices. This network needs to be upgraded and reconfigured.

Figure 3: Beit Jala Hospital

COST ANALYSIS

The Project, accompanied by a representative from the HIS Implementing Company, has conducted an assessment on MOH hospitals and clinics in the districts of Jenin, Jericho, and Bethlehem. The assessment was also conducted on the Al Makassed Hospital in Jerusalem.

This analysis investigated the cost of bringing the facilities under consideration for future expansion online on the HIS (see Tables 2 through 6, and Graph 1 below). The analysis was conducted based on the site visits that took place on April 17 and 18, 2012. The analysis was organized in accordance with the methodology that was adopted in the Project's first deployment; mainly looking at the readiness of those facilities in terms of connectivity, hardware, and software.

The total cost of bringing all of the above mentioned facilities onto the HIS will be approximately $2,705,056.73, from which the Jerusalem district (which is represented by Al Makassed Hospital) will need $1,274,826, or 47.13% of the total cost. Bethlehem District will require $882,516, or 32.62% of the total cost; and Jericho District will require $547,714, or 20.25% of the total cost.

Table 2: Facilities under Consideration for HIS Expansion

District	Hospital / Clinic
Jericho	Hospital
Jericho	Clinic Level 4
Jericho	Clinic Level 3
Bethlehem	Hospital
Bethlehem	Clinic Level 4
Bethlehem	Clinic Level 3
Jerusalem	Hospital

Table 3: Estimated Cost of Bringing Al Makassed Hospital onto the HIS

	Al Makassed Hospital
Implementation	$568,835.00
AviCenna	$328,992.77
Software	$5,499.00
Hardware	$215,130.57
Connectivity	$156,368.80
Total / Facility	**$1,274,826.13**

Table 4: Estimated Cost of Bringing Jericho Hospital onto the HIS

	Jericho MOH Hospital	Jericho Primary Health Care Directorate (PHCD)	Jericho Level 3 Clinic
Implementation	$122,868.36	$56,883.50	$18,202.72
AviCenna	$57,931.34	$26,820.06	$8,582.42
Software	$2,419.00	$594.00	$176.00
Hardware	$130,535.34	$35,278.43	$13,796.17
Connectivity	$52,490.80	$11,568.00	$9,568.00
Total / Facility	**$366,244.83**	**$131,143.99**	**$50,325.31**

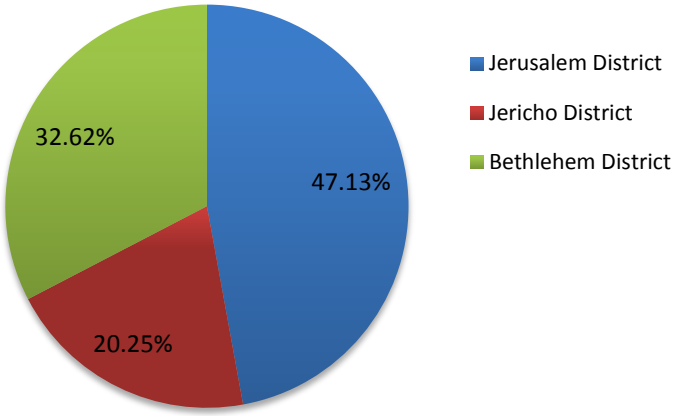
Table 5: Estimated Cost of Bringing Beit Jala Hospital onto the HIS

	Beit Jala MOH Hospital	Bethlehem PHCD	Bethlehem Level 3 Clinic
Implementation	$288,968.18	$56,883.50	$18,202.72
AviCenna	$136,245.92	$20,025.65	$5,721.61
Software	$3,189.00	$594.00	$176.00
Hardware	$188,655.77	$35,278.43	$13,796.17
Connectivity	$93,643.52	$11,568.00	$9,568.00
Total / Facility	**$710,702.38**	**$124,349.58**	**$47,464.50**

Table 6: Total District Estimates

	Jerusalem District	Jericho District	Bethlehem District
Implementation	$568,835.00	$197,954.58	$364,054.40
AviCenna	$328,992.77	$93,333.82	$161,993.18
Software	$5,499.00	$3,189.00	$3,959.00
Hardware	$215,130.57	$179,609.94	$237,730.37
Connectivity	$156,368.80	$73,626.80	$114,779.52
Total / District	**$1,274,826.13**	**$547,714.13**	**$882,516.46**

Graph 1: Total District Estimates (Percentage Distribution)



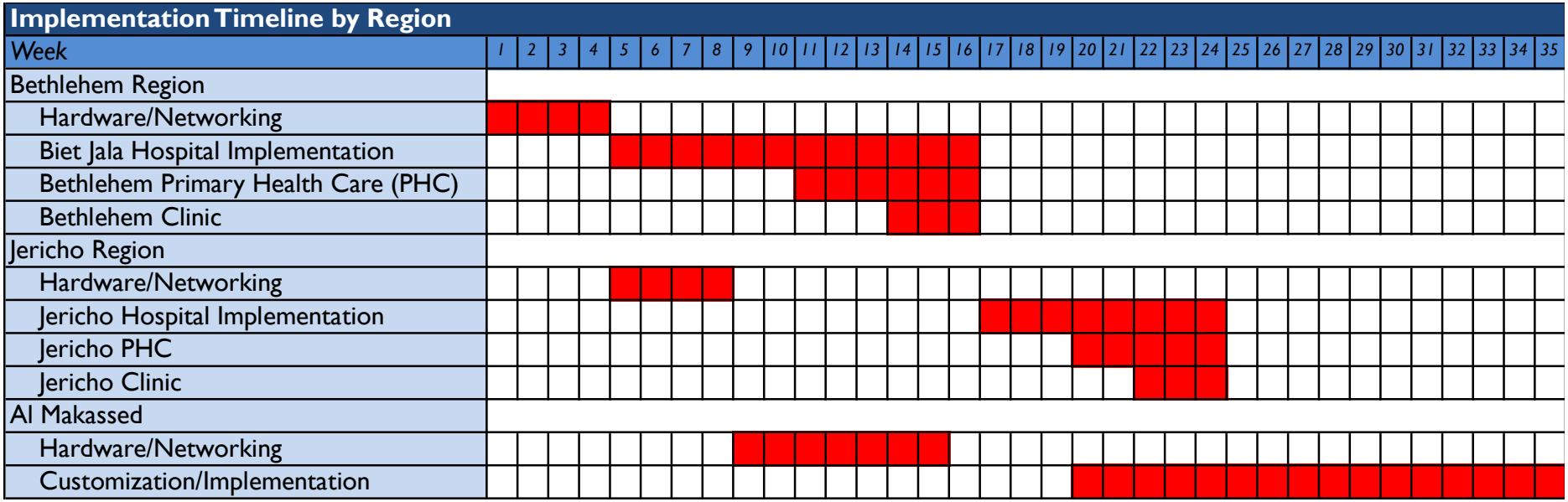
IMPLEMENTATION TIME ANALYSIS

Two factors determine the period required to bring those facilities under consideration on line on the HIS. The first is the uniqueness of each facility in terms of structural, departmental, and staffing size, which will affect the duration of implementation in each. The second factor is that March 31, 2013 should be the target date for completing any Project-related tasks. This time constraint will force the Project to carefully choose the facilities it works with; it would not be advised to begin such a huge intervention and not be able to complete it.

The total time frame for bringing all facilities onto the HIS will require nine months of implementation, therefore the project has to complete all approvals and (i.e., 611e for the Al Makassed Hospital) before July 1, 2012 in order to have enough time to achieve all objectives by March 31, 2013 (see Table 7 below).

- The Jericho district, being the smallest of the three districts, will require two months of implementation time. This will include preparing operations for implementation of the Jericho Hospital, Jericho PHCD, and one Level 3 clinic. It will also include end user training and implementation in all three facilities.
- The Bethlehem district will require three months of implementation time. This will include preparing operations for implementation of Beit Jala Hospital, Bethlehem PHCD, and one Level 3 clinic. It will also include end user training in all three facilities.
- The Jerusalem district will require four months of implementation time. This will include preparing operations for implementation of Al Makassed Hospital and end user training.

Table 7: Implementation Timeline



DEMOGRAPHIC PERSPECTIVE

The idea behind this analysis is to shed some light on the notion of coverage percentage mentioned throughout the HIS implementation. Table 8 summarizes the estimated population trends for the years 2009 to 2013 in the West Bank as provided by the Palestinian Central Bureau of statistics (PCBS).

Table 8: Population Estimates in the West Bank, 2009 to 2013

District	2009	2010	2011	2012	2013
Jenin	267,027	274,001	281,156	288,511	295,985
Tubas	52,950	54,765	56,642	60,582	60,582
Tulkarm	162,668	165,791	168,973	172,224	175,494
Qalqilia	94,947	97,447	100,012	102,649	105,330
Salfit	61,714	63,148	64,615	66,119	67,641
Nablus	332,389	340,117	348,023	356,129	364,333
Ramallah & Al-Bireh	292,629	301,296	310,218	319,418	328,811
Jerusalem	375,167	382,041	389,298	396,710	404,165
Jericho	44,183	45,433	46,718	48,041	49,390
Bethlehem	183,804	188,880	194,095	199,463	204,929
Hebron	580,955	600,364	620,417	641,170	662,454
Total / West Bank	**2,448,433**	**2,513,283**	**2,580,167**	**2,651,016**	**2,719,114**

Source: http://www.pcbs.gov.ps/DesktopDefault.aspx?tabID=3845&lang=en

Using Table 8, above, and focusing on the year 2012 we can calculate the percentage of the total population for each district (see Table 9 below).

Table 9: Population Percentage in the West Bank, 2012

District	2012	% of total
Jenin	288,511	10.88%
Tubas	60,582	2.29%
Tulkarm	172,224	6.50%
Qalqilia	102,649	3.87%
Salfit	66,119	2.49%
Nablus	356,129	13.43%
Ramallah & Al-Bireh	319,418	12.05%
Jerusalem	396,710	14.96%
Jericho	48,041	1.81%
Bethlehem	199,463	7.52%
Hebron	641,170	24.19%
Total / West Bank	**2,651,016**	**100.00%**

From Table 9, and focusing on the scope of the project in terms of coverage area, the coverage area of the HIS under the current scope is as follows:

Qalqilya (3.87%) + Nablus (13.43%) + Ramallah (12.05%) + Hebron (24.19%) = 53.34%

Any future expansion of the HIS into any district that is not covered by the current scope will add more strength to the system. The option under investigation for further expansion is looking at the Jericho, Bethlehem, and Jerusalem districts.

Due to budgetary limitations, the Project has three options for expansion. The first is through expansion to additional MOH facilities (Jericho and Bethlehem districts) by covering MOH hospitals, PHC clinics, and one Level 3 clinic in each district. The second option is through covering Al Makassed Hospital, thus bringing Jerusalem district under the system's coverage. The third option combines options one and two.

Table 10: District Percentage of Total Population

District	Percentage of total
Current Scope	53.34%
Jerusalem	14.96%
Jericho	1.81%
Bethlehem	7.52%

Option 1: Current Scope + Jericho + Bethlehem =
53.34% + 1.81% + 7.52% = 61.67%

Option 2: Current Scope + Jerusalem =
53.34% + 14.96% = 68.30%

Option 3: Current Scope + Jericho + Bethlehem + Jerusalem =
53.34% + 1.81% + 7.52% + 14.96% = 77.63%

AN OPEN LICENSE

For the past two years, the Project has been discussing the possibility of obtaining an open license for the HIS software with AviCenna. One of the many advantages of this open license is that it would allow future expansions to eliminate the cost of software, which is a major cost of the HIS. Currently, licenses are purchased based on the number of beds in hospitals and Level 4 PHC clinics.

An open license would allow the MOH to provide software at no cost to additional MOH facilities as well as NGO and private facilities. The MOH could also develop guidelines and protocols that would introduce cost sharing of the overall system maintenance through the inclusion of the NGO and private facilities.

The cost to obtain the open license, based on recent discussions, is approximately $2 million. Table 6 (above) provides information on the cost of implementation for the

Jerusalem, Bethlehem, and Jericho districts. If the open license was purchased now, approximately $600,000 could be applied the $2 million cost. The Project does not have the additional $1.4 million in its current funding. This is something that could be considered once the Project receives FY2012 funding.

SUMMARY OF TASK I

Through the procurement of the HIS, which is considered a unique intervention, USAID has helped the MOH take a major step towards health sector reform and development. In two years, the HIS has become one of the most important systems that doctors, nurses and administrators are using on a daily basis to improve public health. Today, the MOH has a system that documents all procedures and services provided to patients, a platform that is considered a tool that helps to monitor the quality of care that patients receive, and a system that is helping to minimize the financial burden of using inefficient, older, out-of-date systems. Any further expansion to the current implementation of the HIS will only add strength and stability to the system. The following list summarizes the key points discussed in Task I:

- The total budget required for bringing all three districts online is approximately $2,705,056.73.
- The cost of procuring an open license is $2,000,000; this cost will cover all health care providers, hospitals, and clinics, whether they are governmental, private, or NGO-operated in the West Bank.
- Al Makassed Hospital is the largest NGO referral hospital in the West Bank.
- Jericho Hospital and Biet Jala Hospital will bring the MOH one step closer to being completely on the same HIS.
- Bringing Al Makassed Hospital onto the HIS will move the system closer to becoming a national system.
- The time frame for delivering all objectives (i.e., Jerusalem, Bethlehem, and Jericho) is limited.
- Jericho and Beit Jala Hospitals are relatively small compared to Al Makassed Hospital; hence, the implementation in those facilities could be achieved by March 31, 2013.
- Al Makassed Hospital will require an investment of more than $1 million for implementation; therefore, it will require a 611e document.
- 14.96% of the Palestinian population is living in the Jerusalem District. The cost of bringing Al Makassed Hospital online is approximately $1,274,826.
- 7.52% of the Palestinian population is living in the Bethlehem District. The cost of bringing Beit Jala Hospital online is approximately $882,516.
- 1.81% of the Palestinian population is living in the Jericho District. The cost of bringing the Jericho Hospital online is approximately $547,714.

Task II: Assess the Current Usage of Data Generated by HIS

GENERAL SYSTEM ANALYSIS

During a workshop held in May 2010, forty-six MOH staff and twelve Al Makassed Hospital staff convened to work on the details of the HIS data sets. Representatives from the Palestine Medical Relief Services (PMRS), Palestine Central Bureau of Statistics (PCBS), and the Italian Cooperation also participated in the workshop. Data sets are a collection of data, usually presented in tabular form. Data sets are supported by a data dictionary, which is a repository of information about the data being entered into the system, including the meaning, relationship to other data, origin, usage, and format. The data sets were developed with the vision of a unified and standardized national health system in mind, not just a system for the MOH. In addition, the data sets for the new HIS needed to meet international standards and the system needed to be set up to allow for the development of new business rules and processes. Approximately 250 data sets were reviewed during the workshop, forming the foundation for the work that would be completed over the following several weeks.

The data sets currently used and stored on the HIS are considered the most important element of the system; they are the soul of the system and shape all of the data that is entered and thus all reports generated by the system. These data sets should always be monitored and improved to reflect best health care practices and international standards. Before moving to data analysis, a closer examination of the different data sets stored on the system will be provided by presenting them in snapshot format.

Figure 4 (below) shows the Diet Types data set which is defined using two languages, English and Arabic. It is very important to set a standard data set, in a single language, that all health care facilities will be adopting at the national level.

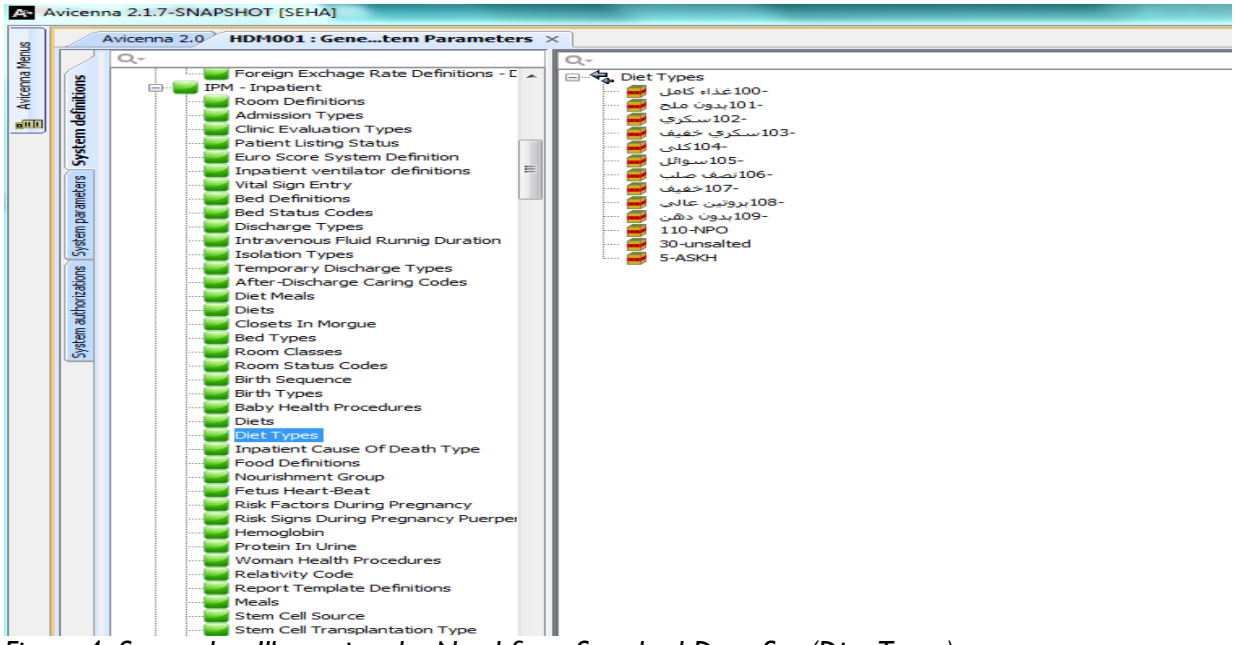


Figure 4: Screenshot Illustrating the Need for a Standard Data Set (Diet Types)

Figure 5 (below) represents the data set of all hospitals available in the West Bank. This data set is to be used when transferring a patient from one hospital to another. As we can see from the image bellow the data set for this table has many issues: first, the table has been defined using two languages, English and Arabic; second, this table does not reflect all hospitals available in the West Bank; and third, the data set should be identified using a standardized naming convention.

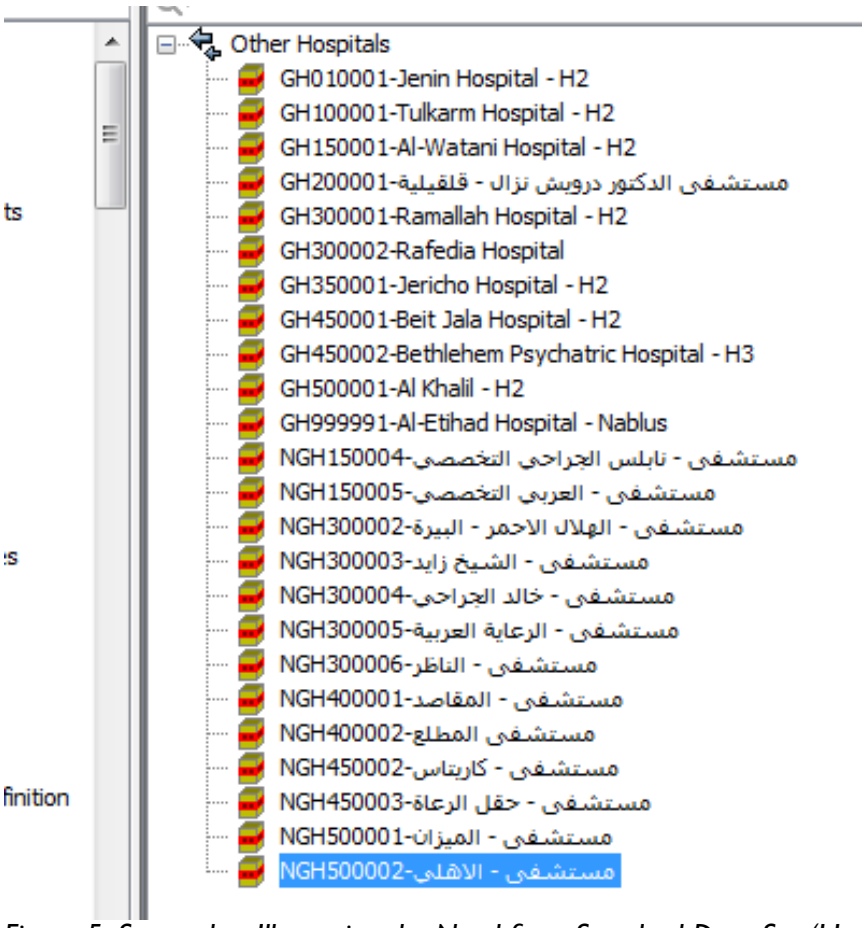


Figure 5: Screenshot Illustrating the Need for a Standard Data Set (Hospital Name)

Figure 6 (below) reflects the data set of the insurance status for patients. This table should be revised, in coordination with the insurance system, to clearly identify different options that should be available on the HIS. One of these data elements is set to be "Waiting" while another is set to be "Pending;" the question that thus needs to be raised is whether there is a substantial difference between those two options? If the answer is yes, does the hospital and clinic staff know the difference, and if not, the data set needs to be modified by keeping one option and deleting the other.

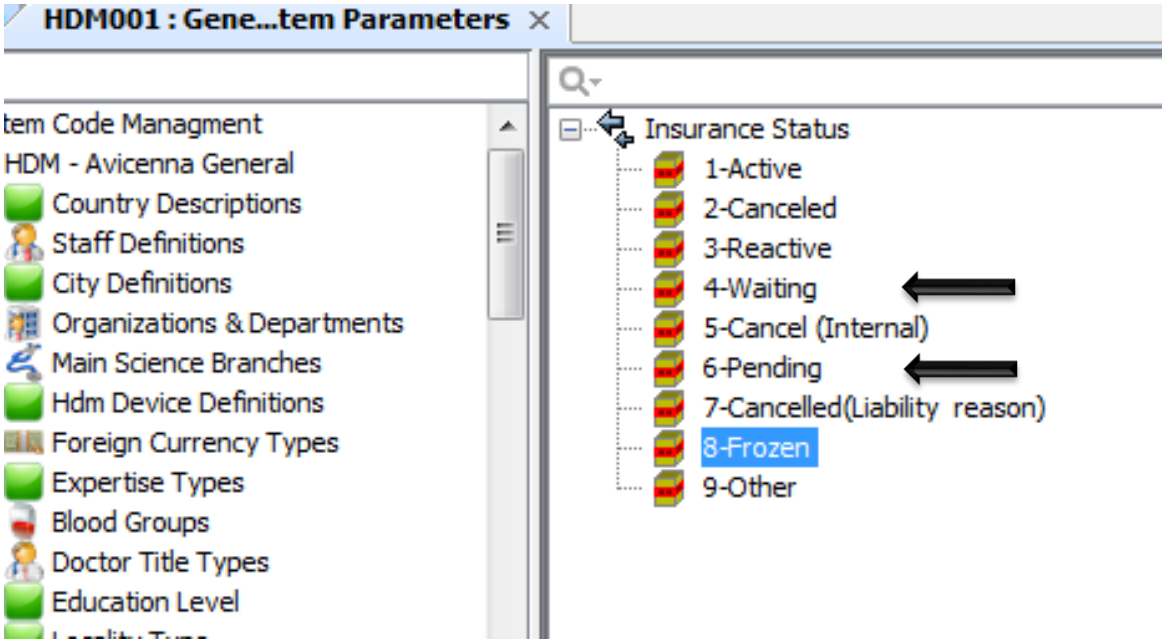


Figure 6: Screenshot Illustrating the Need to Standardize Data Sets (Insurance Status)

During data analysis, only one patient out of more than 150,000 was found who had "Cancel (Internal)" insurance status. This status should therefore be deleted, and should be done with the agreement of the insurance system. The data sets, as mentioned before, are supposed to include all valid options for any given scenario, and those options are subject to change and modification to reflect the reality on the ground and bring more meaning to the information entered.

Figure 7 (below) represents the data set for patient isolation types. As seen from the figure, there are two options for this data set, which are Infectious Diseases and Other. This data set should be redefined to represent the international standards in defining the isolation type. These types should be set to Airborne, Droplet, Contact, and/or any other that represents such a data set.

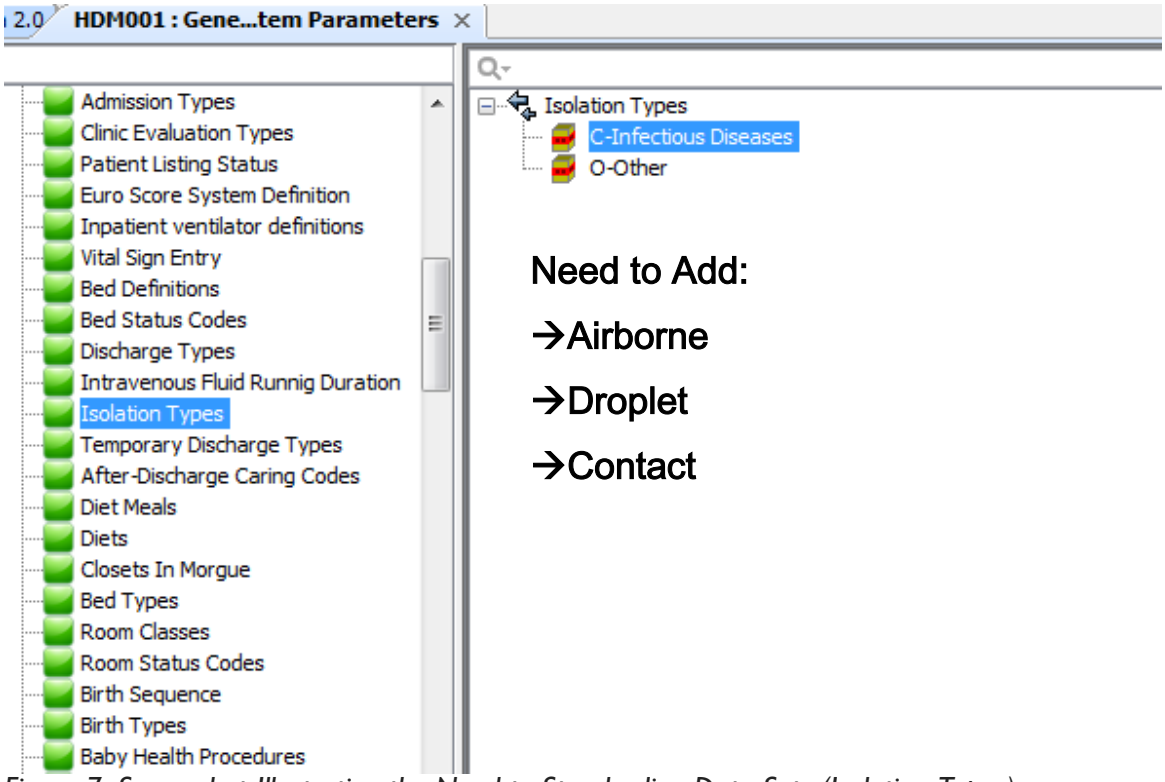


Figure 7: Screenshot Illustrating the Need to Standardize Data Sets (Isolation Types)

Table 11 (below) provides general HIS statistics. The time frame under investigation was from February 1, 2011 to May 15, 2012. The system currently has 168,962 unique medical records, 40 of them being non-Palestinians. The number of unique female medical records is 80,126 and the number of unique male medical records is 88,836.

Table 11: General HIS Statistics, February1, 2011 to May 15, 2012

General Statistics	Total
Total Unique Records (from Feb 1, 2011 to May 15, 2012)	168,962
Total with ID (Palestinians)	168,922
Total with no Document (Non-Palestinians)	40
Age less than 1	59,609
Age greater than 1 and less than 2	4,585
Age greater than 2 and less than 3	3,767
Age greater than 3 and less than 4	2,989
Age greater than 4 and less than 5	2,546
Number of Males	88,836
Number of Females	80,126
Max Number of Visits (*for patient #489554*)	186
Number of Patients with 1 visit	86,239
Number of Patients with 2 visits	33,884
Number of Patients with 3 visits	16,314
Number of Patients with 4 visits	9,348
Number of Patients with 5 visits	5,735

Number of Patients with 6 visits	3,786
Number of Patients with 7 visits	2,741
Number of Patients with 8 visits	1,980
Number of Patients with 9 visits	1,529
Number of Patients with 10 visits	1,241

Table 12 (below) includes the medical records for the top five patients who had the highest number of admissions; patient #489554 is a 31 year-old male who had 186 admissions on the system.

Table 12: Medical Records from the Top Five Number of Admissions

Patient ID	National ID	Gender	Age	Number of admissions
489554	914292131	M	31	186
629843	957822539	M	55	157
276389	429235476	M	2	127
829311	423910892	M	5	125
553987	938827011	M	84	102

Table 13 (below) shows the number of unique medical records for all hospitals and clinics on the system for the period from February 1, 2011 to May 15, 2012 in all facilities. Gender and different age groups group these numbers. This table indicates that more than 42% of all patients fall under the age group 0 to 4 years old.

Table 13: Unique HIS Medical Records by gender and age groups

Age Group	Female	Male
>75	3147	1320
70-74	1003	767
65-69	1296	1086
60-64	1459	1333
55-59	1870	1560
50-54	2305	2190
45-49	2774	2728
40-44	2824	2969
35-39	3278	3507
30-34	3899	3760
25-29	4443	4504
20-24	5298	6248
15-19	3984	7414
10-14	3813	6190
5-9	4193	5974
0-4	34540	37286

Table 14 and Graph 2 (see below) show the total admissions by facility, by month for the time period from January 1, 2011 through May 15, 2012. Table 14 also shows the noticeable

increase in the number of patients admitted that took place in April 2012, when Alia hospital was brought online.

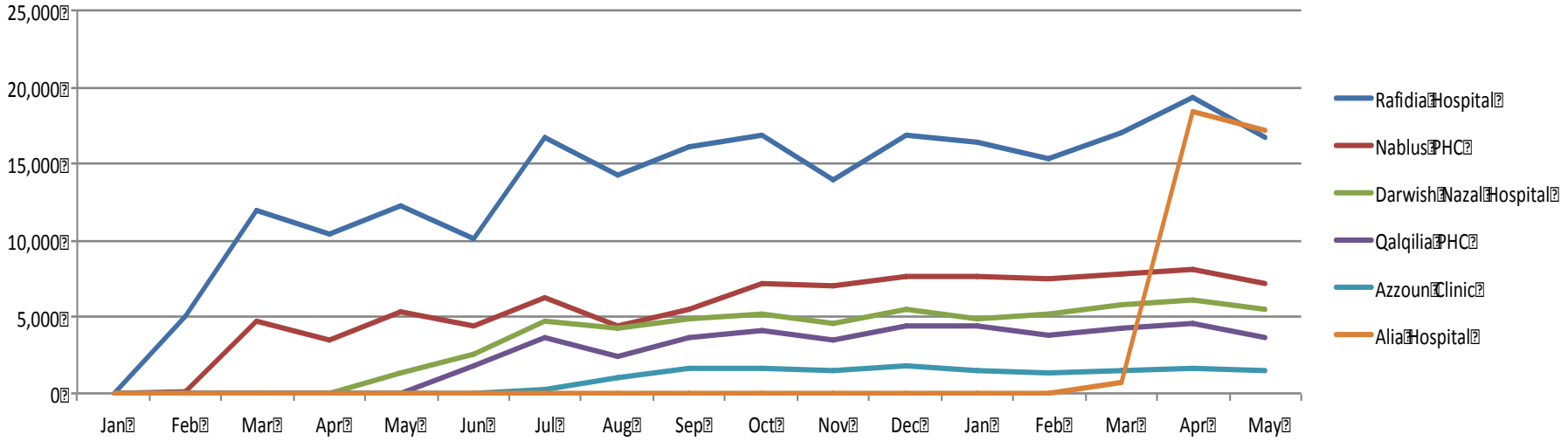
There is an obvious upward trend in the number of patients seen by each facility for the period under consideration; this indicates that the HIS is helping those facilities to increase their efficiency by addressing their daily workload activities.

There is a huge opportunity for continuing this analysis and many others. For example, the efficiency of facilities in relation to the total population of each district could be investigated. The analysis could also look at the age groups and why more than 42% of the current medical records are for patients between 0 and 4 years of age, and which district has the largest percent of admissions for the same age group relative to population and the reasons behind that.

Table 14: Total Admissions per Facility, by Month

Facility	2011 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2012 Jan	Feb	Mar	Apr	May	Total
Rafidia Hospital	0	5,083	11,863	10,474	12,300	10,016	16,634	14,280	16,010	16,838	14,008	16,876	16,421	15,323	17,080	19,330	16,776	**229,312**
Nablus PHC	0	128	4,666	3,412	5,380	4,404	6,307	4,426	5,520	7,129	6,956	7,661	7,696	7,466	7,724	8,084	7,227	**94,186**
Darwish Nazal Hospital	0	0	1	0	1,401	2,532	4,662	4,262	4,810	5,131	4,501	5,498	4,905	5,178	5,780	6,128	5,504	**60,293**
Qalqilia PHC	0	0	0	0	0	1,733	3,584	2,423	3,562	4,098	3,455	4,328	4,418	3,747	4,175	4,503	3,605	**43,631**
Azzoun Clinic	0	0	0	0	0	0	246	1,088	1,590	1,617	1,510	1,752	1,516	1,262	1,487	1,667	1,459	**15,194**
Alia Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	649	18,341	17,155	**36,145**
Total Admissions	**0**	**5,211**	**16,530**	**13,886**	**19,081**	**18,685**	**31,433**	**26,479**	**31,492**	**34,813**	**30,430**	**36,115**	**34,956**	**32,976**	**36,895**	**58,053**	**51,726**	**478,761**

Graph 2: Rate of Admissions per Facility, by Month



FACILITY SYSTEM ANALYSIS

The following pages present an analysis that was done on Rafidia Hospital that compares all departments and services for the specific time period from April 1 to April 30 for the years 2011 and 2012.

It is very important to keep in mind that data presented for the year 2011 in the following tables are considered from the pilot phase at Rafidia Hospital. It would be very important to institute a continuous monthly analysis that covers all facilities and see the trends that might be developing in the coming months and years.

Table 15 (below) indicates an increase in all department admissions between the year 2011 and 2012. It is important to note that not all departments at Rafidia Hospital joined the HIS in April 2011.

Table 15: Admission Count Comparison at Rafidia Hospital, April 2011 and April 2012

Admission Department and/or Clinic	2011	2012
Blood Bank Department	4	4
CT Department	15	15
Emergency Department	13,986	16,124
Laboratory	475	1,710
Outpatient Polyclinics	1	1
Physiotherapy Department	0	445
Radiology	539	961
Pediatrics	162	623
Neonatology Clinic	20	33
Ear, Nose, and Throat (ENT) Clinic	249	935
Orthopedic Clinic	648	3,159
Ophthalmology	305	905
Maxillofacial Clinic	90	267
Children's Cardiology Clinic	0	152
Urology Clinic	413	1,538
Staff Clinic *	0	253
Obstetrics and gynecology	250	762
Pediatric Surgery Clinic	102	357
Neurosurgery Clinic	219	917
Cardiovascular Surgery Clinic	48	174
Plastic Surgery Clinic	50	148
General Surgery Clinic	319	1,199
Laser Eye Clinic	9	27
Antenatal Care Clinic	95	475
Pediatric Department	3,967	7,692
Neonatology Department	2,359	3,259
Neurology Department	231	1,440
ENT Department	123	1,059
General Surgery - Men	947	3,772
General Surgery - Women	1,473	5,861
Burn Unit	95	1,047

Admission Department and/or Clinic	2011	2012
Intensive Care Unit	265	2,231
Ophthalmology Department	15	475
Face & Jaw Department	116	443
Newborn Unit	0	408
Women's Department	278	1,095
Maternity Ward	1,514	4,396
Orthopedic Surgery Department	506	5,459
Urology Department	743	1,162

** Staff Clinic, is a newly introduced clinic on the system. This clinic helps in providing all medical services needed by Rafidia staff instead of directing them to Rafidia Emergency department and thus increases the workload of a very busy department.*

Table 16: Inpatient Admitted Count Comparison at Rafidia Hospital, April 2011 and April 2012

Department Name	2011	2012
Day Care (Rafidia Hospital)	1	326
Pediatric Department	447	781
Neonatology Department	133	111
General Surgery - Men	224	561
General Surgery - Women	301	328
Burn Unit	23	19
Intensive Care Unit	50	116
Newborn Unit	0	33
Women's Department	612	1,057
Maternity Ward	320	544
Orthopedic Surgery Department	251	586
Urology Department	268	676

Table 17 (below) compares all discharged patients from Rafidia Hospital for the period under consideration. The table raises many questions and answers many others. For example, why did the number of patients discharged under the criteria "Other" increase drastically? Does the decrease in patients discharged under the criteria "Discharged against medical advice" indicate an increase in patient confidence in the services provided by the hospital?

As mentioned before, a continuous analysis and investigation should monitor these readings and guide the hospital's management in identifying the reason behind positive indicators to maintain progress, and the reasons behind negative indicators and work on eliminating them.

Table 17: *Number of Discharges by Type at Rafidia Hospital, April 2011 and April 2012*

Discharge Type	Died		Discharge to another MOH hospital		Discharge/ transfer to another non-MOH hospital		Discharged against medical advice		Improved		Other		Sent back to home		Total	
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Day Care	0	0	0	0	0	0	0	0	0	3	0	211	1	94	**1**	**308**
Pediatric Department	1	0	0	1	0	1	108	3	64	44	3	470	142	12	**318**	**531**
Neonatology Department	12	1	0	3	0	1	31	0	39	5	3	86	16	6	**101**	**102**
General Surgery - Men	0	0	0	2	0	2	37	2	107	20	0	248	15	32	**159**	**306**
General Surgery - Women	0	0	0	1	1	3	18	0	16	14	0	158	147	38	**182**	**214**
Burn Unit	0	0	0	0	0	0	2	0	12	3	0	15	0	1	**14**	**19**
Intensive Care Unit	6	0	1	6	0	2	4	2	18	5	0	60	19	15	**48**	**90**
Obstetrics and Gynecology	0	0	0	0	0	0	116	1	33	212	0	117	244	388	**393**	**718**
Maternity Ward	0	0	0	0	0	0	103	1	23	189	0	54	165	268	**291**	**512**
Orthopedic Surgery Department	0	0	0	1	1	2	30	1	18	10	0	225	108	47	**157**	**286**
Urology Department	2	0	0	6	0	1	37	0	101	19	9	263	11	62	**160**	**351**
Total	**21**	**1**	**1**	**20**	**2**	**12**	**486**	**10**	**431**	**537**	**15**	**1,911**	**868**	**979**	**1,824**	**3,470**

Table 18: Comparison of Total Outpatient Admissions at Rafidia Hospital, April 2011 and April 2012

Department Name	2011	2012
Consultation-E.N.T.	1	0
Physiotherapy Department	0	806
Pediatrics	49	209
Neonatology Clinic	10	29
ENT Clinic	218	532
Orthopedic Clinic	372	1,520
Ophthalmology	274	641
Maxillofacial Clinic	62	177
Children's Cardiology Clinic	0	144
Urology Clinic	175	529
Staff Clinic	0	88
Obstetrics and gynecology	197	446
Pediatric Surgery Clinic	82	271
Neurosurgery Clinic	135	511
Cardiovascular Surgery Clinic	27	136
Plastic Surgery Clinic	49	121
General Surgery Clinic	206	596
Laser Eye Clinic	6	26
Antenatal Care Clinic	29	117

Tables 19 and 20 (below) compare the emergency department at Rafidia Hospital for the period under investigation; gender and age groups group these tables.

Table 19: Emergency Department Admissions at Rafidia Hospital, April 2011

Age Group	Female	Male
> 75	65	66
70-74	31	25
65-69	54	52
60-64	36	56
55-59	58	53
50-54	81	65
45-49	91	93
40-44	102	132
35-39	96	147
30-34	111	139
25-29	101	156
20-24	126	232
15-19	127	294
10-14	165	404
5-9	227	404
0-4	556	818

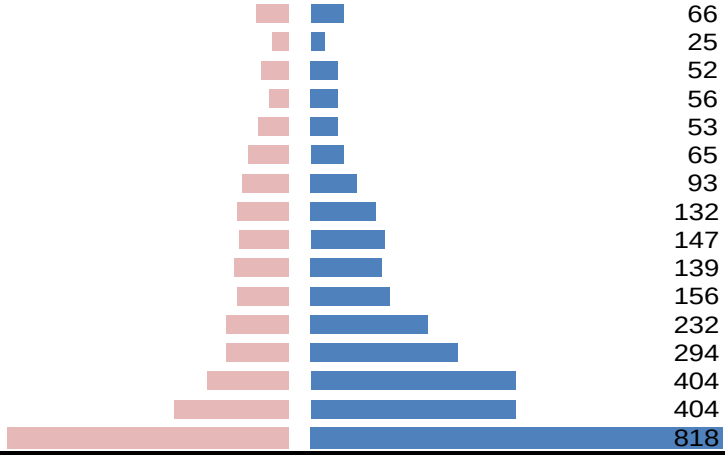


Table 20: Emergency Department Admissions at Rafidia Hospital, April 2012

Age Group	Female	Male
> 75	99	102
70-74	61	49
65-69	58	56
60-64	68	58
55-59	76	70
50-54	97	99
45-49	142	146
40-44	153	178
35-39	140	206
30-34	130	218
25-29	120	230
20-24	149	321
15-19	215	469
10-14	227	567
5-9	288	515
0-4	849	1150

The data presented in Table 21 (below) indicates that 3.4% of all female patients admitted to the emergency department in April 2011 were an emergency case, while 4.4% of all male patients admitted to the same department were an emergency case.

Table 21: Emergency Admissions by Gender at Rafidia Hospital, April 2011

Gender	Emergency Case	Non-Emergency Case
Female	67	1,968
Male	133	3,016

Graph 3: Emergency Admissions by Gender at Rafidia Hospital, April 2011

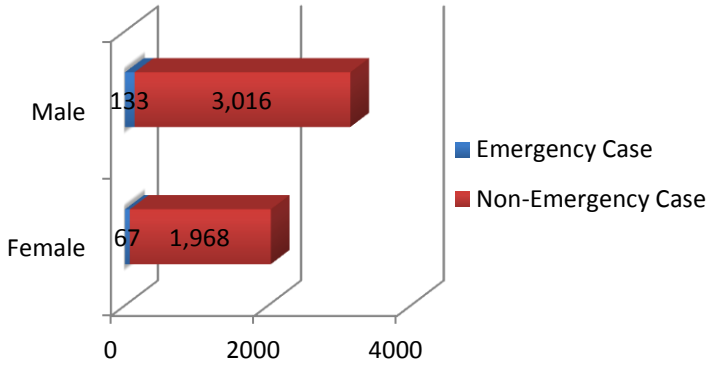


Table 22 (below) indicates that 12.67% of all female patients admitted to the emergency department in April 2012 were an emergency case, while 12.02% of all male patients admitted to the same department were an emergency case.

The emergency department at Rafidia Hospital was perceived as an easy access outpatient clinic that could provide all medical services for all patients. This comparison indicates a great improvement of patients' perception for the emergency department.

Table 22: Emergency Admissions by Gender at Rafidia Hospital, April 2012

Gender		Emergency Case	Non-Emergency Case
Female		323	2,549
Male	476	3,958	

Graph 4: Emergency Admissions by Gender at Rafidia Hospital, April 2012

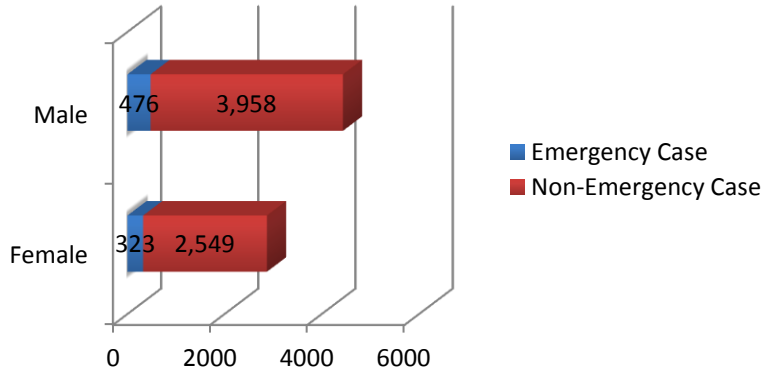


Table 23 (below) indicates the benefits of having an easy access laboratory ordering system. All departments are using the system for ordering their laboratory requests, in which the results of every order is stored in the patient profile for easy access at any time by doctors.

One reading stands out from Table 23 is that for the emergency department. The total number of patients admitted to the emergency department for April 2011 was 4,984 (Table 21 above) and 1,802 lab orders were requested for them. In April 2012 the total number of patients admitted to the same department was 6,507 (Table 22 above) – an increase of 30 percent from the previous year – and only 1,185 lab orders were requested for them – a decrease of 52 percent.

Table 23: Laboratory Count Comparison at Rafidia Hospital, April 2011 and April 2012

Ordering Department	2011	2012
Day Care	0	206
Emergency Department	1,802	1,185
Laboratory	482	1,596
Pediatrics	30	172
Neonatology Clinic	5	2
ENT Clinic	1	15
Orthopedic Clinic	9	81
Maxillofacial Clinic	3	5
Urology Clinic	76	252
Obstetrics and gynecology	16	114
Pediatric Surgery Clinic	2	20
Neurosurgery Clinic	1	16
Cardiovascular Surgery Clinic	3	12
General Surgery Clinic	15	137

Ordering Department	2011	2012
Antenatal Care Clinic	18	159
Pediatric Department	1,783	2,677
Neonatology Department	1,118	1,338
General Surgery - Men	118	870
General Surgery - Women	359	1,130
Burn Unit	50	303
Intensive Care Unit	47	1,173
Newborn Unit	0	37
Women's Department	142	704
Maternity Ward	273	707
Orthopedic Surgery Department	85	986
Urology Department	181	1,539
Grand Total	6,619	15,436

Table 24 (below) indicates the benefits of having an easy access radiology ordering system. All departments are using the system for ordering their radiology requests, in which the results of every order is stored in the patient profile for easy access at any time by doctors.

By comparing the radiology orders generated by all departments with orders generated by the emergency department, an increase of 31 percent took place within the emergency department between 2011 and 2012 for the month of April, while an increase of 135 percent took place for the same period in all other departments. This result indicates that more doctors in all departments are benefiting from the online radiology ordering system and are using it for the benefit of their patients. These numbers and percentages are reflected below (see Table 25 and Graph 5).

Table 24: Radiology Count Comparison at Rafidia Hospital, April 2011 and April 2012

Ordering Department	2011	2012
CT Department	13	0
Day Care	0	12
Emergency Department	3,615	4,745
Laboratory	0	3
Radiology	525	784
Pediatrics	8	43
Neonatology Clinic	1	1
ENT Clinic	26	69
Orthopedic Clinic	176	781
Ophthalmology	0	2
Maxillofacial Clinic	8	4
Children's Cardiology Clinic	0	1
Urology Clinic	63	262
Staff Clinic	0	1
Obstetrics and gynecology	5	25
Pediatric Surgery Clinic	10	62
Neurosurgery Clinic	40	134
Cardiovascular Surgery Clinic	3	21

Ordering Department	2011	2012
Plastic Surgery Clinic	1	0
General Surgery Clinic	36	122
Pediatric Department	170	326
Neonatology Department	162	169
General Surgery - Men	37	174
General Surgery - Women	149	210
Burn Unit	1	8
Intensive Care Unit	23	119
Newborn Unit	0	3
Women's Department	8	70
Maternity Ward	1	3
Orthopedic Surgery Department	88	284
Urology Department	156	330
Grand Total	5,325	8,768

Table 25: Comparison of Total Orders from All Departments and the Emergency Department, April 2011 and April 2012

Department	2011	2012
Emergency Department	3,615	4,745
All Other Departments	1,710	4,023

Graph 5: Comparison of Total Radiology Orders from All Departments and the Emergency Department, April 2011 and April 2012

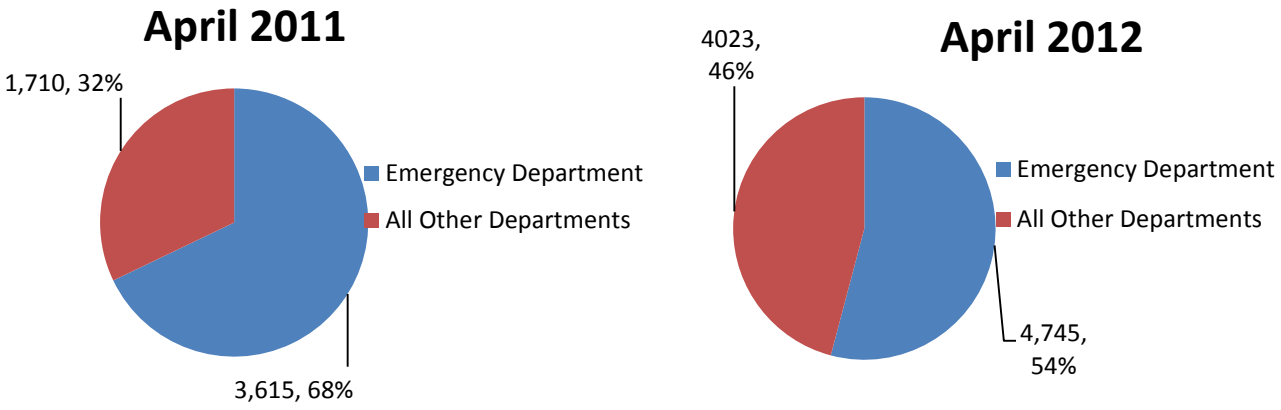


Table 30: Radiology Count Comparison at Rafidia Hospital, April 2011 and April 2012

Age Group	Apr 2011	Apr 2012
> 75	252	464
70-74	117	230
65-69	163	280
60-64	181	333
55-59	158	355
50-54	241	421
45-49	292	516
40-44	299	500
35-39	283	488
30-34	282	437
25-29	300	440
20-24	367	532
15-19	485	812
10-14	561	891
5-9	435	712
0-4	909	1357

All of the information presented above indicates that:

1) The HIS is up and running in all departments at Rafidia Hospital.
2) Doctors and nurses are benefiting from the different ordering systems available.
3) There has been a marked increase in the workflow efficiency of all departments at Rafidia Hospital.

Nevertheless, more time should be invested in monitoring the quality of data collected on the HIS and that all information collected is adding to the quality of health care provided to Palestinian citizens.

RESULTS AND RECOMMENDATIONS

- DataSel should follow a clear, identifiable, and agreed upon naming convention. In one screen they use the word "Sponsor," which means "Card Name" on another screen.
- Using abbreviations to describe a data field should not be allowed on the HIS. For example, the term "Admission Number" should always be used in all screens; "Adm. Number" should never be used.
- Data sets must be reviewed to ensure that they are complete and reflect best practices and the reality on the ground.

- A reminder is needed in that the Project's purpose is not to automate the MOH working environment, but to push for a better quality of care for all Palestinians by introducing best practices and eradicating the faults of the old system.

Task III: Identifying Reports from the HIS

The HIS adopted by the MOH is intended to create a unique Patient Medical Record (PMR) that will capture all services delivered to that patient in all facilities that have joined the system. In general, the PMR captures a given patient's demographic information, admissions, laboratory orders, radiology orders, and drug prescriptions, in addition to notes entered by his or her doctor(s) and nurse(s) and a financial record of all payments made.

There is an enormous wealth of information that needs to be reviewed and monitored on a regular basis, some on a daily basis while others are on a monthly basis. The main objectives of these reports are divided into three main categories:

1) National Level Reports;
2) Facility Level Reports; and,
3) Patient Level Reports.

NATIONAL LEVEL REPORTS

The HIS is capable of providing reports that will address many topics at the national level. Only individuals at the Ministry level should be granted access these types of reports. Examples include:

- The burden of disease on the health system in the West Bank and Gaza.
- The distribution of diseases at the national level.
- The efficiency of services delivered at the district level.
- The cost of services provided to patients at the national level.

FACILITY LEVEL REPORTS

The HIS is also capable of providing reports at the facility level. The management team of each facility should access these reports and department heads should access other reports. Examples include:

- The efficiency of services delivered at the facility level.
- The quality of care provided to the Palestinian citizens.
- The efficiency of doctors and nurses.
- Patient load in every department.
- Distribution of disease at the district level.
- Cost of services at the district level.

PATIENT LEVEL REPORTS

The PMR is the core of the system, thus enabling all health care providers to generate all reports needed for the patient. Examples include:

- All services provided to a patient.
- Medical history of a patient.
- Every note that was written for that patient.
- Financial record of all payments made.

As mentioned before, the amount of information available is astronomical, and Table 31 (below) defines every module on the HIS that is capable of generating a report. This table is organized in the following manner:

- Column one ("Module") identifies the module name on the HIS.
- Column two ("Source Data") defines the source of data that will provide the report and the ID of the screen on the system.
- Column three ("Reporting Screen") lists the reporting screen name and ID on the system.
- Column four ("Active") indicates whether a report is "Active" and is marked by one of the following two symbols:
  - ✔ Indicating that the report is ***active***
  - ⊗ Indicating that the report is ***inactive***
- Column five ("Data") indicates whether a report with generate data and is marked by one of the following two symbols:
  - ✔ Indicating that the report ***will*** generate data
  - ⊗ Indicating that the report ***will not*** generate data
- Column six ("Frequency") illustrates how often the report should be accessed and is marked by one of the following symbols:
  - ☀ Indicates that the report should be accessed on a ***daily*** basis
  - ☽ Indicates that the report should be accessed on a ***monthly*** basis
  - ❕ Indicates that the interval of accessing these reports is ***variable***
- Column seven ("Department") indicates which department should have access to this report.

During the time of this consultancy the HIS was upgraded from version 2.7 to version 2.8 – this upgrade affected many screens and reports generated by the system. Although this upgrade was long anticipated by the MOH, it created a challenge to be working on two versions of the HIS. Continuous changes and improvements will be taking place on the HIS in the coming months, which creates the need for continuous monitoring of these changes, to ensure that they comply with best standards and practices.

Table 31: HIS Modules

Module Name	Source Data		Reporting Screen		Active	Data	Freq.	Depart.
	Name	ID	Name	ID				
Patient Registration	Patient registration	PRS001	Patient detailed information	PRS005	✓	✓	☀	
			Detailed patient search pivot	PRS006	✓	✓	☀	
Patient Admission	Patient Admission	BAR001	Admission Search (Admin)	BAR012-1	✓	✓	☀	
			Admission Search (Admin) pivot	BAR016-1	✓	✓	☀	
			Un-Billed Patient Services	FIN024	✓	✓	☀	
			Payment by Invoice	FIN023	✓	✓	☀	
			Invoice Cancel/Refund	FIN022	✓	✓	☀	
			Invoice Administration	FIN026	✓	✓	☀	
			Accrual Statistics	BAR039	✓	✓	☀	
			Accrue Search pivot	FIN046	✓	⊗	☀	
Outpatient	Outpatient protocol (New)	OPM001	Outpatient Statistical report pivot	OPM005	✓	✓	☾	
			Polyclinic Admission History	OPM006	✓	✓	☾	
			Emergency Unit: Discharge Patient List	OPM019	✓	⊗		
			Polyclinic Examination Statistics	OPM018	✓	✓	☾	
			Outpatient General Report Screen	OPM004				
			Report Based On Agreement Type - Clinic	OPM0034	✓	✓		
			Report Based on Sponsor - Clinic	OPM0035	✓	✓	☾	
			Report Based on Agreement Clinic	OPM0036	✓	✓	☾	
			Report Based on Doctor	OPM0037	✓	✓	☾	
			Report Based on Discharge Type - Clinic	OPM0038	✓	✓	☾	
			Report Based on Patient Detail – Clinic	OPM0039	✓	✓	☀	
			Report Based on Appointment Type – Clinic	OPM0040	✓	✓	☀	
			General Statistics based on Discharge Type	OPM0047	✓	✓	☾	
Inpatient	Inpatient Admission	IPM001	Inpatient General Report	IMP011				

			Hospitalized Patient List by Patient	IPM0005	✓	✓	☀	
			Hospitalized Patient list by Department and Gender	IPM0036	✓	⊗	☀	
			Hospitalized Patient List in Hospitalization Detail	IPM0022	✓	✓	!	
			Hospitalized Patient List by Doctor	IPM0038	✓	✓	!	
			Hospitalized Patient List by Main Branch of Science Counts	IPM0041	✓	✓	!	
			Hospitalized Patient List by Main Branch of Science and Services	IPM0050	✓	⊗	!	
			Hospitalized Patient List by Main Branch of Science Detail	IPM0042	✓	✓	!	
			Hospitalized Patient List by Main Branch of Science and Services Detail	IPM0051	✓	⊗	!	
			Discharge Statistics by Department and Discharge Type	IPM0055	✓	✓	☾	
			Hospitalized Patient List by Department and Bed Class	IPM0054	✓	⊗	!	
			Discharged Report Written for Patient List	IPM0062	✓	✓	!	
			Bed Transfer Report	IPM0065	✓	✓	!	
			Census Report Counts	IPM0057	✓	✓	☾	
			Census Report Rates	IPM0058	✓	✓	☾	
			Bed List	IPM014	✓	✓	!	
			Last 3 Months Tests	IPM016	✓	✓	!	
			Drug List	PMS016	✓	⊗		
Inpatient Meal	Menu Definition	IPM033	Menu	IPM037	✓	⊗		
	Diet Confirmation	IPM035	Patient meals by portions	IPM038	✓	⊗		
	Order Button	IPM002	Meal Number Report	IPM043	✓	⊗		
			Inpatient Diet distribution	IMP041	✓	⊗		

Appointment	Appointment	RSS001	Quick Appointment Search	RSS002	✓	✓	!	
			Appointment Search Pivot	RSS006	✓	✓	!	
			Daily Appointment List (quota)	RSS007	✓	⊗		
			Appointment Generic Report	RSS008				
			Appointment list according to creation date	RSS0024	✓	✓	☀	
			Appointment list with appointment status	RSS0025	✓	✓	☀	
			Total appointment by doctor and status	RSS0026	✓	✓	☽	
			Accepted appointment list with receipt	RSS0027	✓	✓	☀	
			Outpatient Appointment list	RSS0028	✓	✓	☀	
			Appointment list based on operation group	RSS0030	✓	✓	☀	
			Appointment list based on doctor	RSS0031	✓	✓	☽	
			Operation appointment list	RSS0032	✓	✓	☀	
Operation Room	Operation Data Entry	ORS001	Operation Room Statistics	ORS012				
	Operation Result Entry	ORS003	Operation counts based on department and operation size	ORS0001	✓	✓	!	
			Operating room general statistics	ORS0006	✓	✓	☽	
			Operation statistics based on operation team	ORS0009	✓	✓	!	
			Operating room statistics based on anesthesia types	ORS0010	✓	✓	!	
			Operation Team Report	ORS0011	✓	✓	☀	
			Appointment Date Operation List	ORS0008	✓	✓	☀	
Laboratory	Lab Specimen Taken	LAB002	Laboratory Statistics Report	LAB007				
			All tests matching the criteria	LAB0012	✓	✓	☽	
			Test counts based on department, test, patient	LAB0013	✓	✓	☽	
			Test counts based on department, test	LAB0014	✓	✓	☽	
			Test counts based on department	LAB0015	✓	✓	☽	

			Test counts based on doctor, test, patient	LAB0016	✓	✓		
			Test counts based on doctor, test	LAB0017	✓	✓		
			Test counts based on doctor	LAB0018	✓	✓		
			Laboratory Pivot Report	LAB008	✓	✓		
			Microbiology Result Report	LAB009				
			Microbiology Test Result	LAB0019	✓	✓		
Radiology	Test result entry	RAD004	Radiology Statistic Panel	RAD006				
	Radiology Technician exam screen		Exam Counts (Summary)	RAD0015	✓	✓		
			Exam Details	RAD0016	✓	✓		
			Exam by ordered Doctor	RAD0017	✓	✓		
			Exam by ordering Doctor	RAD0018	✓	✓		
			Exam by Ordered Department	RAD0019	✓	✓		
			Exam by ordering Department	RAD0020	✓	✓		
			Exam by Sponsor	RAD0021	✓	✓		
			Exam by Patient	RAD0009				
			Radiology Request Search Report	RAD009	✓	✓		
			Radiology Technical Report	RAD008	✓	✓		
			Radiology Pivot Report	RAD007	✓	✓		
Pathology	Pathology Test Orders	RMS00-3	Pathology Generic Report Screen	PTL009				
	Pathology Test Results Entry	PTL002-1	General Activity Report	PTL0012	✓	✓		
			Test Distribution by Category	PTL0013	✓	✓		
			Test Distribution by Material	PTL0014	✓	✓		
			Test Distribution	PTL0015	✓	✓		
			Test Distribution by Ordering Department	PTL0016	✓	✓		
			Test Distribution by Ordering Doctor	PTL0017	✓	✓		
			Pathology General Statistics Pivot	PTL003	✓	✓		
Pharmacy	Drug Order	RMS001	Drug List	PMS006	✓	✗		
	Withdrawal Screen	PMS001	Drug List by Doctor	PMS008	✓	✗		

			Drug Order Status	PMS010	✓	⊗		
			Pharmacy Drug Order Status	PMS011	✓	✓		
Inventory and Stock	Item Ordering	STK011-0	Store Critical Level and expiration status	STK017	✓	✓		
	Order Items	STK012-1	Stock Status Via Expiration Date	STK015	✓	✓		
	Stock Transaction Screen	STK010	Stock Statues in Stores Pivot	STK022	✓	✓		
	Receiving Item Invoice List	FIN011	Item Transactions Report	STK020				
	Request From other Hospitals	STK011-5	Item Transaction Screen	STK016	✓	✓		
	Receiving item invoice list	FIN011	Stock Transaction Screen	STK010	✓	✓		
	Drug Order	RMS001						
	Withdrawal Screen	PMS001						
Hemodialysis	New Dialysis Operation	HDS001	Hemodialysis Monthly Report	HDS005	✓	✓		
			Hemodialysis General Statistics Report	HDS003	✓	⊗		
Laundry	Laundry Order	LND001-0	Laundry Order Report	LND002	✓	⊗		
	Laundry Order Approval	LND001-1						
Mother and Child Care	Patient Care Follow up	HIM003	Child Care and Vaccination Report pivot	HIM004	✓	✓		
Statistics	All Modules		Diagnosis Generic Report Frame	MRS004				
			Radiology Admission Count	RAD010	✓	✓		
			Form 053	IPM044	✓	✓		
			Polyclinic Numbers	OPM010	✓	✓		
			Distribution of Pathology Exams	PTH004	✓	✓		
			Distribution of Pathology Test Counts	PTH007	✓	✓		
			Cancerous Patient List		⊗	⊗		
			General Service Statistics	BAR024				
			Based on Sponsor Type	BAR0501	✓	✓		
			Based on Sponsor	BAR0502	✓	✓		
			Based on Making Department	BAR0503	✓	✓		
			Based on Ordering Department	BAR0504	✓	✓		
			Based on Doctor	BAR0505	✓	✓		
			Patient Based	BAR0506	✓	✓		

			Service Based	BAR0507	✓	✓		
			Detailed Report	BAR0508	✓	✓		
			Diagnosis Report Frame	MRS004				
			Illness Count Based on Illness Type	MRS0020	✓	✓		
			Diagnose Count Based on Diagnoses Range	MRS0021	✓	✓		
			Diagnose Count Based on Diagnose Codes	MRS0019	✓	✓		
			ICD Distribution Based on Age Intervals	MRS0024	✓	✓		
			Patient Diagnosis List	MRS0025	✓	✓		
			ICD Distribution Based on Age Interval (All ICD)	MRS0026	✓	✓		

SECTION II: ACTIVITIES CONDUCTED

The first activity that was conducted was a rapid assessment of different MOH facilities covering the Jenin, Jericho, and Bethlehem districts. Another assessment was done for the Al Makassed Hospital located in the Jerusalem District. The results of these assessments, which were discussed earlier in this report, had one main objective: to identify the next facility to adopt the HIS after the current scope.

The second activity that was conducted focused on analyzing the data collected on the system by highlighting some of the total numbers admitted to the facilities and looking at different variables on the system such as services provided to patients.

SECTION III: FINDINGS, CHALLENGES, RECOMMENDATIONS, AND NEXT STEPS

A. Findings

- The stop work order due to the FY2011 funding delay had a huge impact on the end user and their trust in the HIS.
- System is up and running in all facilities that have been trained on the HIS.
- Most of the modules are running on the system, some modules have not yet been implemented due to reasons related to the facility itself or the MOH. As an example, the sterilization department and the chart of accounts have not been implemented.
- MOH did not provide necessary IT staffing as promised to cover the first level help desk at the hospitals.
- Many complaints have been received from different facilities regarding the consumable items the HIS needs, such as printer cartridges. This represents an inefficient procurement and delivery system within the MOH that should be resolved.

B. Challenges

- Moving forward with implementation of the HIS at Al Makassed Hospital may be challenging due to the following concerns:
    - Possible strikes by medical staff due to delays in salary payments could affect implementation, as they may not be available for training.
    - Additional IT personnel will need to be hired to provide HIS support; however, due to the financial situation at the hospital, this may not be possible at this time.
    - There is a limited timeframe for implementation that must be taken into consideration.
- Moving forward with the implementation of the HIS at Beit Jala Hospital may be challenging due to its current management, who have previously been difficult to work with.
- Linking the system with the MOI. This step may be challenging to complete, but will enable MOH users after entering the patient ID on the HIS to query his or her demographic information as set on the MOI's database, which will result in reducing the human errors entered on the system.
- Solving the issues that arise with implementation within the hospitals. For example, at Alia Hospital the HIS can enforce having an Anesthesia specialist before performing any operation, but the hospital does not have that specialty. Or having two patients occupying the same bed due to the number of patients and the limitation of the number of beds available.

C. Recommendations

- As the HIS will become a national system, many activities should be planned at the national level, including: obtaining an MOU on data usage, security of financial data at the facility level, patient privacy, standardization of data sets, and cost sharing maintenance and support for the system.
- Ensure that any task initiated is completed before moving forward.

D. Next Steps

- Work with the MOH Finance Department to develop a budget for system expansion, operation, and maintenance.
- Monitor the quality of data stored on the system continuously.
- Review the data sets for compliance at the national level.
- Monitor the different upgrades to the system continuously.
- Complete required contracted approvals to expedite expansion to Al Makassed Hospital.
- Develop patient privacy protocols.
- Complete full implementation of HIS in hospitals and clinics that are currently receiving system implementation.

ANNEX A: SCOPE OF WORK

Short-Term Consultancy Agreement Scope of Work

SOW Title: HIS Consultant
Work Plan No: Technical , B.
SOW Date: 3/13/2012
SOW Status: DRAFT
Consultant Name: Yaser Harb
Job Classification: Short-Term US Expatriate Consultant
Reporting to: Abdulhamid Qusrawi, HIS Manager

I. Project Objective

The Palestinian Health Sector Reform and Development Project (the Project) is a five-year initiative funded by the U.S. Agency of International Development (USAID), and designed in close collaboration with the Palestinian Ministry of Health (MOH). The Project's main objective is to support the MOH, select non-governmental organizations, and select educational and professional institutions in strengthening their institutional capacities and performance to support a functional, democratic Palestinian health sector able to meet its priority public health needs. The project works to achieve this goal through three components: (1) supporting health sector reform and management, (2) strengthening clinical and community-based health, and (3) supporting procurement of health and humanitarian assistance commodities.

The Project supports the MOH in implementing health sector reforms needed for quality, sustainability, and equity in the health sector. By addressing key issues in governance, health finance, human resources, health service delivery, pharmaceutical management, and the HIS, the MOH will strengthen its dual role as a regulator and main health service provider. The Project also focuses on improving the health status of Palestinians in priority areas to the MOH and public, including mother and child health, chronic diseases, injury prevention, safe hygiene and water use, and breast cancer screening for women.

II. Specific Challenges to Be Addressed by this Consultancy

The Health Information System (HIS) is an integrated and automated system underpinning the MOH reform agenda for health care that will serve (from original vision) Public, NGOs, UNRWA and Private Health Care Providers and Players. The objectives behind implementing a HIS in the Palestinian Territories are:

- Integrate health care record systems
- Improve governance planning, administration and management of health systems
- Improve the efficiency of health service delivery, both personal care and public health services
- Develop a population health care Database
- Facilitate monitoring and evaluation of health trends

- Data for decision making

The HIS is designed to be inclusive of clinical standards and protocols, patient records, MOH personnel files, staff schedules, job descriptions, comprehensive financial information, cost of services, pharmaceutical stock information, equipment information and preventative maintenance schedules, and a referral system. There is a need to productively utilize the data generated from HIS for decision making and provide guidelines related to user access and privileges that would maintain process flow and privacy of patient information.

III. Objective and Result of this Consultancy

The objective of this consultancy is to assess the current role HIS is taking in management and decision making. The consultant will assess the role of management in HIS facilities and ensure data generated from HIS is being used productively. By identifying HIS reporting tools to be utilized for different management purposes of processes and staff at the health facilities. Providing such methodology would be a start for a HIS Management Plan created by the consultant. In this plan, the consultant will also include guidelines for user rights and privileges based on their role at MOH, maintaining the processes' flow and patient privacy, the consultant will develop a plan with MOH to work with different health sectors to connect to HIS.

IV. Specific Tasks of the Consultant

Under this Scope of Work, the Consultant shall perform, but not be limited to, the specific tasks specified under the following categories:

A. **Background Reading Related to Understanding the Work and Its Context**. The Consultant shall read, but is not limited to, the following materials related to fully understanding the work specified under this consultancy:
   - Implementation Plan for Y4.
   - Most recent quarterly report
   - WHO Assessment
   - WHO Legal Framework for Privacy Issues in e-health

B. **Background Interviews Related to Understanding the Work and Its Context**. The Consultant shall interview, but is not limited to, the following individuals or groups of individuals in order to fully understand the work specified under this consultancy:

   - Dr. Jihad Mashal, Deputy Chief of Party –Technical Programs
   - Abdulhamid Qusrawi, HIS Manager
   - Project HIS Team
   - Bashir Barghouthi, MOH Liaison Consultant
   - Relevant MOH counterparts

C. **Tasks Related to Accomplishing the Consultancy's Objectives**. The Consultant shall use his/her education, considerable experience and additional understanding gleaned from the tasks specified in A. and B. above to:

The consultant will work in various sites to assess the following; whereas the findings will be applied to all facilities under HIS at a later stage:

Task 1: (1st Visit)

- Assess the current usage of data generated by HIS through the reporting tool in the system, both at department level and management level.
- Identify reports from HIS for each department/managerial position and explain the purpose and benefit of the reports, to ensure these reports are utilized properly with an emphasis on the HR module.

Task 2: (1st Visit)
Develop Guidelines to give user permissions based on their role; adopt World Health Organization (WHO) legal framework for privacy issues in E-Health.

- Assess the current privileges and access rights given to users at Rafidia Hospital.
- Consult with key MOH personnel.
- Conduct a workshop for key stakeholders to present findings – to get consensus.

Task 3: (1st visit)

- Preparatory work for Task 4 and 5.
- Meeting key persons and get what is in their mind.

Task 4: (2nd visit)
Identify methods to bridge gaps in implementation of HIS between facilities and central level (administrative, HR, finance, and data).

Task 5: (2nd visit)
Plan with MOH to work with different health sectors towards HIS as national system.

V. Expected Products.

Within three days of the consultant's first day of work (unless otherwise specified), the consultant should provide the methodology for successfully completing the work (using Annex I: STTA Methodology). The substance of, findings on and recommendations with respect to the above-mentioned task shall be delivered by the Consultant in a written report, policy statement, strategy, action plan, etc. for submission to USAID (using Project-provided STTA report template provided in the Welcome Packet). A draft of this report is due no later than 3 business days prior to the consultant's departure (unless otherwise specified) and final no later than 7 business days after the consultant's departure. Please note that USAID requires that a debrief be scheduled prior to your departure. You will find a list of debrief topics in the STTA Methodology template to cover with your team leader before you meet with USAID.

The reports shall include the following:

- Assessment results of current HIS data usage in decision making.
- Draft Methodology (specialized user manual) for using HIS reporting tool at different levels, identifying specific reports and their purpose.

- Assessment results of current methodology in granting and revoking user rights and privileges.
- Methodology for granting and revoking user rights and privileges while adopting WHO legal framework for privacy issues in E-Health.
- Consensus document concerning the privileges.
- Work plan for next visit to accomplish tasks 4 and 5.
- Discrepancies in procedures/prices between facilities.
- Develop a plan for engaging NGOs and private health sector.

VI. Time Frame for the Consultancy.

The time frame for this consultancy is on or about 4/1/2012 and will conclude on or about 9/27/2012. The consultant will be working in country, however may be assigned up to four days of remote work as needed. The consultancy will be intermittent and could include multiple visits. The first visit is April 9 –May 13th. The second visit will be decided upon the completion of the first visit.

VII. LOE for the Consultancy

Total days of level of effort estimated is forty-four. For the first visit the days of level of effort are estimated to be three days for travel and **up to** 27 days for work in West Bank;

VIII. Consultant Qualifications.

The Consultant shall have the following minimum qualifications to be considered for this consultancy:

Educational Qualifications

- Degree in Computer Science, Engineering, Information System or Related field or equivalent in experience

Work Experience Qualifications

- At least 5 years of experience in the field of Information Systems
- Experience with international standards development
- Familiarity with USAID and international experience
- Fluency in written and spoken Arabic and English

IX. Other Provisions.

This Scope of Work document may be revised prior to or during the course of the assignment to reflect current project needs and strategies.

Modification on the Short-Term Consultancy Tasks

IV.C. **Tasks Related to Accomplishing the Consultancy's Objectives**. The Consultant shall use his/her education, considerable experience and additional understanding gleaned from the tasks specified in A. and B. above to:

Task 1:

- The consultant is expected to complete assessments and aid in the budgeting and planning for future HIS facilities.

Task 2:

- Assess the current usage of data generated by HIS through the reporting tool in the system, both at department level and management level.
- Identify reports from HIS for each department/managerial position and explain the purpose and benefit of the reports, to ensure these reports are utilized properly with an emphasis on the HR module.

ANNEX B: ASSIGNMENT SCHEDULE

During this short-term consultancy period, many meetings were held with different stakeholders. The purpose of these meetings had two agendas: one looked at the future of the HIS that was adopted by the Palestinian MOH and the other aligned the initial Project objectives with the data collected on the HIS.

Meetings conducted with objectives focusing of the future of the HIS:

- Meeting with Beit Jala Hospital management.
- Meeting with Jericho Hospital management.
- Meeting with Jineen Hospital management.
- Meeting with Annajah University IT department.
- Meetings with Al Makassed Hospital management.
- Meeting with the Information Technology department at Al Makassed Hospital to assess the IT infrastructure and the required recourses to bring the hospital on the system.
- Meeting with Al Makassed Hospital management to evaluate their readiness to support and maintain the system as a requirement for USAID approval.

Meetings conducted with objectives focusing of the current status of the HIS:

- Meeting with Muhamad Suboh, Administrator and Financial Manager of Hospitals at the MOH.
- Meeting with the Implementing Companies (Dimensions Health Care and DataSel) to clarify the meaning of a license and the cost of an open license that covers all public, private, and NGO hospitals.
- Meeting with Dimensions Health Care focusing on the datasets and the quality of data collected on the system.
- Meeting with Rafidia Hospital management to address the importance of the quality department in monitoring and evaluating all data collected on the system.

ANNEX C: CONSULTANT CV

Yaser T. Harb
Home: (865) 766-5923 Mobile: (865) 221-9694
yasir_harb@yahoo.com

A professional with 16 years of experience in project implementation and management and heavily involved in monitoring and ensuring compliance with contract terms and USAID regulations. As an information technology expert has extensive experience in health information systems, communication systems, and security systems. Demonstrated strength in business development, sales, and marketing. Strong record of success in leading start-ups, operational growth, and turnaround efforts. Demonstrated skills in leadership, strategic planning, team management, and communications which have contributed to successful implementation of project activities that fulfilled strategic objectives.

PROFESSIONAL EXPERIENCE

USAID Palestinian Health Sector Reform and Development Project (Flagship Project), Ramallah, West Bank (January 2009-December 2011) – implemented by Chemonics International, Washington DC.

- **Director, Health Information System** (Mar 2010-Dec 2011)

The $7.5 million Health Information System (HIS) was procured for the Palestinian Ministry of Health (MOH) as an integral part of the five-year $85 million health sector project funded by USAID. As Director of HIS, I managed the project's HIS team, all aspects of the HIS sub-contract, and coordination with all stakeholders to ensure efficient implementation and compliance with USAID regulations. It was also my role to ensure that the HIS team was coordinating with other components of the project to maximize the impact of the HIS as a cross-cutting element of the project's reform and development efforts in primary and secondary health care. I worked closely with the project management to maintain communication and coordination with the MOH, USAID, and other donors involved in this type of support to the MOH. I oversaw the work of the HIS team and the subcontractor in upgrading the technical and managerial capacities of the MOH to support the HIS, as well as the HIS training provided to end-users and the facility level.

- **Manager, Information Technology** (Jan 2009-Feb 2010)

As the Manager of Information Technology, I was responsible for aiding the MOH in assessing their current health information data collected at MOH primary and secondary health care facilities. Promoting a strategic objective that aims at upgrading the capabilities of MOH in collecting and analyzing data by advocating for a National HIS that will bring all health care providers (public, private and non governmental organizations) to share a unique Patient Medical Record which will adhere to the same health data-sets and prompt international standards and best practices. I was in charge of all steps to achieve the National HIS that started with full coordination with major health care providers to identify all needed components that will constitute the System, design a Request for Proposal that integrates all components in the National HIS, lead

the evaluation committee that completed a transparent evaluation process complying with USAID rules and regulations, identify the best solution and the teams that will deliver all elements of the system and ended with the procurement of the HIS sub-contract.

Sinokrot Industrial Supplies (Pieralisi Group authorized distributor), Ramallah, West Bank (June 2007-May 2008)

- **Technical Manager**

I was recruited by the owner and general manager to help establish the company with its main focus being on the Palestinian olive oil industry. In addition to completing the feasibility study and preparing the business plan, I managed a team of 20 technicians responsible for assessing industry needs in preventive maintenance and installation of modernized equipment. I supervised the rehabilitation and quality improvement process of 12 olive oil mills in the West Bank, including the adoption of the Hazard Analysis and Critical Control Point (HACCP) approach. I played a key role in acquiring the subcontract for this assignment from the Palestinian Agribusiness Partnership Activity (PAPA), a USAID-funded project.

EDISCO (DELL authorized distributor), Ramallah, West Bank (Apr 2002-May 2007)

- **Marketing Manager**

I managed the marketing division responsible for promoting and servicing DELL computer products throughout the West Bank and designed and developed a web-based servicing center for the company. I also lead the company's implementation of a large IT project for Jericho Hospital, funded by the Japan International Cooperation Agency (JICA).

MBC Inc., (MOTOROLA authorized distributor), Ramallah, West Bank (Aug 1995-Feb 2002)

- **Systems and Networks Manager** (Jan 1998-Feb 2002)

In this position, I led the company's efforts in the planning, design, and implementation of several large contracts including the following: 1) communications and logistics systems for the Red Crescent Nationwide Emergency Call Center project, 2) communication and surveillance systems for the Bethlehem 2000 festivities, and 3) two-way radio systems for the Palestinian National Authority. My additional responsibilities were the layout and installation of four MOTOROLA SMARTNET II trunking systems and maintenance of base station repeaters including troubleshooting, configuration, and calibration. In this position, I oversaw the company's activities in the West Bank and Gaza, managing a team of ten people.

- **Senior Engineer** (Aug 1995-Jan 1998)

As senior engineer, I planned the layout and installation of five MOTOROLA StartSite systems and six DeskTrak repeater, installed telephone systems, installed security systems, and maintained trunking systems. I managed a team of five engineers.

EDUCATION

Bachelor of Science, Electrical Engineering (BSEE), University of Kentucky (1993-1995)
Bachelor of Arts, Physics; minor in Mathematics, Northern Kentucky University (1990-1995)
(Courses completed in 1995, diploma was issued in 2001)

TRAINING SEMINARS / WORKSHOPS

MOTOROLA Worldwide Technical Education Center, Schaumburg, Illinois, USA (1999)

- Principles and Servicing of SMARTNET Trunking System
- Principles and Servicing of SMARTNET Trunking System, Site Lens, Quantar, and MBeX

National Institute for Information Technology, Ramallah, West Bank (2001)

- Microsoft® Certified Solution Developer

LANGUAGES

- English: fluent, excellent verbal and written skills
- Arabic: mother tongue, excellent verbal and written skills

REFERENCES AVAILABLE UPON REQUEST

ANNEX D: BIBLIOGRAPHY OF DOCUMENTS COLLECTED AND REVIEWED

- IMPLEMENTATION PLAN FOR Y4
- MOST RECENT QUARTERLY REPORT
- WHO ASSESSMENT
- WHO LEGAL FRAMEWORK FOR PRIVACY ISSUES IN E-HEALTH

ANNEX E: LIST AND COPY OF MATERIALS DEVELOPED AND/OR UTILIZED DURING ASSIGNMENT

- A letter to Lisa Baldwin discussing the options we have at hand in moving with the HIS forward.
- A presentation that looks at the status of the HIS and the future opportunities of moving forward.

Summary of Health Information System Activities and Discussion of Future Activities

The purpose of this memorandum is to document conversations from a meeting held on Wednesday, April 25, 2012 in the Flagship Project office. The meeting was attended by the following:

- Lisa Baldwin, USAID/WBG
- Dr. Feletcia Saleh, USAID/WBG
- Kirk Ellis, Flagship Project
- Dr. Jihad Mashal, Flagship Project
- Abed Qusrawi, Flagship Project
- Yaser Harb, Flagship Project
- Yacoub Saad, Flagship Project
- Hanna Rabah, Flagship Project

The focus of the meeting was on the status of the health information system (HIS) implementation to date and what could be accomplished in the future with available funds. The objective of this document is to summarize the HIS activities to date, and then to look at the benefits, challenges, and resources needed to move forward with HIS implementation in other locations in Jerusalem and the West Bank.

SUMMARY OF ACTIVITIES TO DATE

USAID/WBG has invested approximately $8 million to fund the procurement and implementation of the initial phase of the HIS. The HIS is operational in the Rafidia and Qalqilia Hospitals, one PHC clinic in the Nablus district, two PHC clinics in the Qalqilia district, and select Ministry of Health (MOH) administrative offices in the West Bank.

The HIS implementation was delayed due to the delay of FY2011 project funding and disagreement with the MOH on the order of implementation. The Project has received FY2011 funding and an MOU was signed by USAID and the MOH agreeing to the order of implementation. This has allowed the Project to proceed with HIS implementation at Alia Hospital in Hebron and the Ramallah Hospital Complex as well as five PHC clinics in the Hebron and Ramallah Districts. Implementation in Hebron and Ramallah should be substantially completed by the end of September 2012.

DEMOGRAPHIC INFORMATION

The following table summarizes the estimated population for the year 2007 in the West Bank as provided by the Palestinian Central Bureau of Statistics (PCBS).

Table 1: Population in the West Bank as presented by the PCBS for 2007

District	2007	Percent of Total
Jenin	256,619	10.92%
Tubas	50,261	2.14%
Tulkarm	157,988	6.72%
Qalqilia	91,217	3.88%
Salfit	59,570	2.53%
Nablus	320,830	13.65%
Ramallah & Al-Bireh	279,730	11.90%
Jerusalem	363,649	15.47%
Jericho	42,320	1.80%
Bethlehem	176,235	7.50%
Hebron	552,164	23.49%
Total / West Bank	2,350,583	100.00%

The Project will have substantially completed HIS implementation in the Nablus, Qalqilia, Hebron, and Ramallah districts by the end of September 2012. This will provide HIS coverage to 52.92% of the population in the West Bank based on 2007 PCBS population data. Based on the direction of future HIS implementation, the above table provides the percentage increase of the population that would be served by the system. For example, adding Jerusalem would increase the total population served to 68.39% (52.92 + 15.47).

COST ESTIMATES FOR HIS EXPANSION

The Project has approximately $8 million currently under subcontract for the installation of the HIS system in the Nablus, Qalqilia, Hebron, and Ramallah Districts. In addition, the project has estimated the costs to expand the system to the Jerusalem, Bethlehem, and Jericho Districts as presented in Table 2.

Table 2: Estimated Cost of HIS Expansion

	Investment	Population	Investment per Capita
Original Scope	$8,026,854	1,243,941	$6.45
Jerusalem District	$1,274,826	363,649	$3.50
Bethlehem District	$882,516	176,235	$5.00
Jericho District	$547,714	42,320	$12.94

The estimated cost to expand to the Jerusalem, Bethlehem, and Jericho districts is approximately $2.7 million. Although the Jerusalem district has the highest estimated cost, it has a lower investment cost per capita than the other three districts. In addition, the Al Makassed Hospital in Jerusalem also serves as the MOH tertiary referral hospital for the West Bank and Gaza.

Table 3: The original scope broken down to the district level.

	Investment	Population	Investment per Capita
Data Centers	$2,393,575	2,350,583	$1.02
Ramallah District	$1,468,422	279,730	$5.25
Nablus District	$1,407,278	320,830	$4.39
Qalqilia District	$876,366	91,217	$9.61
Hebron District	$1,881,211	552,164	$3.41

IMPLEMENTATION SCHEDULE ANALYSIS

Given that the end of the project is slated for September 2013, the timing of implementation is very important; a priority should be placed on completing all work by March 2013, especially if there is an issue or delay with release of FY2012 funds. Table 3 provides an implementation schedule for the Jerusalem (23 weeks), Bethlehem (16 weeks), and Jericho Districts (12 weeks). The schedule assumes that HIS will be operational in all the hospitals by the end of March 2013 if necessary but can be adjusted to reflect the actual implementation. The implementation schedule includes network installation, preparation of hospital and clinic management, installation of equipment and software, training of hospital and clinic staff, and software customization depending on the needs of each facility.

Table 4: Implementation Schedule

District/Activities	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	W27	W28	W29	W30	W31	W32	W33	W34	W35
Bethlehem District																																			
Hardware/Networking																																			
Beit Jala Hospital Implementation																																			
Bethlehem PHC																																			
Bethlehem Clinic																																			
Jericho District																																			
Hardware/Networking																																			
Jericho Hospital Implementation																																			
Jericho PHC																																			
Jericho Clinic																																			
Jerusalem District																																			
Hardware/Networking																																			
Al Makassed Implementation																																			
Al Makassed Customization																																			

Al Makassed Hospital will require the Project to obtain a 611e approval as the estimated implementation cost exceeds the $1 million threshold. It is anticipated that it will be obtained by September 1, 2012 to allow the start of implementation and provide the time required to complete implementation. Additional time will be required at Al Makassed to customize the system to interact with the Israeli MOH system requirements. These are anticipated to be minor, based on recent conversations with Al Makassed management.

HOSPITAL SUMMARIES

The three hospitals are the major components of the HIS implementation in the three districts. The following provides a summary of the advantages of installing the HIS as well as the challenges that will be faced prior to and during implementation.

Al Makassed Hospital (Jerusalem District)

Al Makassed Hospital is the primary referral hospital for the MOH and is the only tertiary hospital serving Palestinians living in the West Bank and Gaza. The facility has a 250 bed capacity and employs more than 750 staff.

The following have been identified by the Project as being advantages to having Al Makassed as part of the HIS:

- Al Makassed Hospital is the primary referral hospital for MOH.
- It would be the first NGO hospital to receive the HIS, which increases the realization of a national system.
- With the network system in place and the equipment currently available the cost share provided by Al Makassed will exceed $1 million.
- The concept of cost sharing in maintaining the system could be addressed by having Al Makassed Hospital on the system with the MOH.
- The majority of hospital staff members, including doctors, nurses, administrators, and support, are already familiar with using computers as part of their daily practices. This is something that is not common in other hospitals.
- Patient records can be easily shared with other hospitals on the HIS system allowing doctors in the West Bank access to the records of patients receiving treatment at Al Makassed when they return to their primary care doctors.
- Serves a population of 363,649 Palestinians in addition to those patients that are being referred to the hospital by the MOH from the West Bank and Gaza.
- Will assist Al Makassed in its pursuit of their Israeli MOH license.
- The cost per capita is estimated at $3.50 which is considerably less than the other districts. The cost per capita would be lower if the patients referred by the MOH were included in the calculation.

There are also challenges to Al Makassed joining the system. The challenges include the following:

- Limited time for implementation and customization of the HIS.
- Frequent strikes by medical staff due to delays in salary payment could affect implementation as they may not be available for training.
- The process will require a 611e approval due to the implementation cost exceeding $1 million. This could prevent implementation from starting on September 1, 2012 which would not allow sufficient time for the implementation to be completed before March 2013.
- Additional IT resources need to be hired to provide system support. Due to the financial situation at the hospital this may not happen.

Jericho Hospital (Jericho District)

The Jericho Hospital was established in 1998. The hospital has a 56 bed capacity and employs more than 170 staff.

The following have been identified by the Project as being advantages to having the Jericho Hospital as part of the HIS:

- A better geographical representation of MOH facilities in the West Bank.
- Short implementation time due to the size of the facility.

There are also challenges to the Jericho Hospital joining the system. The challenges include the following:

- Based on the population Jericho, the cost per capita ($12.94) of those being served by the system is high.
- Challenges with MOH in identifying IT personnel that can support the system in facilities during and following implementation.
- Challenges with MOH in committing to the MOU that was signed with USAID earlier this year which requires the MOH to provide for the cost of system connectivity.

Beit Jala Hospital (Bethlehem District)

The Beit Jala Hospital is a regional facility supporting the Bethlehem area. It has a 117 bed capacity and employs more than 296 staff.

The following have been identified by the Project as being advantages to having the Beit Jala Hospital as part of the HIS:

- The hospital hosts the only Oncology-Hematology Department in the MOH.
- A better geographical representation of MOH facilities in the West Bank.

There are also challenges to the Jericho Hospital joining the system. The challenges include the following:

- Challenges with MOH in identifying IT personnel that can support the system in facilities during and following implementation.
- Challenges with MOH in committing to the MOU that was signed with USAID earlier this year which requires MOH to provide for the cost of system connectivity.
- Hospital management has not been fully cooperative with the Project in the past and this can lead to serious problems during implementation when their support is needed.

OTHER CONSIDERATIONS

For the past two years, the Project has been discussing the possibility of obtaining an open license for the HIS software with AviCenna. One of the many advantages of the open license is that it would allow future expansions to eliminate the cost of software, which is a major

cost of the HIS. Currently licenses are purchased based on the number of beds in hospitals and Level 4 PHC clinics.

An open license would allow the MOH to provide software at no cost to additional MOH facilities as well as NGO and private facilities. The MOH could also develop guidelines and protocols that would introduce cost sharing of the overall system maintenance through the inclusion of the NGO and private facilities.

The cost to obtain the open license based on recent discussions is $2 million. Table 4 provides information on the cost of implementation for the Jerusalem, Bethlehem, and Jericho Districts. If the open license was purchased now, approximately $600k could be applied to the $2 million cost. The Project does not have the additional $1.4 million in our current funding. This is something that could be considered once the project receives FY2012 funding.

Table 5: Breakdown of Implementation Costs per District

	Jerusalem District	Jericho District	Bethlehem District
Implementation	$568,835.00	$197,954.58	$364,054.40
AviCenna	$328,992.77	$93,333.82	$161,993.18
Other Software	$5,499.00	$3,189.00	$3,959.00
Hardware	$215,130.57	$179,609.94	$237,730.37
Connectivity	$156,368.80	$73,626.80	$114,779.52
Total / District	$1,274,826.13	$547,714.13	$882,516.46

CONCLUSIONS AND RECOMMENDATIONS

Table 6 provides a summary of the information provided in this memorandum. It is followed by the Project's recommendations for HIS implementation with available funding and future funding once it is received.

Table 6: Summary of Recommendations Parameters

	Jerusalem District	Bethlehem District	Jericho District
Population (PCBS 2007)	363,649	176,235	42,320
Percent of Total West Bank Population	15.47%	7.50%	1.80%
Cost of Implementation	$1,274,826	$882,516	$547,714
Cost of the System per Capita	$3.5	$5	$12.9
Number of Hospitals	1	1	1
Number of Clinics Level 4	0	1	1
Number of Clinics Level 3	0	1	1
Number of Beds	250	117	56
Number of Staff	750	296	170
Implementation Time Frame	4 Months	3 Months	2 Months

The Project has budgeted $1.3 million for additional HIS implementation within the current funding. This would allow for HIS implementation in either the Jerusalem District or the Bethlehem and Jericho Districts. We would need to find additional funds to do the Bethlehem and Jericho Districts, but this should be manageable if the MOH can provide the connectivity of the HIS.

The Project would recommend implementation of the HIS at Al Makassed Hospital (Jerusalem District) if the 611e can be obtained by September 2012. It is felt that this facility would be the most advantageous for nationalizing the system and would bring the primary referral hospital online.

The Bethlehem and Jericho Districts should receive the HIS once the FY2012 funding is available or it is determined that the 611e for Al Makassed will not be received in time for full HIS implementation.

The project has also done a preliminary assessment of the Jenin and Tulkarm Districts. The cost of providing HIS in these two districts is estimated to be $1.6 million. Detailed cost analysis has not been completed, but should be manageable if the project receives FY2012 funding taking it to the project ceiling by the end of September 2012.

The following presentation was directed towards the status of the HIS to date and the anticipated accomplishments in the near future. The presentation summarize the HIS activities to date, and then to look at the benefits, challenges, and resources needed to move forward with HIS implementation in other locations in Jerusalem and the West Bank.

The meeting was held on Wednesday, April 25, 2012 in the Flagship Project office. The meeting was attended by the following:

- Lisa Baldwin, USAID/WBG
- Dr. Feletcia Saleh, USAID/WBG
- Kirk Ellis, Flagship Project
- Dr. Jihad Mashal, Flagship Project
- Abed Qusrawi, Flagship Project
- Yaser Harb, Flagship Project
- Yacoub Saad, Flagship Project
- Hanna Rabah, Flagship Project

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USAID Palestinian Health Sector Reform & Development Project

Health Information System (HIS)

April 25,2012

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OBJECTIVES

Implement a solution that will provide the MoH with the following:

- Integrate Healthcare Record Systems.
- Develop a population health care database.
- Improve the efficiency of health service delivery.
- Improve Governance Planning, Administration and Management of Health systems.

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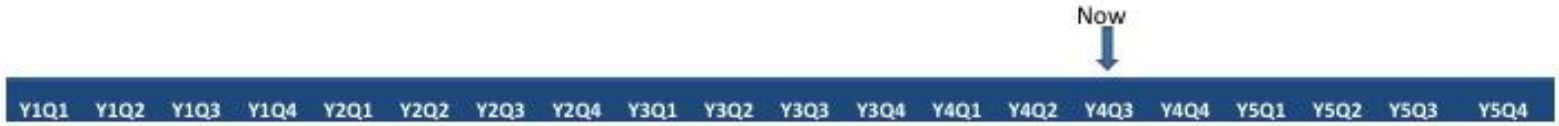
CURRENT STATUS

- TIME LINE OF CURRENT SCOPE
- COVERAGE AREA UNDER CURRENT SCOPE
- SOME INDICATORS

TIME LINE



(January 22, 2010) Subcontract signed with Joint Venture

(February 2, 2011) HIS Go-Live in Pilot site (Rafidia Hospital)

(May 8, 2011) HIS implementation in Qalqilya District

(October 1, 2011) Stop work order

(January 15, 2012) End SWO

(March 1, 2012) MEMO of Understanding signed

(March 26, 2012) Implementation in Hebron District

(April 11, 2012) Mod 8 signed for extending the HIS

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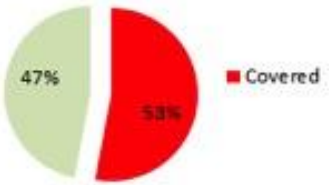
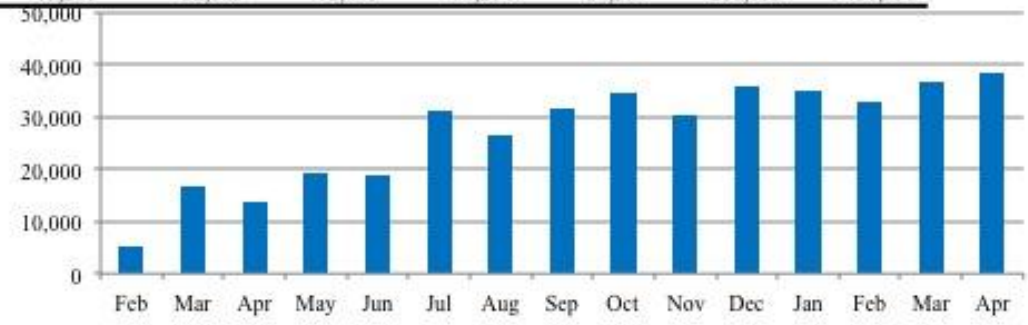
COVERAGE AREA



District	H/C	Name	
Nablus	H	Rafidia Hospital	✓
	CL4	Nablus PHC	✓
Qalqiliya	H	Dr. Darwish Nazal Hospital	✓
	CL4	Qalqiliya PHC	✓
	CL3	Azzoun Clinic	✓
Hebron	H	Alia Hospital	
	CL4	Al Karantina Clinic	
	CL4	Habron PHC	
	CL3	Tarquimia Clinic	
Ramallah	H	Palestine Medical Complex	
	CL4	Central Ramallah Clinic	
	CL3	Beit Rima Clinic	
		Hippocrates Blood Bank	

NUMBER OF ADMISSIONS PER FACILITY

Admission Year	Admission Month	Azzoun Clinic	Darwish Nazzal Hospital	Hebron Hospital	Nablus PHC	Qalqilia PHC	Rafidia Hospital	Grand Total
2011	Feb				128		5,083	5,211
	Mar				4,666		11,863	16,529
	Apr				3,412		10,474	13,886
	May		1,401		5,380		12,300	19,081
	Jun		2,532		4,404	1,733	10,016	18,685
	Jul	246	4,662		6,307	3,584	16,634	31,433
	Aug	1,088	4,262		4,426	2,423	14,280	26,479
	Sep	1,590	4,810		5,520	3,562	16,010	31,492
	Oct	1,617	5,131		7,129	4,098	16,838	34,813
	Nov	1,510	4,501		6,956	3,455	14,008	30,430
	Dec	1,752	5,498		7,661	4,328	16,876	36,115
2012	Jan	1,516	4,905		7,696	4,418	16,421	34,956
	Feb	1,262	5,178		7,466	3,747	15,323	32,976
	Mar	1,487	5,780	649	7,724	4,175	17,080	36,895
	Apr	1,133	4,023	11,828	5,399	3,064	12,907	38,354
Grand Total		13,201	52,683	12,477	84,274	38,587	206,113	407,336



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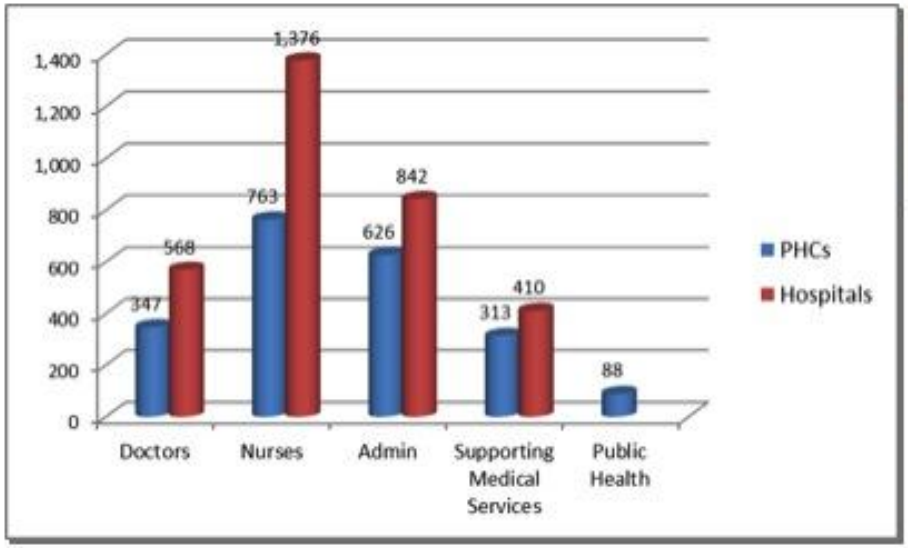
DOCTOR'S PERFORMANCE

Clinic	Doctor Name	Start Time	End Time	Number of Patients	Average	Date
عيادة الباطني (م.الخليل الحكومي)	[redacted]	7:32	13:10	60	5	Thursday 19 April 2012
المؤسسة الطبية (مديرية صحة قلقيلية)	[redacted]	8:02	11:17	18	11	Thursday 19 April 2012
عيادة السكري (مديرية صحة نابلس)	[redacted]	8:08	14:04	86	4	Thursday 19 April 2012
المؤسسة الطبية(مديرية صحة نابلس)	[redacted]	8:15	13:49	37	9	Thursday 19 April 2012
عيادة طب عام(مديرية صحة قلقيلية)	[redacted]	8:18	8:18	1	0	Thursday 19 April 2012
عيادة طب عام(مديرية صحة نابلس)	[redacted]	8:21	14:35	108	3	Thursday 19 April 2012
عيادة الصدر(مديرية صحة نابلس)	[redacted]	8:25	14:34	39	9	Thursday 19 April 2012
عيادة طب عام(مديرية صحة قلقيلية)	[redacted]	8:29	13:32	70	4	Thursday 19 April 2012
عيادة طب عام(مديرية صحة نابلس)	[redacted]	8:35	14:06	24	14	Thursday 19 April 2012
عيادة العيون (م.رفيديا)	[redacted]	8:37	13:35	40	7	Thursday 19 April 2012
عيادة الطب الوقائي(مديرية صحة نابلس)	[redacted]	8:39	12:55	9	32	Thursday 19 April 2012
عيادة المسالك البولية (م.رفيديا)	[redacted]	8:40	14:13	40	8	Thursday 19 April 2012
الامومة والطفولة(مديرية صحة قلقيلية)	[redacted]	8:41	12:17	10	23	Thursday 19 April 2012
عيادة الأنف والأذن والحنجرة (م.الخليل الحكومي)	[redacted]	8:43	14:01	44	7	Thursday 19 April 2012
عيادة الأسنان(مديرية صحة نابلس)	[redacted]	8:44	13:34	15	20	Thursday 19 April 2012
عيادة طب عام -2-(مديرية صحة نابلس)	[redacted]	8:54	14:17	39	8	Thursday 19 April 2012
عيادة الباطنية (م.درويش نزال)	[redacted]	8:56	12:36	27	8	Thursday 19 April 2012
عيادة الاسنان (مديرية صحة قلقيلية)	[redacted]	8:56	13:36	3	139	Thursday 19 April 2012
عيادة العظام (م.رفيديا)	[redacted]	8:57	14:09	59	5	Thursday 19 April 2012
عيادة الانف والاذن والحنجرة (م.رفيديا)	[redacted]	8:59	13:47	57	5	Thursday 19 April 2012
عيادة جراحة الاوعية الدموية (م.رفيديا)	[redacted]	8:59	12:33	25	8	Thursday 19 April 2012
عيادة العظام (م.الخليل الحكومي)	[redacted]	9:00	13:41	45	6	Thursday 19 April 2012
عيادة الاطفال (عيادة عزون)	[redacted]	9:03	13:09	34	7	Thursday 19 April 2012
عيادة الاطفال (م.درويش نزال)	[redacted]	9:07	12:34	23	9	Thursday 19 April 2012
عيادة طب عام(مديرية صحة قلقيلية)	[redacted]	9:11	14:16	25	12	Thursday 19 April 2012
عيادة الجراحة (م.الخليل الحكومي)	[redacted]	9:15	14:02	28	10	Thursday 19 April 2012
عيادة طب عام(مديرية صحة قلقيلية)	[redacted]	9:18	13:43	3	132	Thursday 19 April 2012
عيادة العيون (م.الخليل الحكومي)	[redacted]	9:29	11:09	35	2	Thursday 19 April 2012

DISTRIBUTION OF MOH STAFF

Staff Group	PHCs	Hospitals
Doctors	347	568
Nurses	763	1,376
Admin	626	842
Supporting Medical Services	313	410
Public Health	88	
Grand Total	2,137	3,196



List of PHCs
Bethlehem PHCs
Hebron PHCs
Jenin PHCs
Jericho PHCs
Nablus PHCs
Qalqilya PHCs
Jerusalem PHCs
Ramallah PHCs
South of Hebron PHCs
Salfeet PHCs
Thahiriyeh PHC
Tubas PHCs
Tulkarem PHCs

List of Hospitals
Bethlehem Hospital
Beit Jala Hospital
Darwish Nazzal Hospital
Alia Hospital
Jenin Hospital
Jericho Hospital
Ramallah Hospital
National Hospital
Rafidia hospital
Salfeet Hospital
Tulkarem Hospital
Yata Hospital

PROPOSED EXPANSION

COVERAGE AREA UNDER PROPOSED SCOPE

- Jenin District
- Jericho District
- Bethlehem District
- Jerusalem District
- Annajah University Hospital

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TIME LINE

ESTIMATED COST

	NGO Hospital	MOH	University
Data Center / Jerusalem	770,406		
Disaster Recovery / Jerusalem	326,742		
Al Maqassed	1,481,832		
Annajah University			449,956
Jenin Government Hospital		733,764	
Jericho Government Hospital		384,836	
Beit Jala Government Hospital		607,797	
Jenin Primary Health Care Directorate		154,788	
Jericho Primary Health Care Directorate		154,788	
Bethlahem Primary Health Care Directorate		154,788	
Jenin Level 3		60,674	
Jericho Level 3		60,674	
Bethlahem Level 3		60,674	
	2,578,980	**2,372,790**	**449,956**

PROS VERSUS CONS

Annajah University:

Pros	Cons
New Hospital	Not ready
Different Management	They are looking for a private system
A great step towards a national system	
Infrastructure is contributed from hospital	

MOH:

Pros	Cons
Additional coverage areas	Jenin Hospital Name
Brings more success to the system	Availability of resources
Relatively less cost	
short implementation period	

Al Maqassed

Pros	Cons
Bringing NGO's to the system (National)	High cost due to special needs
Brings more success to the system	Longer period of implementation
Readiness in adopting the system.	Special customization needs