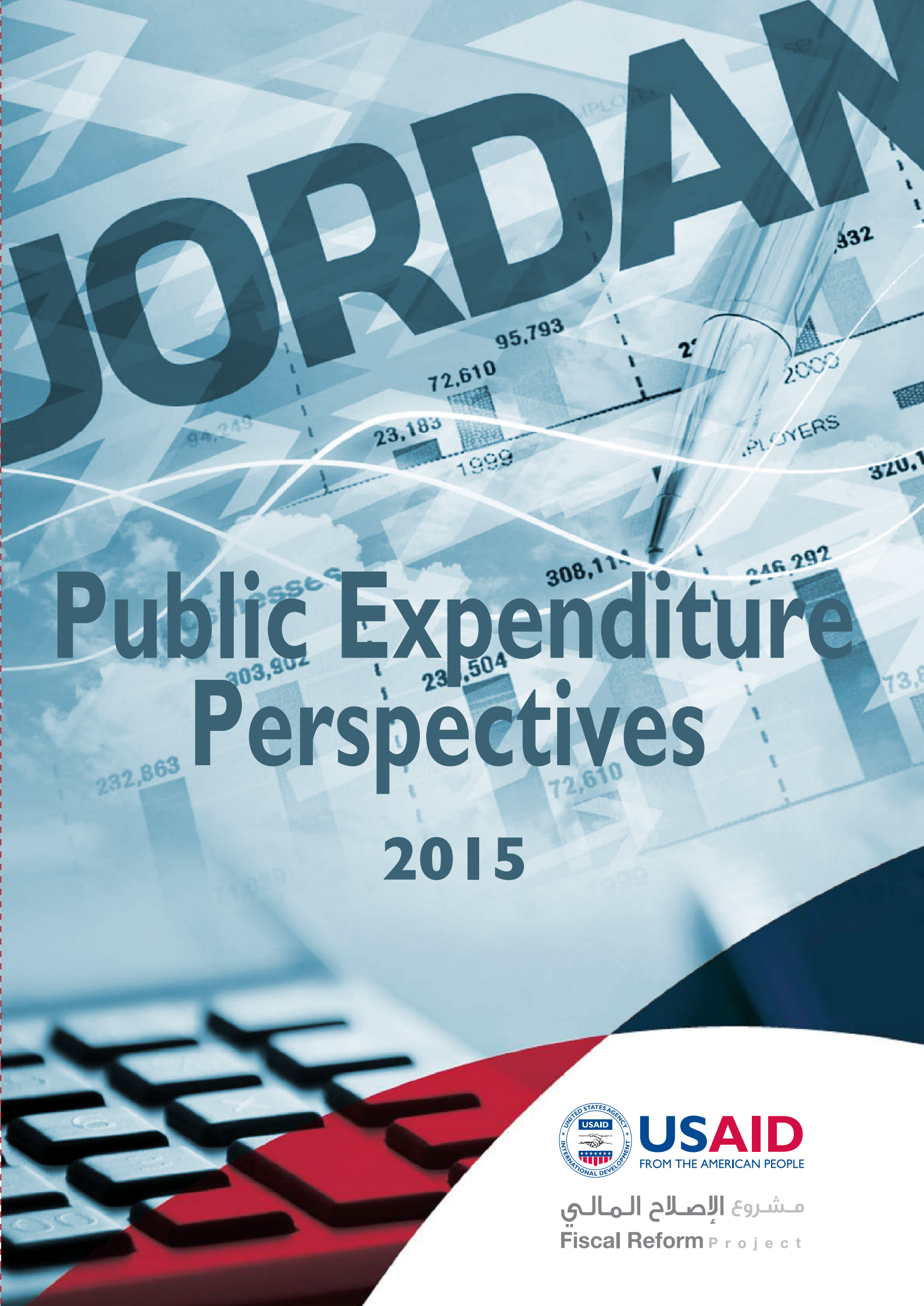


Public Expenditure Perspectives

2015

USAID
FROM THE AMERICAN PEOPLE

مشروع الإصلاح المالي
Fiscal Reform Project

Jordan
Public Expenditure Perspectives

2015

This document was produced for the United States Agency for International Development. It was prepared by DAI for the Fiscal Reform Project, contract no. AID-278-C-14-00006. The authors views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

ACKNOWLEDGMENTS

The USAID-funded Jordan Fiscal Reform Project (FRP) has prepared the 2015 Public Expenditure Perspectives Study (PEP 2015) in close collaboration with the General Budget Department. The PEP 2015 was prepared by a core research team of American experts comprising Stephen Carpenter, Dilip Limaye, David Hall, and Terence Driscoll, supported by FRP's local team including Roa'a Mismar, Dana Tantash, Lana Kawar, Tala Zalloum, Anthony Pusatory, Fadi Daoud, Saba Issa, Salem Abulghanam, and Ammar Jarrar. The research team benefitted tremendously from the assistance of FRP's counterparts in reviewing and commenting on drafts, arranging meetings, assisting with data collection, and coordinating the PEP 2015 Validation Forum.

FRP's Partners in the General Budget Department provided constant support and invaluable insights, led by Director General Dr. Mohammad Al Hazaimeh, Majdi Al Shuraiqi, Khalid Wishahi, Ayman Abu Rub, Montaser Masadeh, and Eyad Al Foqaha'a.

The Ministry of Finance also provided helpful input to the analysis, especially in the areas of macro-fiscal policy. In particular, continuous guidance was extended by MOF's Secretary General Dr. Ezz Al-Deen Kanakrieh, Hussam Abu Ali, Sami Ahjak, Asema Doghan, Salem Al Quda, and Sireen Hikmat.

The research team could not have completed its work without close collaboration with a wide range of partners and public sector organizations; including, the Ministry of Education, the Ministry of Health, the Ministry of Water and Irrigation, the Ministry of Energy and Mineral Resources, the Ministry of Planning and International Cooperation, Water Authority of Jordan, Jordan Valley Authority, the High Health Council, the National Electric Power Company, the Health Insurance Fund, UNHCR, and UNICEF.

From the Ministry of Education, the team would particularly like to thank Secretary General Dr. Mohammed Al Okour, Secretary General Sami Salayteh, Dr. Mohammad Abu Ghazleh, Atta Abu Nuseir, Dr. Omar Khasawneh, Firyal Aqel, Hisham Abu Khashabeh, Mohammed Al Manaseer, Jamal Abu Al Neel, Ra'ed Al Rawashdeh, and Mohammed Barakat.

From the Ministry of Health, the team would particularly like to thank Secretary General Dr. Daif Allah Al-Louzi, Muayyad Barmawi, Dr. Marwan Habashneh, Dr. Mohammad Tarawneh, Dr. Safaa Qsous, Dr. Tayseer Fardous, Andera Oweis, Dr. Nidal Al Athab, and Dr. Youssef Haddad.

From the Ministry of Water and Irrigation, the team would particularly like to thank Secretary General Basem Telfah, Aysha Wahbe, Hayat Nasser, Susan Kilani, Mohammad Alakhras, Thamer Masri, Ghazi Hammash, and Bahaa Baghdad.

From the Ministry of Energy and Mineral Resources, the team would like to thank in particular Secretary General Dr. Ghalib Al Ma'abreh, Khalil Al Khateeb, Hasan Al Hyari, Zyad Jebril, Kamal Al Atoot; from the Energy and Minerals Regulatory Commission Engineer Meqdad Qadous; from the National Electric Power Company Amani Al Azzam, Mohammed Abu Za'roor, and Mudar Sarah.

Special thanks also go to Alaa Batayneh, former Minister of Energy and Mineral Resources for his insights and support.

From the Jordan Valley Authority, the team would like to thank Director General Dr. Saad Abu Hammour and from the Water Authority of Jordan the team would like to thank Director Iyyad Idhayyat.

From the High Health Council, the team would like to thank in particular Secretary General Dr. Hani Kurdi, Dr. Jamal Abu Yusef, and Muein Abu Shaer.

The team would also like to thank Abd Al-Raheem Basal from the Queen Rania Center for Entrepreneurship, Walid Abd Rabuh and Ikram Khasawneh from the Ministry of Planning and International Cooperation; Ahmad Jaraba from the Health Insurance Fund; Dr. Ibrahim Abu Siam from UNHCR; as well as Esmaeil Ibrahim, Fiona Ward, and Mansoor Ali from UNICEF. Finally, the team would like to thank EDAMA's Chairman Dr. Maher Matalqa and CEO Yara Abed Al Samad.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

1. INTRODUCTION

The public finance system in Jordan has expanded well beyond the traditional responsibilities of controlling and reporting and is now equipped with functions that enable decision-makers to allocate publically available resources to achieve the most important goals of society. In Jordan, these goals have been articulated in *Jordan 2025: A National Vision and Strategy*. To achieve the objectives and targets laid out in the Strategy, the government must appropriately allocate its financial, capital, and human resources in ways that will most effectively serve the national interest.

Over the past decade, the Government of Jordan (GOJ) has implemented a number of financial management reforms to improve results-oriented budgeting and further streamline a transparent process to allocate public resources by adopting a plan to implement a nationwide government financial management information system (GFMIS). The government's efforts were rewarded through timely support coming from local and international partners who have conducted diagnostic studies and evaluations to reinforce the design and implementation of these efforts.

The USAID-sponsored Jordan Fiscal Reform Project (FRP) has been supporting GOJ's plan to improve its public finances, create a more results-oriented budget, and modernize fiscal planning. These advances have enabled and will continue to enable the Jordanian government to better control public finances and make more efficient use of resources. To further support the planning and implementation of reform, FRP has conducted an assessment of the public finances of Jordan's key economic sectors in the form of the Public Expenditure Perspectives Report 2015 (PEP 2015).

The PEP 2015 is the Fiscal Reform Project's second effort to evaluate the budgetary impact of Jordan's economic drivers from a sector-specific perspective. The Public Expenditure Perspectives 2011 was FRP's first assessment. Both efforts share the objective of conducting budget evaluation and efficiency testing to ensure that modernization efforts achieve their targets and serve the people of Jordan.

The overall intent of the report is to improve how government resources produce the services that the people of Jordan most desire and need from their government and how those services can be most effectively and efficiently delivered. The intention is that a broad and in-depth analysis of public expenditure in 2015 will identify opportunities and challenges to be overcome in the future.

Insightful analysis and realistic recommendations will improve public finances in Jordan and help GOJ to develop a clear roadmap for government finance and spending that will lead to fiscal sustainability, improved efficiency, and more effective programs that better meet the needs of the growing economy and population.

1.1 SUMMARY OF FINDINGS AND RECOMMENDATIONS

During the past decade, Jordan has been very successful in achieving many of its reform goals in education, health, and economic privatization and liberalization. GOJ continues to introduce social protection mechanisms and reform subsidies, creating the conditions for public-private partnerships in infrastructure and improving its overall fiscal and budgetary health.

Regional developments, particularly the conflict in Syria and Iraq and the associated humanitarian emergency, continue to adversely affect Jordan and its economy. The trade balance in goods and services continues to widen due to more expensive energy imports compensating for the disruption of gas supplies from Egypt.

Jordan continues to face high unemployment, a dependency on remittances from Gulf economies, and continued pressure on natural resources.

Sound budgetary planning policies and growth-enhancing reforms are needed to reduce the country's vulnerability to these challenges and build trust in public institutions. Staying the course with the fiscal consolidation program will be difficult, but is necessary to sustain strong economic performance.

There are many challenges particular to specific sectors of the Jordanian economy and associated budgetary planning policy. The following sections summarize the challenges in the sectors of water, health, electricity, and education as well as a brief summary of recommendations.

1.2 EDUCATION

Jordan continues to achieve impressive results in the education sector. Through the government's reform efforts, major strides have been accomplished, bringing Jordan closer to universal primary education. But today, Jordan faces old and new challenges with a tight fiscal position limiting its ability to make new investments in the education sector—a constraint that has been exacerbated by the Syrian refugee crisis.

GOJ, through strategy documents like the *National Education Strategy* and *Jordan 2025*, appropriately identify key areas for focus in the education sector.

Despite the government's awareness of priority areas for investment, it has not allocated sufficient funds. The government's ability to increase funding is severely constrained due to the ongoing fiscal austerity measures and the impact of the Syrian refugee crisis, as well as competing priorities for the Kingdom.

The PEP 2015 makes the following recommendations, among other initiatives:

- Gradually increasing education spending levels;
- Launching a public outreach campaign to inform policymakers and citizens about the need to prioritize education and the challenges facing it;
- Instituting a hiring freeze for teachers and promoting natural retrenchment;
- Improving student-teacher ratios;
- Increasing the allocation of government funds for education and rationalize both school use and teacher allocation across the Kingdom;
- Investigating the gap between boys and girls performance;
- Reducing the number of small schools to lower total education costs;
- Continuing to roll-out bussing and other transportation options to facilitate the shift from underutilized remote schools to right-sized regional schools;
- Developing a disposition plan or repurposing plan for schools to be shuttered in remote locations;
- Improving utilization of existing space and implementing a modern maintenance management system;
- Increasing Ministry of Education (MoE) allocations for kindergarten;
- Continuing MoE efforts to create new kindergarten classrooms and increase enrollment; and
- Introducing bussing for kindergarten and primary school students.

1.3 HEALTH

Jordan rates favorably in most major public health metrics and residents enjoy high quality, accessible healthcare for relatively low prices. Jordan consistently outperforms its neighbors and close comparator countries in worldwide statistical regression models conducted by the World Bank.

There have been notable changes in the provision of public health services over the past few years; however, a stubbornly high burden is shouldered by government as the primary financier of the health sector. Since 2008, the distribution of financing sources for health has remained essentially constant, indicating that no significant shifts in healthcare financing have taken place since the PEP 2011.

Jordan continues to provide access to quality healthcare; however, in order to address outstanding challenges, this report recommends:

- Decentralizing the budget process and management authority to the facility level, with oversight from health areas/districts;
- Collecting and using high-quality, disaggregated, and transparently available data for management decision-making;
- Setting a goal of 80% aggregate occupancy rates for Ministry of Health hospitals;
- Re-distributing existing public resources from curative care to primary care;
- Implementing innovative solutions to promote healthy lifestyles and curb growth in non-communicable disease;
- Reforming incentives to attract and retain health professionals;
- Re-integrating the Serums, Vaccines and Pharmaceuticals Program and its performance indicators into the budgets of primary and secondary care;
- Implementing new pharmaceutical prescribing procedures through training, communications, change management, and enforcement;
- Working with the Ministry of Planning and International Cooperation (MOPIC), Royal Medical Services (RMS), University Hospitals, Ministry of Finance (MOF) and the private sector to develop a comprehensive plan for financing universal health coverage.

1.4 ELECTRICITY

Jordan's electricity sector has historically provided reliable electric power to consumers at a reasonable cost with adequate reserve margins. The sector benefited from the availability of low-cost natural gas supply from Egypt that was used as the primary fuel for power generation. However, disruptions of the supply of gas from Egypt starting in 2010, has forced Jordan to rely on much more expensive fuels, which has put tremendous financial pressure on the electricity sector and severely impacted the national budget.

Jordan's economy has been growing at a healthy rate and, correspondingly, electricity demand has grown at 7% annually. The major challenge faced by the electricity sector will be the securing of reliable fuel supply sources at reasonable cost to replace the inexpensive Egyptian gas.

In order to address these challenges, this report recommends the following measure and actions:

- Developing a National Master Plan for Energy and Electricity, supported by a roadmap;
- Continuing the exploration of options for eastern Mediterranean gas supplies;
- Taking immediate steps to address and remove the barriers to the scaling up of the deployment of solar and wind power plants;
- Encouraging the Energy and Mineral Resources Regulatory Commission (EMRC) and the distribution companies to implement aggressive demand-side management (DSM) programs targeted at the lower tariff tier consumers;
- Conducting a comprehensive assessment of the existing tariff structure and its effects on cross-subsidies, potential retail flight, and resulting impacts on the sector's losses; and
- Conducting a detailed assessment, in cooperation with the distribution companies, of the level and causes of non-technical losses and measures to minimize or eliminate such losses.

1.5 WATER

The water sector has made significant improvements in the four years since the PEP 2011was released. The Water Authority of Jordan (WAJ) has developed a five-year strategic plan to address water sector issues and create a world-class water organization. Water and wastewater coverage is near-universal and water quality has also improved significantly. New wastewater treatment plants have been constructed and the reuse of treated wastewater is increasing at a rapid rate.

However, challenges remain. Water resources are under severe stress with increased water usage exceeding supplies. Nonrevenue water, a significant problem for GOJ, has been decreasing in Aqaba, but has been increasing nearly everywhere else.

Electricity costs to the water sector have risen considerably since 2011, resulting in a significant impact on the water sector since electricity represents almost two thirds of the cost of delivering water. Yet, as electricity costs have increased, no compensating tariff increases have been approved for the water sector and, as a result, operating cost recovery across the water sector has fallen.

The Syrian refugee crisis has placed huge strains on existing water and sanitation infrastructure, has necessitated an emergency program to build and operate new water and sanitation facilities, and has served to negate many positive trends in the water sector in Jordan up to 2010. This will need to be a major focus of human and financial resources for the foreseeable future.

In order to address these challenges, this report recommends:

- Addressing short- and medium-term water resource needs by focusing on the northern cities;
- Continuing long-term water resource development by expediting the Red-Dead project;
- Addressing electrical cost issues in WAJ and Jordan Valley Authority (JVA), now representing 33% of total operating costs and increasing;
- Focusing on non-revenue water reduction in Amman, the largest single source of non-revenue water in Jordan; and
- Establishing an independent regulatory agency for the water sector, with the power to establish and modify tariffs for WAJ and JVA.

EDUCATION

2.1 OVERVIEW OF EDUCATION SECTOR [1]

Jordan has achieved impressive results in the education sector over the past five decades. The literacy rate for all ages of Jordanians is 94.6 percent as compared to an estimated 33 percent literacy rate in 1960. The reported literacy rate is even higher among 15-24 year olds reaching 99.1 percent, with parity between males and females. These important leaps forward in education were made possible through several successive education reform initiatives including a reform effort in 1998 with an estimated USD 1 billion investment,[2] and a second major educational reform initiative launched in 2002.[3] Through these reform efforts, by its own assessment, the Government of Jordan has made major strides towards achieving universal primary education, which is Millennium Development Goal 2. In addition, Jordan graduates more university-level students than other country in its upper-middle income peer group.

But today, Jordan faces old and new challenges in the education sector. First and foremost, Jordan hosts an estimated 1.4 million Syrians, of which roughly 650 thousand are refugees.[4] The challenge to provide primary education for Syrian refugee children comes not simply from the basic costs for these new pupils, such as new school construction, new textbooks, and new teacher salaries, which are covered to a greater or lesser extent through support from the international donor community, but also from less quantifiable impacts such as the wear-and-tear on existing school buildings and equipment, as many schools start operating in shifts, and the increased need for psycho-social services for Syrian children. Jordan currently faces a tight fiscal position, limiting its ability to make new investments in the education sector.

GOJ, through strategy documents like *Jordan 2025*,[5] appropriately identifies key areas for focus in the education sector. These include the need to rationalize school use and student-teacher ratios across the Kingdom, because many schools are overcrowded while others, especially in remote areas, are underutilized. Furthermore, the Ministry of Education has identified the need to improve the quality of instruction through teacher training; curriculum reform; governance improvements, including decentralization of decision-making; and investments in infrastructure, IT, and other equipment. The challenges in Jordan have been thoroughly assessed by GOJ and the international donor community and responsible GOJ agencies are taking action. This chapter does not seek to duplicate existing recommendations or strategies, but rather detect and analyze patterns from a fiscal perspective. Findings herein are designed to reinforce ongoing efforts led by GOJ and international donors, not contradict them.

Despite GOJ's awareness of priority areas for investment in education, it has not allocated sufficient funds in the 2014 and 2015 budgets. Education expenditure as a percent of total public expenditure has been falling steadily since 2013. GOJ's ability to increase the education budget is severely constrained due to ongoing fiscal austerity measures and the impact of the Syrian refugee crisis, as well as competing priorities for the Kingdom.

Jordan's performance on international test scores such as the Trends in International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA) tests indicates an overall decline in the quality or effectiveness of education in Jordan relative to other countries. These trends were noticeable prior to the influx of Syrian refugees and therefore cannot be attributed to the refugee crisis, but it is clear that the crisis will exacerbate these already apparent trends. Furthermore, the international scores show that there is a startling disparity between the performance of girls and boys, with boys doing much worse. Both TIMSS and PISA are set to publish their 2015 reports this year; these reports will provide valuable information about the impact of the Syrian crisis.

Current and planned expenditure in Jordan does not appear to address these fundamental problems. The 2014 Budget Law and draft 2015 Budget Law for the Ministry of Education and other education-related government units primarily cover recurrent salary costs of teachers and administrators. Capital expenditure also includes limited appropriations for new school construction. However, current and planned expenditure rates and allocations are not enough to reverse the decline in international test scores relative to other countries, including other upper-middle-income countries in Jordan's peer group. For Jordan to be competitive globally, it must invest more in education, increasing the per student amount to approach the rates of investment of other upper-middle income countries, and continue key reforms to improve the quality of education delivered.

2.2 INTRODUCTION

This chapter builds on the previous "Building a Knowledge Society" chapter from the 2011 Public Expenditure Perspectives Report, providing updated findings and recommendations for the education sector. These updates reflect important changes in the Kingdom since 2011, including notably the increasingly growing number of material challenges that have resulted in the tightening of Jordan's fiscal position and the influx of Syrian refugees fleeing conflict in their home country.

1 Unless otherwise noted, all sector-related data are from the GOJ Budget Law reports. For Ministry of Education's spending trends, and Syrian impact analysis, the chapter uses the Ministry's sources.
2 Source: www.kinghussein.gov.jo/resources3.html
3 Source: Discussions with the MOE.
4 Source: www.JRPSC.org
5 *Jordan 2025: A National Vision and Strategy.*

Jordan has made progress against 2011 goals in a number of technical areas, in particular on the Millennium Development Goal 2 to Achieve Universal Primary Education. Further, Jordan has initiated a new 10-year strategic planning effort, *Jordan 2025*, which calls for sweeping reforms, including in the education sector, to prepare the country for the future. These reforms will require significant investments at a time when many government agencies receive a fraction of requested funding for basic salaries and maintenance costs, let alone enough to make capital investments to upgrade equipment and facilities. It will be a challenge for Jordan to fund these reforms, but these changes are necessary to enhance education and build a knowledge society, thus achieving the vision outlined in the GOJ plan.

For this report, findings are derived from multiple sources including interviews with education officials, the study of past reports, analyses of current situations and trends over time, and comparisons with other countries. The main source for data, unless otherwise noted, is the Ministry of Education and the 2014 and 2015 Budget Laws.

The next section describes basic trends in education spending in Jordan, followed by a discussion of the Syrian refugee crisis and the impact of the crisis on the education sector. The report also looks at key reform initiatives, such as *Jordan 2025*, and discusses whether GOJ is prepared for such reforms from a budget perspective. Next, direct and proxy measures of efficiency and effectiveness are presented for the education sector, including an analysis of the key performance indicators (KPIs) used in the annual Budget Law itself. This includes an analysis of Jordan's performance on the international TIMSS and PISA tests. Finally, a summary of findings and recommendations are presented.

What Has Changed Since the 2011 Working Paper?

Since the last PEP was published in 2011, one of the most notable changes has been a rapid increase in the population, reaching an estimated 7.69 million people in 2014 from 6.2 million in 2011. This represents a 24 percent increase in population from 2011. The vast majority of this growth can be explained by the influx of refugees fleeing conflict in Syria. According to the Government of Jordan, approximately 650,000 Syrian refugees have entered Jordan since the outbreak of the crisis, joining an estimated 750,000 Syrians already in country totaling 1.4 million Syrians,[10] or about 18 percent of the total population. Of those, there are 143,259 Syrian school-aged children enrolled in Jordanian public schools as of October 2015.[11]

Budget appropriations for Jordan's publicly-funded education programs totaled JOD 1.048 billion in 2014, or 11.1 percent of the total government budget. This is a modest and not statistically significant increase from 10.4 percent of the total government budget in 2011. The 2015 Budget Law again sees education taking 12.73 percent of total public expenditure.

As depicted in Figure 2.2 below, appropriations for education programs are spread among six budget entities: the Ministry of Education, Ministry of Higher Education & Scientific Research, Vocational Training Corporation, Directorate of Military Education and Culture, Ministry of Planning & International Cooperation, and the Higher Education Accreditation Commission.

	2011	2014	% Change from 2011
Government Budget (in JOD)	6.6 billion	8.1 billion	23%
Government Budget as a % of GDP	30.1%	24.05%[6]	-20%
Public Education Expenditure (in JOD)	836.5 million	1.0475 billion	25.0%
Education Spending as a % of GDP	3.8%	3.1%	-18%
Population	6.2 million	7.69 million[7]	24%
Total Students[8]	1.67 million	1.79 million[9]	7%

Figure 2.1: What has changed since the 2011 PEP Report? (Source: Ministry of Education, Department of Statistics, Budget Law (2011-2014)

6 http://data.worldbank.org/country/jordan with 2013 GDP of $33.68 billion
7 UNICEF Education for All Global Monitoring Report 2015
8 Includes all kindergarten, primary, secondary, and higher education students.
9 Ministry of Education. Numbers are aggregates of two years. 2011 figures represent those students attending school during the 2011-2012 academic year.
10 Source: http://www.unhcr.org/syriarrp6/docs/syria-rrp6-jordan-response-plan.pdf
11 Ministry of Education

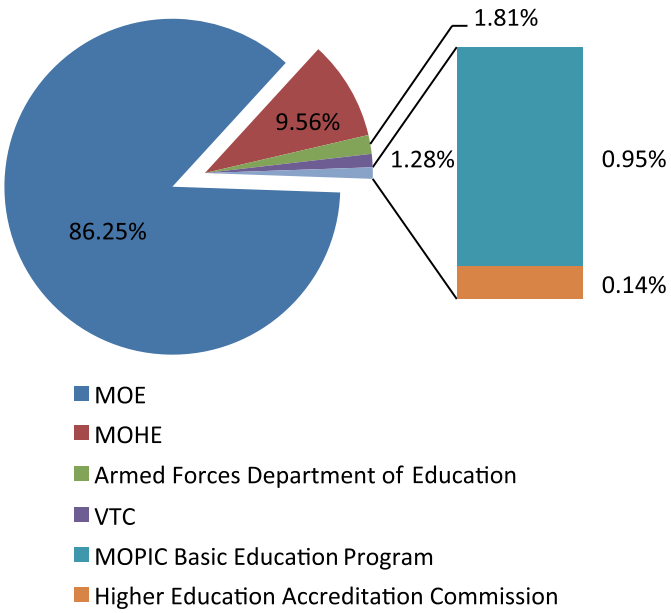


Figure 2.2: Public Expenditure in the Education Sector Divided Among Six Budget Entities (Source: 2014 Budget Law)

Following population growth trends from 2011 levels (+24 percent), public education expenditure increased 25 percent during the same time period. Education expenditure from the combined six budget entities is growing in absolute terms, with a marked jump between 2012 and 2013. Figure 2.3 below illustrates the increased expenditure over time, from JOD 837 million in 2011, to JOD 1.0475 billion in 2014 and an estimated JOD 1.082 billion in 2015.

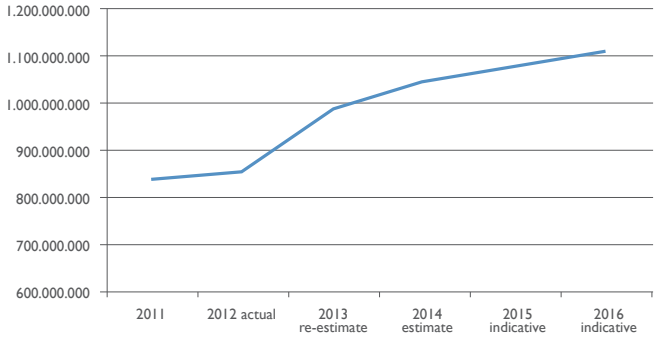


Figure 2.3: Total Public Expenditure in Education in JOD (Source: 2011 and 2014 Budget Laws

The rapid increase in spending that began in 2012 and 2013 is closely correlated to the influx of Syrian refugees. Figure 2.4 below depicts the arrivals of Syrian refugees over time and illustrates the jump in refugee numbers starting in 2012.[12]

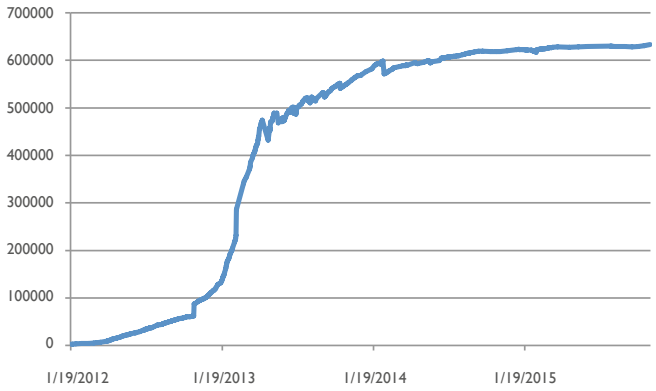


Figure 2.4: Syrian Refugees, 2012-2015 (Source: UNHCR)

While in the 2011 PEP Report, it appeared that education expenditure was growing at a slightly higher rate than total government expenditures, Figure 2.5 below shows a distinct downward trend in education expenditure as a percent of total expenditure, peaking in 2013 at 13.75 percent, but dropping to 12.9 percent in 2014 and an estimated 12.69 percent in 2015 with further declines anticipated in future years.

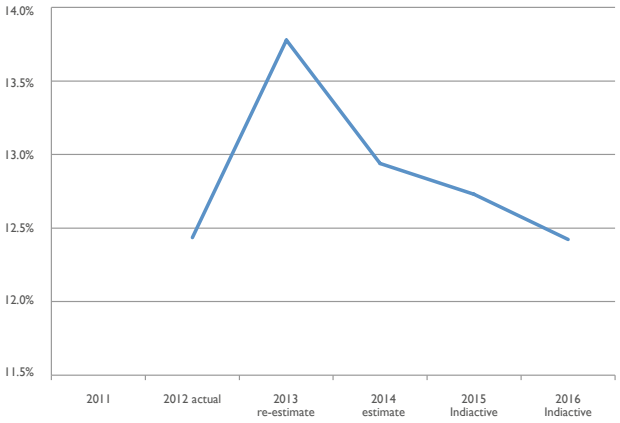


Figure 2.5: Education Expenditure as a Percent of Total Public Expenditure (Source: 2014 Budget Law)

As a comparison, global averages for education expenditures as a percent of total expenditure stand at 13.7 percent in 2012, other upper middle income countries at 14.9 percent in 2014, and other Arab states spent 16.9 percent in 1999 (the last year with comparative data available).[13]

Syria Crisis

The Syrian crisis has obvious impacts on the education sector. Over 143,000 Syrian refugee children were enrolled in Jordanian schools as of October 2015.[14]

12 Source: http://data.unhcr.org/syrianrefugees/country.php?id=107
13 UNESCO 2015 Education for All Global Monitoring Report, p.242
14 Source: Ministry of Education

According to UNICEF, there are still an estimated 90,000 Syrian children in Jordan who are not able to access formal education.[15] The international donor community, led by UNICEF, is providing support to help Syrian children attend Jordanian schools. According to the Jordan Response Plan (2015), an additional USD 256,903,446 (equivalent to JOD 182,144,543) in educational budget support is needed in 2015 from the international donor community to address the Syria crisis.[16]

As Figure 2.6 below provides a fuller breakdown of the 2015 Response Plan. It is important to note that some initiatives of the response plan, such as "Quality of learning environments enhanced" will benefit both Syrian and Jordanian students.

The Government of Jordan Plan for Inclusive and Sustainable Prosperity

The Government of Jordan's *2025 Vision* asserts that the "the available evidence suggests that Jordan's education system has begun to produce stagnant performance outcomes particularly in the public school system." The document goes on to state, "As well-documented in the National Employment Strategy…educational sector outcomes suggest a decline in the standards of quality and excellence and a steady erosion of what was once a key source of national competitive advantage." The plan analyzes international measures of educational attainment such as the TIMSS and PISA scores. But while Jordan's public school students are falling below international levels, Jordan's private school attainment levels remain high. The 2025 strategy presents seven hypotheses for the stagnation of outcomes from Jordan's public education system including low public expenditure per student, the uneven quality of basic public school infrastructure across the Kingdom, outdated curriculum and teaching methods, highly centralized administration, minimal parental and community engagement in education, underfunded teacher training, and weak capacity in some governorates exacerbated by the influx of Syrian refugee children.

To address these identified weaknesses, the plan outlines nine priority education initiatives. These are:

1. Fix basics—supplies, physical infrastructure, and essential teaching aids;
2. Reform curriculum comprehensively at all levels;
3. Improve access to secondary education;
4. Expand kindergarten and pre-kindergarten availability;
5. Train teachers;
6. Decentralize school management and accountability;
7. Strengthen involvement of parents and communities;
8. Reform *tawjihi* system; and
9. Upgrade vocational training centers and universities.

Many of these reforms are already contained in the most recent Ministry of Education strategies and are already being implemented based on availability of funds. However, ongoing fiscal constraints and competing demands on budget resources have limited the reach of these reform efforts to date.

2.3 TRENDS IN EDUCATION SPENDING IN JORDAN

This section looks at expenditure trends within the six budget entities including the Ministry of Education, and compares 2014 Budget Law spending to 2011 levels.

Initiative	Amount (JOD)
Quality of learning environments enhanced	16,293,352
Access to education sustained for vulnerable	39,881,250
Capacity of MOE increased to ensure continuous delivery of quality education in emergency situations	460,850
Capacity of education service providers increased to deliver quality, inclusive education	125,509,091

Figure 2.6: Jordan Response Plan Education Requirements for 2015 (Source: JRPSC.org)

15 Source: http://www.unicef.org/appeals/files/UNICEF_Syria_Crisis_Report_February_2015.pdf

16 While the "refugee response" focuses on direct humanitarian aid to Syrian refugees, the aim of resilience-oriented programming is to ensure that shocks and stresses do not lead to long-term deterioration in the wellbeing of a particular individual, household, system or institution, whether Syrian or Jordanian.

The broad trends in education spending across the six budget entities are presented below:

	2011 Budget Law (JD million)	2014 Budget Law (JD million)	% of Education Budget	% change from 2011
1 Ministry of Education	720.101	903.5	86%	25%
Administration and Support Services	49.1	58.8	6%	20%
Kindergarten Education	9.8	6.64	1%	-32%
Basic Education	535	702.4	67%	31%
Secondary Education	93	101.9	10%	10%
Special Education	3.6	4.2	0%	17%
Illiteracy and Elderly Education	0.601	0.618	0%	3%
Social, Sport, Educational Activities	6	3	0%	-50%
Vocational Education	23	25.9	2%	13%
2 Directorate of Military Education and Culture	18.6	19	2%	2%
Directorate of Military Education and Culture	18.6	19	2%	2%
3 Vocational Training Corporation	11.7	13.37	1%	14%
Administration & Support Services	2.1	2.47	0%	18%
Training and Qualification	9.6	10.9	1%	14%
4 Ministry of Higher Education	74.8	100.2	10%	34%
Administration & Support Services	4.1	3.6	0%	-12%
Public Colleges, Universities	70.7	96.6	9%	37%
5 Ministry of Planning and International Cooperation	10.608	10.000	1%	-6%
Basic Education	10.5	10	1%	-5%
Public Colleges, Universities	0.108	0	0%	-100%
6 Higher Education Accreditation Commission	1.3	1.5	0%	15%
Total Education Spending	837.109	1,047.528	100%	25%

Figure 2.7: Trends in Education Spending across the Six Budget Entities. Source: Budget Law 2011-2014

Ministry of Education

With a 2014 planned budget of JOD 903.5 million, the Ministry of Education continues to consume the largest share of funds dedicated to the education system (86 percent). This is consistent with 2011 levels when MOE expenditure was JOD 719 million representing 86 percent of total education spending. In its 2015 budget request, the Ministry of Education asked for JOD 880.5 million for current expenditure covering primarily salaries and JOD 57.3 million for capital expenditure for a total of JOD 937,845,000. The indicative total amount for 2016 is JOD 956.6 million, representing precisely an anticipated 2 percent increase in costs.

However, the Ministry of Education notes that an additional JOD 55 million for current expenditures and

JOD 162 million for capital expenditures is needed above and beyond the indicative levels to carry out identified reforms including the following: updating curricula and textbooks, adding classrooms and building schools, training teachers, increasing the number of kindergartens, furnishing and equipping schools, upgrading technology infrastructure, addressing financial needs of the influx of Syrian students, and abandoning the two-shift school system. MOE notes that implementation of those projects and activities has been postponed until later years and will depend upon the allocations that will be set for them in the general budget laws. However, if no additional funds are granted, MOE will not be able to undertake these special projects.

Ministry of Education Spending Trends by Programs

The following presents patterns in Ministry of Education spending by program based on actual numbers since 2011, and discusses relevant key performance indicators.

Administration and Support. About 6.3 percent of Ministry of Education spending is channeled toward improving the ministry's administrative capacity and enhancing the efficiency of project management. In terms of key performance indicators, the ministry aims to increase the percentage of qualified and efficient educational leaders, based on a self-evaluation, from the 2013 value of 50 percent to 55 percent in 2014 and 57 percent in 2015.

Kindergarten Education. Representing less than 1 percent of the MOE budget, the kindergarten program objective is to increase overall enrollment in kindergarten, especially in the rural and poor areas that are less developed and have higher concentrations of needy children. In 2014, there were 21,533 students enrolled in public kindergarten leading to the average annual program cost for a public kindergarten student of JOD 308.36. KPIs include increasing the number of equipped kindergarten rooms from 1,080 based on a 2013 self-assessment to 1,150 rooms in 2014 and 1,220 rooms in 2015. The ministry also aims to increase the percentage of pre-school education enrollment in rural and poor areas from 2013 estimates of 45 percent to 47 percent in 2015. It also seeks to increase the number of students in school nutrition programs, from 39 percent in 2013 to 40 percent by 2015.

Basic Education. The ministry's largest program consumes 78 percent of its annual budget. It provides education for grades one through ten and its objective is to expand overall opportunities in basic education and eliminate inequities in educational opportunities. The ministry's key performance indicators for 2014 include holding the basic education dropout rate no

		End of year balances in JOD million			
		2011	2012	2013	2014
Administration and Support	Current Expenditure	41,197,933	52,207,145	54,241,957	55,644,155
	Capital Expenditure	3,070,156	1,457,910	827,901	858,400
	Total of Program	44,268,089	53,665,055	55,069,858	56,502,555
	Program Percentage of Total MOE Budget	6.4%	7.1%	6.5%	6.3%

Figure 2.8: Administration and Support (Source: Budget Laws 2011 and 2014)

		End of year balances in JOD million			
		2011	2012	2013	2014
Kindergarten Education	Current Expenditure	1,957,147	2,170,127	2,589,502	2,394,966
	Public Expenditure	3,711,489	1,207,852	2,103,956	3,686,000
	Total of Program	5,668,636	3,377,979	4,693,458	6,080,966
	Program Percentage of Total MOE Budget	.8%	.4%	.6%	.7%

Figure 2.9: Kindergarten Education (Source: Budget Laws 2011 and 2014)

		End of year balances in JOD million			
		2011	2012	2013	2014
Basic Education	Current Expenditure	498,349,831	572,139,577	630,308,989	652,213,517
	Public Expenditure	27,454,629	18,254,260	26,717,268	44,228,850
	Total of Program	525,804,460	590,393,837	657,026,257	696,442,367
	Program Percentage of the Total MOE Budget	76.3%	77.8%	78%	78.1%

Figure 2.10: Basic Education (Source: Budget Laws 2011 and 2014)

		End of year balances in JOD million			
		2011	2012	2013	2014
Secondary Education	Current Expenditure	66,186,644	70,531,740	88,972,338	90,183,956
	Public Expenditure	19,368,438	13,535,347	6,477,534	13,609,950
	Total of Program	85,555,082	84,067,087	95,449,872	103,793,906
	Program Percentage of the Total MOE Budget	12.4%	11.1%	11.3%	11.6%

Figure 2.11: Secondary Education (Source: Budget Laws 2011 and 2014)

higher than 0.6 percent through 2016. The 2014 Budget Law also sets a performance indicator of 7 percent of students attending a two-shift school. It also seeks to increase the number of students in school nutrition programs (from 169,000 in 2013 to 220,000 in 2015) and decrease the proportion of students in temporary buildings (from 10 percent in 2013 to 9.6 percent in 2015).

Secondary Education. Secondary education in Jordan covers students in grades 11 and 12 and consumes about 11 percent of the ministry's budget. Its objective is to expand enrollment opportunities in secondary education in order for students to expand their life and professional choices and to effectively participate in social changes and development.

The ministry's program performance indicator in the Budget Law is to maintain a 60 percent pass rate on the government's general secondary exam (the *tawjihi*). However, due to recent reforms in the administration of the *tawjihi*, actual pass rates fell to 40 percent, with dramatic drops in some geographic regions in the country. Other KPIs include a slight percentage increase in the total admission for secondary education from the 2009 baseline of 76.6 percent to 79.4 percent [17] in 2014, reaching 79.8 percent in 2016. There were an estimated 164,677 students enrolled in academic secondary education in 2014. The annual program cost per academic secondary student in 2014 was JOD 619, up from JOD 365 in 2011. The ministry also hopes to maintain the proportion of students using temporary, leased facilities at 0.23 percent.

Vocational Education. This program is responsible for preparing secondary students to pursue vocational education and training relevant to the requirements of the Jordanian labor market. It represents 2.6 percent of the ministry's budget for 2014 and 20 percent of the combined secondary and vocational education budgets. The ministry's program KPIs are to increase the percentage of students joining vocational education based on their own desires, as opposed to having to resort to vocational education because of poor performance in the academic disciplines. The goal is to increase the percentage from the 2008 baseline value of 25 percent and the MOE self-evaluated amount of 55 percent in 2013 to reach 60 percent in 2014 and 65 percent in 2015. In addition, the Ministry has set a goal to increase the number of vocational workshops equipped with modern fittings from 183 in 2013 to 200 in 2014 and 220 in 2015.

There were 28,248 students enrolled in vocational secondary education representing approximately 15 percent of the total secondary student body.

17 Interviews with MOE

		End of year balances in JOD million			
		2011	2012	2013	2014
Vocational Education	Current Expenditure	19,063,729	21,614,646	23,207,759	22,725,918
	Public Expenditure	1,375,122	440,971	948,581	533,300
	Total of Program	20,438,851	22,055,617	24,156,340	23,259,218
	Program Percentage of the Total MOE Budget	3.0%	2.9%	2.9%	2.6%

Figure 2.12: Vocational Education (Source: Budget Laws 2011 and 2014)

		End of year balances in JOD million			
		2011	2012	2013	2014
Social, Sport and Educational Activities	Current Expenditure	1,430,679	1,009,204	1,044,792	735,847
	Public Expenditure	2,439,096	904,353	1,037,327	1,211,300
	Total of Program	3,869,775	1,913,557	2,082,119	1,947,147
	Program Percentage of the Total MOE Budget	.6%	.3%	.2%	.2%

Figure 2.13: Social, Sport, and Educational Activities (Source: Budget Laws 2011 and 2014)

Social, Sport and Educational Activities. This program is aimed at enhancing participation of students in programs and activities that strengthen their national affiliations. These efforts claim about 0.2 percent of the ministerial total budget.

The ministry's KPIs for 2014 include maintaining the number of athletic festivals at one per year, maintaining the number of scout camps at 8, gradually increasing the number of teachers' clubs from 10 in 2013 to 11 in 2014 and 12 by 2015, and gradually increasing the percentage of students participating in the King Abdullah II Award for Physical Fitness ages 9-17 from 81 percent in 2013 to 82 percent in 2014 and 83 percent in 2015.

Special Education. Representing 0.4 percent of ministry spending, Special Education increases opportunities available for students with learning disabilities and for gifted students.

The ministry's program KPIs for 2014 are to maintain and then gradually increase the number of excellence schools from 10 to 12 by 2015, and to increase the number of special education resource rooms from 856 based on a 2013 self-evaluation to 885 in 2014 and 915 in 2015.

Illiteracy and Elderly Education. This small program represents less than 0.1 percent of the MOE budget. Its objective is to develop programs, curricula, and human resources to eliminate illiteracy. Jordan's adult literacy rate improved significantly over the past 10 years to reach 98 percent (97 percent for females) today, up from 90 percent (85 percent for females) for the period 1995-2004.[18] This is well above the average among Arab states of 78 percent and the average among upper-middle income countries of 94 percent.

The ministry's KPIs for this program include reducing the number of literacy centers from 508 in 2013 to 490 by 2015, while maintaining the numbers of enrollees in literacy centers at 6,000, and maintaining the number of enrollees in the dropout culture enhancement program.

Directorate of Military Education and Culture

Educational and Social Services. The Directorate of Military Education and Culture's 2014 budget is JOD 19 million, a 2 percent increase from 2011 levels, representing 1.8 percent of total education spending in Jordan. It provides educational and social services for the children of active and retired military personnel and children in secluded and poor areas like the *badia* regions. It is also responsible for six community colleges and plays a role in enhancing the cultural and educational levels of the Jordanian Armed Forces.

18 UNESCO Education for All Global Monitoring Report 2015

		End of year balances in JOD million			
		2011	2012	2013	2014
Special Education	Current Expenditure	2,137,888	2,481,583	2,996,117	2,774,770
	Public Expenditure	610,607	409,253	486,471	617,500
	Total of Program	2,748,495	2,890,836	3,482,588	3,392,270
	Program Percentage of the Total MOE Budget	.4%	.4%	.4%	.4%

Figure 2.14: Special Education (Source: Budget Laws 2011 and 2014)

		End of year balances in JOD million			
		2011	2012	2013	2014
Eradication of Illiteracy and Elderly Education	Current Expenditure	559,215	559,353	528,762	602,371
	Public Expenditure	12,612	-	-	-
	Total of Program	571,827	559,353	528,762	602,371
	Program Percentage of the Total MOE Budget	.1%	.1%	.1%	.1%

Figure 2.15: Eradication of Illiteracy and Elderly Education (Source: Budget Laws 2011 and 2014)

Vocational Training Corporation

The Vocational Training Corporation (VTC) had a 2014 budget of JOD 13.37 million, representing about 1.3 percent of the total education budget. The VTC's goal is to produce a professional labor force through training, certification, and rehabilitation. Its activities are organized under two programs: Administration and Support (18.47 percent of the VTC budget) and Training and Qualification (81.53 percent of the VTC budget). Administration and Support aims to reinforce the management of programs and training, as well as support the computerization of all work procedures in the corporation. The Training and Qualification program aims to enhance enrollment in vocational training programs and its Vocational Training Centers.

In terms of KPIs, the VTC seeks to increase the number of trainees joining VTC programs from 11,000 in 2013 to 11,400 in 2014. In addition, the VTC wishes to increase the percentage of employees in vocational fields who are graduates of vocational training programs from 61 percent in 2013 to 62 percent in 2014 and 63 percent in 2015.

Ministry of Higher Education and Scientific Research

The Ministry of Higher Education requested a total of JOD 241 million for 2015, representing a 140 percent increase in the 2014 re-estimated amount of just under JOD 100 million. This is split between JOD 152 million for current expenditure and JOD 88.7 million for capital expenditure. This major increase in the budget is reflected in new requests for both current and capital expenditures. The ministry requests additional funds to cover new employees, new allowances, and bonuses. Other increases will cover expected jumps in rent. Capital expenditures include upgrades to computers and printers, purchasing land, building maintenance, new construction, and a major expansion of the Disadvantaged Student Fund.

Administration and Support. This program represents 3.6 percent of the ministry's budget. Its objective is to enhance administrative capabilities in all administrative units of the ministry and to reinforce the management of programs and projects. The amount budgeted for administration has been falling in recent years and has dropped 12 percent from 2011 levels.

Public Colleges and Universities. This program represents 96.4 percent of the ministry budget and includes all government budget support for public institutions of higher education. It provides for academic environment and research capacities. It also helps to ensure the academic institutions under its purview keep pace with developments in information technology, deploy those developments on behalf of administration and academic programs, and support universities' infrastructure.

2001 Expenditure	2011 Budget Law (JOD)	2014 Budget Law (JOD)	% change from 2011
6.6 million	18.6 million	19 million	2%

Figure 2.16: Directorate of Military Education and Culture Budget (Source: Budget Laws 2011 and 2014

2001 Expenditure	2011 Budget Law (JOD)	2014 Budget Law (JOD)	% change from 2011
9.5 million	11.8 million	13.37 million	13.3%

Figure 2.17: Vocational Training Corporation Budget (Source: Budget Laws 2011 and 2014)

2001 Expenditure	2011 Budget Law (JOD)	2014 Budget Law (JOD)	% change from 2011
1.9 million	4.1 million	3.6 million	-12%

Figure 2.18: Ministry of Higher Education and Scientific Research Administration Support Services Budget (Source: Budget Laws 2011 and 2014)

2001 Expenditure	2011 Budget Law (JOD)	2014 Budget Law (JOD)	% change from 2011
51.1 million	70.7 million	96.6 million	36.6%

Figure 2.19: Ministry of Higher Education and Scientific Research Public Colleges and Universities Budget (Source: Budget Laws 2011 and 2014)

2001 Expenditure	2011 Budget Law (JOD)	2014 Budget Law (JOD)	% change from 2011
0	1.3	1.5	15%

Figure 2.20: Higher Education Accreditation Commission Budget (Source: Budget Laws 2011 and 2014)

2011 Budget Law (JOD)	2014 Budget Law (JOD)	% change from 2011
10.6	10	-5.6%

Figure 2.21: Ministry of Planning and International Cooperation (MOPIC) Education Budget (Source: Budget Laws 2011 and 2014)

In terms of 2014 KPIs, the ministry wishes to increase the number of higher education students joining community colleges from 12 percent in 2013 to 13 percent in 2014 and 14 percent in 2015. In addition, the ministry seeks to increase the number of beneficiaries of grants and loans from 33,585 to 34,000 in 2014 and gradually increase annual spending on scientific research and development as a percent of GDP, from 0.60 percent based on a 2013 self-assessment to 0.66 percent in 2014 and increasing to 0.75 percent in 2016.

Higher Education Accreditation Commission (HEAC)

The HEAC is an independent organization responsible for assuring the quality of higher education. Claiming only JOD 1.5 million or 0.14 percent of the total education budget in 2014, its objectives include increasing the number of academic specializations subject to accreditation and ensuring that all public and private universities implement accreditation standards. The HEAC's budget is organized into three programs: Administration and Support; Higher Education Institutions Accreditation; and the National Examination Center.

Other education-related appropriations

In addition to the appropriations on behalf of education-related programs presented above, the 2014 Annual Budget includes additional amounts designated to accomplish education objectives, but

which are appropriated to the Ministry of Planning and International Cooperation (MOPIC) in support of basic and higher education.

2.4 MEASURES OF EFFICIENCY AND EFFECTIVENESS

Jordan measures attainment of KPIs through self-assessment and benchmarks student performance against international standardized tests and donor evaluations.

Key Performance Indicators

The following figure summarizes the Ministry of Education Key Performance Indicators as described in the 2014 Budget Law.

		Base year	2012 Actual	2013 Target	2013 Self-Assessment	Target Values		
						2014	2015	2016
Administration and Support	Percentage of qualified and efficient educational leaders	3%	20%	50%	50%	55%	57&	57%
Kindergarten Education	Number of equipped kindergarten rooms	302	925	1,145	1,080	1,050	1,220	1,300
	Percentage of total pre-school education enrollment in rural and poor areas	25%	37%	45%	45%	45%	47%	50%
	Number of students included in the school nutrition program	39%	39%	39%	39%	39%	40%	40%
Basic Education	Percentage of basic education dropouts	.6%	.6%	.6%	.6%	.6%	.6%	.6%
	Percentage of students in two-shift schools	10.5%	7.6%	7%	7%	7% [19]	6.7%	6.7%
	Number of students included in the school nutrition project	250,000	115,000	151,000	169,000	210,000	220,000	230,000
	Percentage of students in leased buildings	10.7%	10.6%	10%	10%	10%	9.6%	9.6%
Vocational Education	Percentage of students joining vocational education based on their desires	25	50	60	55	60	65	65
	Number of vocational education workshops equipped with modern fittings	90	160	200	183	200	220	240
Secondary Education	Percentage of students who pass the General Secondary Exam	55%	59.5%	60%	60%	60%	60%	60.1%
	Percentage of students in leased buildings	.23%	.23%	.23%	.23%	.23%	.23%	.22%
	Percentage of total admission in secondary education	76.6%	79.1%	79.4%	79.4%	79.4%	79.5%	79.8%

19 The actual percentage of students attending two-shift schools was 18.7% according to MOE officials due to the Syrian crisis.

Special Education	Number of excellence schools	3	7	10	10	10	12	12
	Number of special education rooms	521	797	826	856	885	915	935
Illiteracy and Elderly Education	Number of literacy centers	309	497	495	508	500	490	490
	Number of individuals enrolled in literacy centers	3,900	5,878	6,000	6,000	6,100	6,000	6,000
	Number of those enrolled in dropout culture enhancement programs	900	700	300	300	300	300	300
Social, Sport and Educational Activities	Number of athletic festivals	4	4	4	1	1	1	1
	Number of scout camps	5	7	8	7	8	8	8
	Number of teachers' clubs	10	12	13	10	11	12	12
	Percentage of students participating in King Abdallah II Award for Physical Fitness	35%	80%	81%	81%	82%	83%	84%

Figure 2.22: Key Performance Indicators from the 2014 Budget Law

Net enrollment in primary education of 97.4 percent is quite high. When disaggregated by gender, net enrollment is 97.9 percent for boys, 96.3 percent for girls. According to GOJ, the proportion of pupils starting grade one who reach the last grade of primary was 97.9 percent in 2010, 97 percent boys, and 98.8 percent girls.

Illiteracy nationwide among all ages is around 5.4 percent. According to GOJ estimates, this level of illiteracy shrinks dramatically among 15-24 year olds. In other words, the literacy rate of 15-24 year olds was 99.1 percent in 2012, 99 percent for boys, 99.2 percent for girls, giving Jordan a near 1:1 parity for male-to-female literacy rates. These GOJ self-reported figures suggest the Kingdom is coming close to realizing Millennium Development Goal 2: Achieving Universal Basic Education in-country. However, the UNESCO Institute of Statistics Literacy Assessment and Monitoring Programme (LAMP) provide more nuanced analysis of literacy and numeracy by age, level of education, and gender. According to the LAMP findings, about 20 percent of the population in Jordan has limited or no functional literacy ("Level 1") when measuring reading comprehension of continuous texts, 49 percent are reading at a moderate level able to "identify literal information" provided it is "in a brief and…clearly marked section" and "near the beginning of the text" ("Level 2"), and 31 percent reading at a more sophisticated level ("Level 3") able to understand passages with "more challenging features" such as distractors and linguistically dense wording. There does not appear to be a marked difference between male and female levels, but age dramatically impacts reading comprehension. For those aged 65+, 68 percent have limited or no functional reading comprehension and 11 percent are classified as moderately skilled. Similarly, and not unexpectedly, the level of schooling also impacts literacy. For those with primary (ISCED 1) education or less, 56 percent manifest literacy at the lowest functional level ("these respondents can produce answers that require minimal action, e.g. circling, underlining, copying a short fragment of text"). Trends are similar for reading comprehension of discontinuous text and numeracy, although in numeracy, a more distinct difference becomes apparent between men and women in favor of men, and a less pronounced age gap.[20] These findings do not necessarily call into question the 94.6 percent literacy rate reported by GOJ, but they do provide

20 Literacy Assessment and Monitoring Program (LAMP), Country Summary for Jordan, UNESCO Institute for Statistics, June 2013. http://www.uis.unesco.org/literacy/Documents/LAMP%20Country%20Summaries/literacy-statistics-summary-jordan.pdf

a more detailed analysis of functional literacy and numeracy in the Kingdom. This potentially provides valuable information to GOJ on where to focus its efforts to improve educational outcomes and achieve universal basic education in a meaningful way.

In the Ministry of Education's strategic plan, there are about 50 new reform initiatives or projects and indicators for every project. However, there are no indicators in reference to the financial plan and Ministry of Education officers have not yet linked performance indicators from the strategic plan to the budget request.

Ministry of Education officers either directly gather data for KPIs or they rely on other GOJ sources. In the case of literacy rates, they rely on the Department of Statistics. According to MOE, the DOS conducts a field survey and collects data from the field in order to verify literacy levels. To establish enrollment figures, MOE collects data on the number of students in all schools and divides that by the current population. For KPIs such as "Percentage of Vocational Education graduates employ[ed]," the Ministry of Education notes the difficulty to measure this directly and approximates this from data provided by the Ministry of Public Works. Similarly, for "Percentage of students joining vocational education based on their desires," this is an estimate based on the percentage of students continuing on with vocational education based on their own choice in the tenth grade. The number of basic education dropouts is based on data provided by school principals and school records. After a student has been absent from school for more than one year, they are officially shifted to dropout status.

The 2014 Budget Law reports 7 percent of students are attending a double-shift school; this percentage is expected to drop to 6.7 percent for 2015 and 2016. However, the Ministry of Education noted in meetings that the actual number for 2014 is 18.7 percent due to the Syrian refugee crisis. The figures in the Budget Law are out of date. Similarly, the 2014 Budget Law reports that 60 percent of students pass the general secondary exam, the *tawjihi*, and the pass rate is expected to increase to 60.1 percent in 2016. However, the actual pass-rate in 2014 fell to 40 percent according to MOE officials. The marked fall in *tawjihi* scores is due to changes in the administration of the exam with tighter controls.

The high-level KPIs including enrollment levels, persistence to completion of primary education, and literacy levels are standard high-level KPIs and promote comparisons over time and against comparator countries. Additional KPIs, for example, "number of vocational education workshops equipped with modern fittings," tend to focus on outputs and not necessarily on outcomes. Furthermore, these output-oriented KPIs are not always clearly linked to program line items in the budget and therefore do not help create a clear logical justification for continued funding of a given project. This chapter recommends developing KPIs that are outcome-oriented and clearly linked to specific programs listed in the budget. As a start, MOE and other education-related government entities should consider adding program line items from their respective strategic plans or from the *2025 Vision* and developing not just output but also outcome-oriented KPIs for each program line item. It is important to construct outcome-oriented KPIs that demonstrate clear attribution; in other words, KPIs should clearly and logically demonstrate that dinars spent on a given line item clearly led to a specific, measurable, and attributable developmental outcome. Strengthening attribution of outcomes to budgetary inputs is a powerful way to justify continued or even increased spending on a given program.

Student-Teacher Ratios

The number of students per classroom in aggregate appears to be consistent with global averages. These observations, however, are misleading as the ratios are highly inconsistent across the Kingdom with many schools overcrowded and others underutilized, indicating a serious problem with the efficient and rational allocation of educational resources. The 2014 Budget Law reports 1.2 million students in kindergarten, basic education, and secondary education using 3,612 schools with 1,079 kindergarten rooms, 36,962 basic education classrooms, and 6,719 secondary education classrooms. Figure 2.23 below presents the number of students per classroom per level.

	Students	Classrooms	Students/Classroom
Kindergarten	21,533	1,079	19.96
Basic education	980,689	36,962	26.5
Secondary education	192,925	6,719	28.7
Total	1,195,147	44,760	26.7

Figure 2.23: Students per Classroom (Source: Budget Law 2014)

With 26.7 students per classroom in 2014, Jordan is not far off from the global average of 23 students per classroom. [21]

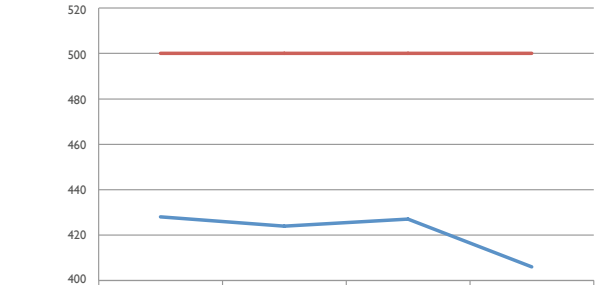
The student-teacher ratio in Jordan appears to be much better than global averages, but this is also only part of the story. According to the 2014 Budget Law, there are 78,735 teachers addressing 1.2 million kindergarten, primary, and secondary students, yielding an aggregate student-teacher ratio of 15:1. However, these calculations do not take into account the unequal distribution of teachers and classrooms. Some classrooms face overcrowding and require second shifts, while other classrooms, especially in remote locations, are underutilized. 587 schools (out of the 3,612 schools) or 16 percent are considered very crowded, with an average student-teacher ratio of 32:1, and there are many examples of student-teacher ratios of 50:1 or more. These figures are most certainly exacerbated by the Syrian crisis. On the other hand, 557 schools, or 15.4 percent of total, are considered under-utilized and have an average of less than eight students in the classroom and a student-teacher ratio of 6:1. [22] In discussions with MOE officials, one interlocutor noted that 60 percent of Jordanian students can be found in 30 percent of the schools. This suggests problems with the rational allocation of resources throughout the country.

TIMSS and PISA scores

Jordan participates in two major international educational tests, the Trends in International Mathematics and Science Study (TIMSS)[23] and the Programme for International Student Assessment (PISA) tests.[24] TIMSS assesses mathematics and science knowledge of fourth and eighth grade students from a diverse range of countries and is designed to assess the performance of a representative sample of students from both public and private schools in each country.[25] The test was first conducted in 1995, and is conducted every four years. In 2011, fourth graders from 52 countries and eighth graders from 45 countries participated. TIMSS will conduct a new test in 2015.

PISA is a worldwide study undertaken by the OECD in both member and non-member nations. The focus is on 15-year-old students' performance in mathematics, science, and reading. The OECD selects a representative sample of 15-year olds from both private and public schools in each country.[26] It was first conducted in 2000 and then repeated every three years. The next cycle will be in 2015. The 2012 PISA measured performance of 510,000 students from 65 countries, 34 OECD member countries and 31 partner countries.

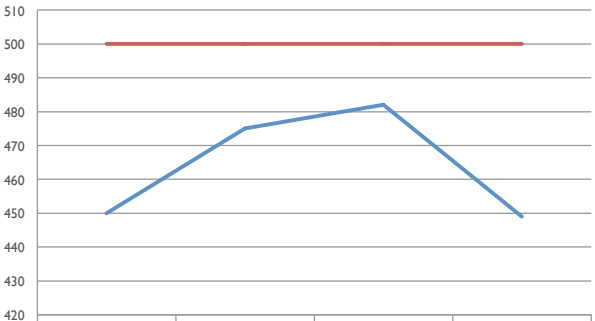
As Figure 2.24 below shows, Jordan's TIMSS score for mathematics is well below the average of all participating countries and is trending downward.



	1999	2003	2007	2011
Jordan	428	424	427	406
Average	500	500	500	500

Figure 2.24: Jordan's TIMSS Score in Mathematics

Similarly for the TIMSS scores in science, Jordan initially showed improvement from 1999 to 2007, but all gains were erased in the 2011 tests.



	1999	2003	2007	2011
Jordan	450	475	482	449
Average	500	500	500	500

Figure 2.25: Jordan's TIMSS Score in Science

The TIMSS and PISA tests both measure the performance of "a representative sample" of the population, including both public and private school students. It would be instructive, but outside the scope of this paper, to disaggregate public and private students to get a clearer understanding of the performance of

21 http://www.oecd-ilibrary.org/docserver/download/9613041e.pdf?expires=1433551153&id=id&accname=guest&checksum=5760AF7119B7CFA987A2C3A3D551B213
22 Based on data from the Ministry of Education
23 All TIMSS data from: https://nces.ed.gov/TIMSS/
24 All PISA data from: http://www.oecd.org/pisa/
25 https://nces.ed.gov/TIMSS/faq.asp?FAQType=3
26 https://nces.ed.gov/surveys/pisa/faq.asp#4

public school students in Jordan.

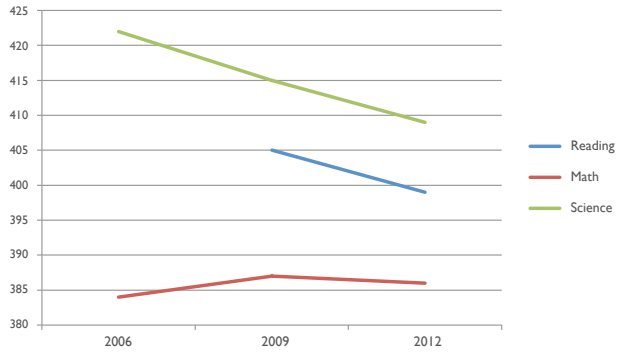


Figure 2.26: Jordan's PISA Scores in Reading, Mathematics, and Science

Similar to the TIMSS findings, on the PISA test Jordan scores well below the OECD average of 500, with performance in science and reading trending downward and performance in mathematics stagnant. Along with the raw test scores in reading, math, and science, PISA provides a country-by-country analysis of other educational factors. In their Jordan country report for the 2012 test, PISA presents four distinct findings for Jordan.

First, the difference between boys and girls in reading and science performance is the largest difference among PISA-participating countries in favor of girls. Jordanian boys score 75 points lower than girls in reading and 43 points lower than girls for science. Jordan is ranked 64 out of 64 participating countries.

- Second, PISA finds that the cumulative expenditure by educational institutions is one of the lowest among PISA-participating countries, ranking 48th out of 49 countries measured for this factor. According to the PISA calculation, Jordan spends approximately JOD 5,058 (USD 7,125) for the education of a given student over the ten-year period from age six to age 15, whereas OECD countries will spend an average of USD 83,382 over the same ten-year period per student. Taking the 2015 MOE budget of JOD 937.8 million and dividing that by public enrollment of 1.26 million students, the average level of expenditure per student is JOD 744.32 per year.
- Third, the percentage of students who had not attended pre-primary education is one of the highest among PISA-participating countries and economies, ranking 10th out of the 64 participating countries.
- Fourth, governance of the education sector in Jordan is highly centralized. PISA found that there is a low percentage of principals and teachers who have responsibility in establishing student assessment policies (rank 59/64), curriculum and assessment (62/64), choosing textbooks (62/64), determining course content (rank 57/64), and deciding which courses to be offered (rank 57/64).

	Math Score	Math Rank	Science Score	Science Rank	Reading Score	Reading Rank
Albania	394	57	397	62	394	62
Argentina	388	59	406	58	396	60
Brazil	391	58	405	59	410	55
Bulgaria	439	47	446	45	436	51
Colombia	376	62	399	60	403	57
Costa Rica	407	56	429	51	441	47
Hungary	477	39	494	32	488	30
Jordan	386	61	409	57	399	58
Kazakhstan	432	49	425	52	393	63
Malaysia	421	52	420	53	398	59
Mexico	413	53	415	55	424	52
Montenegro	410	54	410	56	422	53
Peru	368	65	373	65	384	65
Romania	445	45	439	49	438	50
Serbia	449	43	445	46	446	45
Thailand	427	50	444	48	441	47
Tunisia	388	59	398	61	404	56
Turkey	448	44	463	43	475	41
Average	414.389	52.944	423.167	52.889	421.778	52.833

Figure 2.27: 2012 PISA Scores in Upper Middle Income Countries

When comparing Jordan's PISA scores to other countries, it is not possible to make a comparison with other MENA countries, as only the UAE, Tunisia, and Qatar participated in 2012. It is possible, however, to compare Jordan's performance to that of 17 other upper-middle income countries. Figure 2.27 shows the average of all upper middle-income countries, sorted alphabetically by country.

The average mathematics score for UMICs is 414, whereas Jordan scored below average at 386. The average UMIC score for science is 423; Jordan scored below average at 409. Similarly, the average reading score for UMICs is 422; Jordan scored below average at 399. Jordan is among the bottom third of upper-middle income countries for math and reading and among the middle third for science. Figure 2.28, Figure 2.29, and Figure 2.30 below illustrate Jordan's PISA ranking in math, science, and reading in relation to all other participating UMICs.

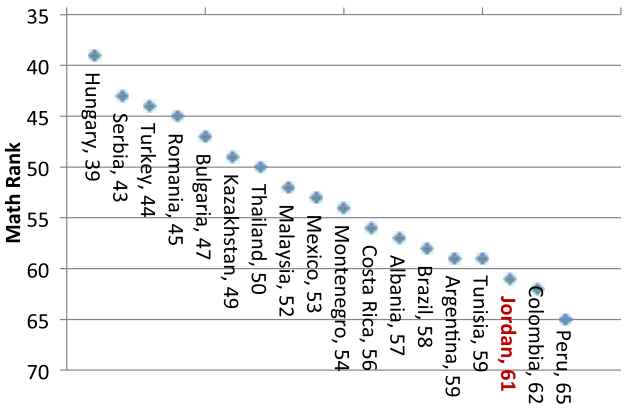


Figure 2.28: Jordan's PISA math ranking among all participating UMICs

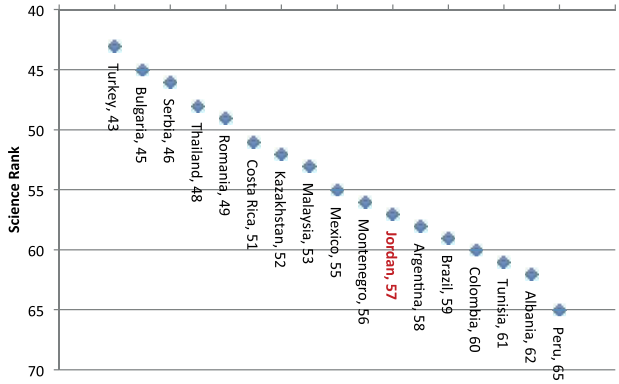


Figure 2.29: Jordan's PISA Science ranking among all participating UMICs

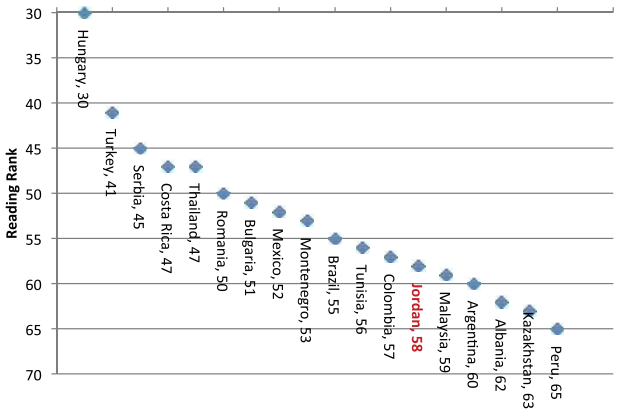


Figure 2.30: Jordan's PISA Reading ranking among all participating UMICs

2.5 FINDINGS AND RECOMMENDATIONS

Introduction

Section 3 of this chapter analyzed trends in education spending in Jordan focusing on major changes since 2011 when the last Public Expenditures Report was produced. Section 4 outlined key measures of efficiency and effectiveness and results achieved in the education sector with a view to Jordan's current performance relative to 2011 and in comparison to other countries.

The Government of Jordan has effectively identified a number of challenges to address, such as expanded pre-primary enrollment with a goal of universal kindergarten enrollment, improved teacher quality and accountability, increased investments in vocational training and equipment, and decentralized governance of schools. However, the 2014 and 2015 Budget Laws do not include the necessary increases to begin to fund these reform efforts.

Despite many strategies and a well-developed understanding of the challenges, Jordan's education sector has made only partial advances. The Syrian refugee crisis has exacerbated weaknesses in the education sector and added major new challenges during a time of tight fiscal constraints.

The following findings and recommendations are organized in line with critical issues that deserve special attention including levels of education spending, teacher staffing levels, utilization of school facilities, and kindergarten enrollment. Some of these recommendations update those found in the 2011 PEP Report while others are new.

Levels of Education Spending

At the time of writing the 2011 PEP Report, it appeared that education expenditure was growing slightly faster than total government expenditures, demonstrating a growing prioritization of education spending relative to other areas of public expenditure. However, starting in 2013, that trend reversed and education expenditure has been falling as a percent of total public expenditure. In absolute terms, the amount of dinars going to education is growing, but as a percent of total expenditure, the amount has fallen to about 12.9 percent in 2014. Upper middle income countries, on average, spend 14.9 percent of government expenditure on education. Based on 2011 data, the Arab states on average spend 16.9 percent of government expenditure on education.

Current spending levels, with 2 percent annual increases, will not reverse the negative trend in international test scores. At current spending levels, it is not possible to make the necessary investments in teacher training, infrastructure improvements, IT upgrades, curriculum reform, and governance improvements. Indeed, the Government of Jordan and the Ministry of Education in particular, are well aware of the reform initiatives needed, but face constraints when trying to marshal higher expenditure levels to meet those needs. The ministry has been active in pushing through what reforms it can with limited budgetary support.

Therefore, in order to bring Jordan in line with other upper middle income countries, this chapter recommends increasing the levels of education spending gradually over a 3-5 year period to 14.9 percent of total public expenditures. In 2014 terms, that means increasing total education spending across the six budget units from JOD 1.048 billion to JOD 1.206 billion, or increasing total education expenditure by JOD 158 million. In order to achieve this target spending level as a percent of total public expenditure requires national prioritization of education relative to other government spending units, public outreach, and internal advocacy efforts. This chapter recommends a formal outreach and advocacy campaign that includes data analysis to communicate "pain and gain" messages to both the general public and policy-makers. This outreach campaign should outline the reforms needed, their cost, and the outcomes that will accrue; conversely, advocacy efforts should educate citizens and officials about the likely outcome if reforms remain unfunded.

But absolute amounts of investment alone are not sufficient to bring about the desired change. The way that those funds are allocated is also essential, as is discussed in the following sections.

Recommendations:

- Gradually increase education spending levels from 12.9 percent to 14.9 percent of total public expenditure.
- Launch a public outreach campaign to inform policymakers and citizens about the need to prioritize education.

Teacher Staffing Levels

As the 2011 PEP Report noted, teachers are by far the largest education expenditure. The 2011 report points out that "teacher employment growth exceeded student growth between 2001 and 2011 and all analyses of teacher utilization since 1991 have concluded that there are significant inefficiencies in the utilization of teacher resources." Teacher employment growth continues to outstrip student growth as demonstrated by the eroding average student-teacher ratio, even in the context of the Syrian refugee crisis. The ERfKE Teacher Utilization Study of 2008 reported a student-teacher ratio of 17.7:1. The ratio deteriorated to 16.2:1 during the time of the 2011 report. Based on data in the 2014 Budget Law, the calculated student-teacher ratio for 2014 is 15:1. Compounding this low student-teacher ratio is the fact that teachers are not allocated efficiently throughout the country leading to a situation where many classrooms are overcrowded and others are underutilized.

In 2014, teacher and other salaries made up 85 percent of the Ministry of Education budget—a cost that is on a steep upward trajectory (see Figure 2.31 below).

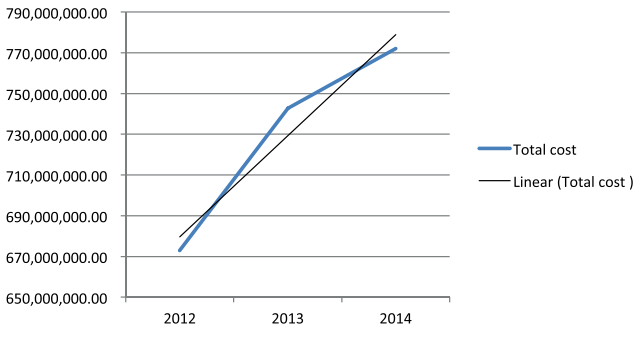


Figure 2.31: Total Cost of Salaries at Ministry of Education (Source: Budget Laws 2012, 2013, 2014)

27 2011 Jordan Fiscal Reform Project II, Education Public Expenditures Working Paper

In addition to hiring new teachers to address both the natural 2 percent population growth rate and also the Syrian refugee crisis, costs are increasing. Teachers in Jordan have recently unionized and union representatives have been active in advocating for greater teacher benefits. The 85 percent of the recurrent budget spent on salaries crowds out spending for non-salary items that could be used for quality improvements. This report echoes consistent recommendations from the 2011 PEP Report and the ERfKE report on Teacher Utilization—these are suggestions that the Ministry of Education itself has begun to implement. The ERfKE study recommended a "moderate policy" of moving to a 25:1 student-teacher ratio for basic education and a 20:1 ratio in secondary education. The ERfKE study estimated that after a five-year period, this moderate policy would yield an annual savings of about JOD 85 million, which could be better invested in areas to reform education quality.

However, it is neither politically or culturally feasible nor desirable to reduce the teaching workforce by 16,000 teachers. Rather, this reduction in forces can be achieved only gradually through hiring freezes and natural retrenchment through retirement. In a three-to-five year timeframe, it would be possible to slowly move from 15:1 to perhaps 17:1 or 18:1 through a hiring freeze and retrenchment but ERfKE's recommended "moderate policy" to reach a 25:1 ratio does not sound realistic given the cultural and political imperatives today, including the recent unionization of teachers.

Further, the idea of a hiring freeze on teachers runs counter to the dominant narrative in Jordan regarding school overcrowding, double-shift schools, and sensational 50-1 student-teacher ratios or worse in particularly crowded schools. At this moment in Jordan's history, there is not much political support for a hiring freeze when urban-based policy makers only see overcrowding when, in fact, many of the challenges Jordan faces have as much to do with underutilization of schools and inefficient allocation of teachers in remote or rural areas. In order to build political support for a hiring freeze, the chapter recommends an outreach and advocacy campaign to increase awareness about underutilized schools to balance the overcrowding narrative, which is accurate but only part of the story.

A hiring freeze and natural retrenchment are necessary but not sufficient in themselves to address inefficiencies in teacher allocation. Teacher resources must be reallocated more efficiently throughout the Kingdom. Recommendations to improve the allocation of teacher resources include a transportation program not just for students but also teachers to bring teachers from less populous regions to areas where there is greater need. In addition, the 2011 PEP Report recommended a program of multi-grade teaching as an efficient alternative for some schools, which is still a sound recommendation today.

Recommendations:

- Launch a public outreach campaign to educate citizens and policymakers about the concomitant challenge of extremely low student-teacher ratios in the remote areas of the country to counter the observed high ratios in major urban areas.
- Institute a hiring freeze for teachers and promote natural retrenchment.
- Gradually move towards the ERfKE "moderate policy" recognizing that shifting from a 15:1 student-teacher ratio to 25:1 is not politically likely in a 3-5 year timeframe.

Education Results

Underperformance on international testing such as the TIMSS and PISA demonstrates inefficiencies in public expenditure. Jordan's TIMSS scores for mathematics and science are below the average of all participating countries, which includes 34 OECD countries and 31 partner countries. Similarly, Jordan's PISA scores for reading, math, and science are all well below the OECD average and are either stagnant or declining. When compared to other upper middle-income countries (that are not necessarily OECD countries), Jordan performs in the lower-third in most categories.

Although Jordan continues to spend about 2 percent more on its combined education budget each year, a corresponding 2 percent increase is not observed in international test scores year-over-year. Clearly, there is not a one-to-one correlation between dinars spent and educational outcomes. Rather, the falling test scores indicate two broad challenges: (1) that educational resources are not allocated in a rational and efficient manner across the Kingdom; and (2) that current amounts of spending are not sufficient to promote the global competitiveness of Jordanian students.

This chapter recommends an increase in education spending but also a rationalization in teacher numbers so new investments can be spent in areas that are more likely to increase educational quality. Investments in education should be rationalized: the issue is not necessarily more teachers or new school construction but rather the efficient allocation of resources throughout the Kingdom.

In addition, the 2011 PEP Report pointed out that Jordan has an unusually low rate of repeating grades and this may contribute to the low academic achievement on international tests. The 2011 report suggested analyzing this phenomenon to determine whether a change to have more low performing students repeat grades can increase positive education results and student scores on standardized tests. According to interviews with UNICEF in Amman, an MOE ruling caps at 5 percent the number of students that can be held back in a given class irrespective of performance. This type of ruling may help advance students to the next grade level and through to achieve nominal primary persistence, but does not necessarily help students who are failing to develop functional literacy and numeracy skills. This chapter recommends eliminating this ruling and advancing only those students who have mastered the skills at their grade level.

Finally, the PISA tests showed that the gap between boys' and girls' performance in Jordan was the most pronounced of all 64 PISA participating countries. Jordan must pay special attention to boys' education and identify the core challenges, whether it has to do with violence in boys' schools as suggested by UNICEF and other observers or the quality of instruction provided by male teachers due to unique social factors in the country that lead to this observed problem.

Recommendations:

- Consistent with earlier recommendations, increase the allocation of government funds for education and rationalize both school use and teacher allocation across the Kingdom.
- Eliminate rules that cap the percentage of students that can be held back; do not advance students who have not mastered the necessary competencies of a given grade level.
- Investigate the gap between boys and girls performance. Provide focused training to boys' school teachers and create incentives to attract and retain qualified teachers for boys' schools. Launch national-level programs to address violence in boys' schools. Increase psycho-social services in boys' schools.

Utilization of School Facilities

The 2011 PEP Report identified the efficient utilization of school facilities as a key issue in Jordan, including overcrowding and underutilization. This problem is closely linked with the challenge of teacher staffing levels. According to the 2011 report, almost 60 percent of Jordan's schools in the 2010-11 academic year were classified as small; these schools enrolled 25 percent of the students. Costs in small schools are double or triple the cost per student in larger schools. According to recent reports, about 16 percent of Jordanian schools are considered very crowded, and can have double-shifts and student-teacher ratios of 32:1 or more in extreme cases. A matching 15.4 percent of other schools are considered underutilized with student-teacher ratios of 6:1.[28] The Syrian refugee crisis has had a substantial impact on school use, number of classrooms, and student-teacher ratios.

In Jordan, a rural community with 10 children is eligible to have its own school.[29] This ruling, along with a requirement that no student should travel more than four kilometers from his/her home to attend a school, has led to inefficiencies in remote areas. According to UNICEF, the Government of Jordan is changing the 10-student benchmark to 50 students and will gradually shift this to 100 or 150 students.

This report agrees with the ongoing effort to increase the number of students to 100 or 150 or more before constructing a new school. It also recommends amending or eliminating the 4 km requirement. Again, the idea of closing local schools and bussing students and teachers to regional schools is politically difficult and culturally challenging. During interviews for this report, interlocutors have argued that it would not be politically possible to close local schools. One particular challenge would be the cultural barriers of female teachers traveling from their home to a central location to teach. This chapter asserts that political and cultural reticence is not insurmountable, but may require dedicated outreach efforts over a three-to-five year period and therefore recommends informing citizens and enlisting allies from within the local communities that would be affected by any changes.

Consistent with the 2011 PEP Report, this report recommends reducing the number of small schools to lower the total education costs. Small schools can be re-purposed, divested, or otherwise reallocated. Sale of school buildings or re-purposing the buildings may be an opportunity for the MOE to increase revenue in the short-term. Through improved transportation policies, students from small schools can be bussed in to a central school location. Transportation can also be a means to more efficiently use space, by transporting students from overcrowded schools to underutilized schools nearby.

28 Based on data from the Ministry of Education
29 Source: UNICEF Amman

In addition to the number of schools and overcrowding, ERfKE II made recommendations addressing safety issues and maintenance needs within current facilities. With the Syrian crisis, deferred maintenance at overcrowded schools is becoming an urgent issue and much more expensive than preventive maintenance to resolve.

Recommendations:

- Launch a public outreach campaign to educate citizens and policymakers about the challenge of school underutilization in the remote areas of the country.
- Reduce the number of small schools to lower total education costs. Adjust the government ruling entitling a community with 10 children to have their own school, raising this to 100 or 150 children or eliminate this ruling altogether. Amend or eliminate the 4 km school requirement.
- Continue to roll-out bussing and other transportation options to facilitate the shift from underutilized remote schools to right-sized regional schools.
- Launch public outreach campaign in local communities that will be affected by this shift.
- Develop a disposition plan or repurposing plan for schools to be shuttered in remote locations.
- Improve utilization of existing space and implement a modern maintenance management system.

Kindergarten and Primary Enrollment

The 2011 PEP Report noted that most kindergarten education in Jordan is provided by the private sector, with under-enrollment a persistent problem among public schools. In 2011, the pre-primary enrollment rate was 36 percent. That figure fell to 34 percent in 2012 according to the UNICEF Education for All Global Monitoring report, with 83 percent enrolled in private schools. Despite increases in kindergarten spending between 2011 and 2014, MOE should further expand its efforts to equip kindergarten classrooms throughout the Kingdom. As with primary and secondary education, bus transportation for students will allow young students, including those from rural and economically challenged areas, to access kindergarten education.

Recommendations:

- Increase MOE allocations for KG.
- Continue ongoing MOE efforts to create new KG classrooms and increase public KG enrollment.
- Introduce bussing for KG and primary school students.

REFERENCES

1. Government of Jordan, General Budget Department (2014) GOJ Budget Law, Amman, Jordan
2. Government of Jordan, General Budget Department (2015) GOJ Budget Law (draft), Amman, Jordan
3. The Office of King Hussein I Website, "Education in Jordan: A Commitment to Excellence," http://www.kinghussein.gov.jo/resources3.html, accessed July, 2015.
4. UNHCR website (2015) "Syria Regional Refugee Response Data: Jordan," http://data.unhcr.org/syrianrefugees/country.php?id=107, accessed July, 2015.
5. Government of Jordan and UNHCR, (2014) 2014 Syria Regional Response Plan: Jordan, http://www.unhcr.org/syriarrp6/docs/syria-rrp6-jordan-response-plan.pdf, accessed July, 2015.
6. Government of Jordan (2015) Jordan 2025: A National Vision and Strategy (draft), Amman, Jordan.
7. The World Bank (2015), World Development Indicators: Jordan, http://data.worldbank.org/country/jordan, accessed July, 2015.
8. UNICEF (2015), Education for All Global Monitoring Report 2015, Paris, France.
9. UNESCO (2013) UNESCO 2012, Paris, France.
10. Education Policy and Data Center (2014) "Jordan National Education Profile 2014 Update," http://www.epdc.org/sites/default/files/documents/EPDC%20NEP_Jordan.pdf, accessed July, 2015
11. UNICEF (2014) Syria Crisis Report, "Monthly Humanitarian Situation Report February 2015," http://www.unicef.org/appeals/files/UNICEF_Syria_Crisis_Report_February_2015.pdf, accessed July, 2015.
12. IECONOMICS (2015), "Jordan Gross National Product," http://ieconomics.com/jordan-gross-national-product, accessed July, 2015.
13. Ministry of Planning and International Cooperation (MOPIC), Government of Jordan (2015), Jordan Response Plan 2015 for the Syria Crisis Final Report, http://www.jo.undp.org/content/dam/jordan/docs/Publications/JRP+Final+Draft+2014.12.17.pdf, accessed July, 2015.
14. UNESCO Institute for Statistics (2013) Literacy Assessment and Monitoring Program (LAMP), "Country Summary for Jordan," http://www.uis.unesco.org/literacy/Documents/LAMP%20Country%20Summaries/literacy-statistics-summary-jordan.pdf, accessed July, 2015.
15. OECD (2013), Education at a Glance, http://www.oecd-ilibrary.org/docserver/download/9613041e.pdf?expires=1433551153&id=id&accname=guest&checksum=5760AF7119B7CFA987A2C3A3D551B213, accessed July, 2015.
16. National Center for Education Statistics (2015), "Trends in International Mathematics and Science Study (TIMSS)," https://nces.ed.gov/TIMSS/ and https://nces.ed.gov/surveys/pisa/faq.asp#4, accessed July, 2015.
17. OECD (2015), "Programme for International Student Assessment," http://www.oecd.org/pisa/, accessed July, 2015.
18. Jordan Times, "Regulating Private Schools," Yusuf Mansur, April 27, 2015, http://jordantimes.com/regulating-private-schools, accessed July, 2015.

HEALTH

3.1 OVERVIEW OF HEALTH SECTOR

Residents of Jordan enjoy high-quality, accessible healthcare for relatively low out-of-pocket costs. Jordan rates favorably in most major public health outcome metrics, based on econometric analysis of Jordan's performance against comparable countries and neighbors. Residents of Amman in particular have a wide range of public and private health services, including several centers of excellence in specialized areas such as cancer treatment, in vitro fertilization treatment, and cardiac surgery, which have made regional medical tourism a burgeoning area of private sector growth. In the interim period since the publication of the 2011 Public Expenditure Perspectives report, there have been notable changes in the provision of public health services; those findings will be updated below.

However, the main change on a broader scale is that the health financing mix has solidified since the global financial crisis, with a stubbornly high burden placed on government as the primary financier in health. The public purse subsidizes health care without sufficient discrimination in favor of the most vulnerable, which results in a regressive financing system that wastes increasingly scarce taxpayer resources, according to a World Health Organization and Jordanian High Health Council analysis. [30]

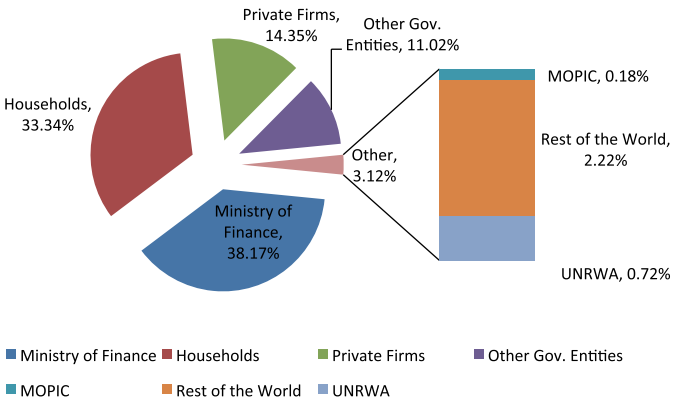


Figure 3.1: Health Funding by Source as of 2012 (Source: National Health Accounts 2014)

Since 2008, the distribution of financing sources for health has remained essentially constant, indicating that no significant shifts in healthcare financing have taken place since the last review. Different government funding sources account for over half of total healthcare expenditure with households picking up a third and the private sector covering 14.35 percent.

World Bank and WHO figures list public expenditure even higher at 66 percent in 2013.[31] [32] According to the World Health Organization, despite the fact that the growth rate of total health expenditure has increased at slightly below the growth of GDP from 1995-2011, the public sector began and continues to shoulder a disproportionate burden since the financial crisis, leveling off recently around 65 percent of total health expenditure in the economy, as shown in Figure 3.2 below.[33]

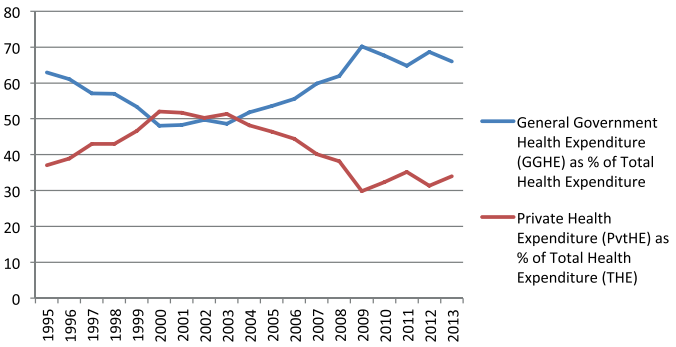


Figure 3.2: Public and Private Shares of Total Health Expenditure (Source: WHO Global Health Observatory)

The growing presence of the private sector in the healthcare field creates interesting opportunities to reduce the pressure on stagnant public revenues. In the current period of fiscal stress, examining all large spending categories for opportunities to improve efficiency is essential; those opportunities will be presented as recommendations of this chapter. To introduce the case for specific efficiency gains, this chapter will first review a snapshot of Jordan's national health performance to understand the systems' strengths and weaknesses.

Jordan consistently outperformed its neighbors and close comparator countries in worldwide statistical regression models conducted recently by the World Bank,[35] and for the indicators where data was collected (see Figure 3.3) performance has incrementally improved since 2009:

- The total fertility rate has gone down from 3.8 to 3.5, though the still-high fertility rate remains a concern for women's empowerment and participation in the economy;

30 Fairness in Financial Contribution in Jordan. 2010 HHC and WHO.
31 World Development Indicators 2014. Accessed 17 November 2015.
32 WHO Global Health Expenditure Database. Accessed 17 November 2015.
33 Jordan National Health Accounts 2007, 2012; Ministry of Health Statistical Book 2013; World Development Indicators, Department of Statistics 2013
34 Jordan Population and Family Health study figure from 2007.
35 World Bank Health Finance Review 2014.

Country Demographic and Health Data	1980	1985	1990	1995	2005	2009	2010	2011	2012	2013
Population	2.2	2.7	3.5	4.3	5.5	5.98	6.1	6.24	6.38	6.5
Population Growth Rate (%)						2.2	2.2	2.2	2.2	2.2
Total Fertility Rate (Live Births Per Woman)	7.8	7	5.5	4.6	3.7	3.8	3.8	3.8	3.5	3.5
Life Expectancy at Birth (Male)	65.5	67	64	66	70.6	71.6	71.6	71.6		72.4
Life Expectancy at Birth (Female)	67.4	71	68	70	72.4	74.4	74.4	74.4		76.7
Infant Mortality Rate (Per 1,000 Live Births)	70	60	37	28	22	19[34]			17	17
Child Immunization Rates (% of Children 0-24 Months)										
Measles		65	87	92	100	103	97	95	99	94
DPT3		89	98	100	95	103	97	95	99	97
Hepatitis B					95	103	97	95	99	97

Figure 3.3: Jordan Health Snapshot (Source: Jordan National Health Accounts 2007, 2012; Ministry of Health Statistical Book 2013; World Development Indicators, Department of Statistics 2013)

- Life expectancy for men and women has improved despite high rates of smoking, among men especially, and rising rates of non-communicable disease (NCD), particularly diabetes; [36]
- Infant mortality continued its steady downward trend from 19 to 17 per 1,000 live births;
- DPT3 immunization, also a proxy for post-natal care, has dipped slightly to 97 percent,[37] but can be understood to be universal, supported by minimal cases of routine, vaccine-preventable disease each year;
- Maternal mortality per 100,000 is not tracked rigorously; though a wide range of maternal health indicators are tracked in detail by the Department of Statistics' Population and Family Health Survey. The best available data suggest that maternal mortality lags other indicators with a relatively high rate of 50 per 100,000 live births (the figure listed in the Ministry of Health Statistical Book for 2009 is of questionable reliability), but which is on par with regional averages.

Therefore, based on improved performance since the 2011 PEP Report, it can be concluded that Jordan continues to punch above its weight in terms of both access to and quality of healthcare in nearly every international benchmark for developing countries, with access to and usage rates of family planning methods and reduction of maternal mortality identified as areas for improvement.

Reasonable Expectations for Jordan

The 2011 PEP Report used cross-country comparisons to calibrate appropriate expectations for Jordan's performance levels. This report will do the same, leveraging similar analysis that was conducted at the end of 2014 in the World Bank's Health Financing Review,[38] which utilized a range of high quality data. The 2011 PEP Report used MENA neighbors in addition to all upper middle income countries. The World Bank's more recent analysis, summarized in bullets below, also used MENA neighbors, but used a smaller selection of relevant comparator countries, Turkey, Philippines, Thailand, Colombia, and Lebanon.

A necessary caveat to this type of analysis is that simply comparing countries to each other can fail to reflect nuances of the political-economic context within which those countries exist. Jordan has a number of unstable neighbors and for years has been a safe haven for refugees. That is certainly the case currently with internal conflict in Syria. That is not to say that Jordan is unique in this regard (among the comparator countries, Colombia and the Philippines cope with sustained violent conflict domestically), but it is important to remember that context matters and being above or below modeled expectations does not in and of itself signify a justified positive or negative value judgment. With this caveat in mind, the key findings from the World Bank's cross-country regressions, using data from 1990-2011, are:

- Jordan has a higher than expected life expectancy adjusted for per capita income and total health spending;

36 World Bank Health Finance Review 2014.

36 Rates of which are not regularly recorded, the most recent from the 2014 World Development Indicators indicates 47% of men smoke compared to only 6% of women.

37 Refugee children were measured and counted separately from Jordanian children as opposed to the data for 2009, which included refugee children receiving care at government clinics.

38 World Bank Group to Support Health Financing. http://ieg.worldbank.org/evaluations/wbg-support-health-financing

- Infant and maternal mortality have steadily declined. Both indicators significantly outperform the MENA average and are on average with close comparator countries by income;
- Physicians per 1,000 is above expectations (Jordan=2.6), with only Lebanon exceeding that ratio among comparators (though as will be seen later in this review, that ratio declined sharply in 2013 perhaps signaling a more serious attrition problem among physicians than indicated by data that is now over four years out of date);
- Hospital beds per thousand meets expectations both by region and income group, but is below expectations relative to total health expenditure;
- Total health spending per capita is much higher than expected relative to per capita income and relative to spending amongst MENA neighbors, with total health spending rising from $127 in 1995 to $392 in 2011;
- Total health spending has fluctuated between 8-9.9 percent of GDP since 1995, with the most significant shift being that government shoulders a much higher proportion of growing healthcare costs—both total and public health spending are significantly higher than expected relative to MENA and comparator countries;
- Out of pocket (OOP) spending as a share of GDP was at the same level in 2011 as it was in 1995. This despite nearly doubling relative to 1995 during the boom years from 2000-2008;
- Overall, OOP spending for Jordanians roughly meets expectations. On certain measures, OOP expenditure is higher than expected (OOP expenditure as a share of GDP versus per capita income, OOP expenditure per capita versus income per capita) and on others lower than expected (OOP spending as a share of total health expenditure versus per capita income).[39]

In summary, Jordan continues to outperform neighbors and comparator countries in health outcomes, but spends more than expected to achieve those outcomes. Given that broader trend in the data, the strategic issues in front of policymakers are:

- As a national value, does the Government of Jordan wish to spend more to deliver above average health services when presented with other immediate threats to fiscal health?
- How can the government curb, or redistribute to the private sector, its spending on healthcare without putting quality or access at risk?

Strategic Developments: Toward Universal Health Coverage

The health sector has declared its intent to achieve universal health coverage (UHC). The World Bank, in collaboration with the full range of health actors, has conducted an extensive and rigorous economic analysis of the potential for and feasibility of universal coverage, concluding that universal coverage is possible given current budget funding levels if far-reaching structural reforms are executed successfully. Necessary reforms range from streamlining a now-fragmented, uncoordinated, and loosely regulated (in the case of the private sector) web of financial flows; consolidating public providers; reducing the disproportionate amount spent on high-cost, curative, hospital-based care rather than low-cost outpatient preventive care; and inefficient resource allocation stemming from centralized management of human resources and physical infrastructure. Strong leadership from the health sector's technical secretariat, the High Health Council, provides research and analysis on the types of policy reforms needed to achieve UHC with current resources. To complement their efforts, this paper focuses on providing recommendations that will significantly improve the efficiency of public resource allocation through changes in management and administration rather than policy change. This chapter is focused on addressing the efficiency of resource allocation across health districts and seeks to do so in an inclusive fashion and in a format that will be repeatable for budget analysts at the GBD, MOH, and other health sector institutions as well.

Since the funding sources for universal health coverage, as well as commitments to consolidating the health finance system, have not yet solidified, the focus of this analysis will be to provide policymakers and leaders in the Ministry of Finance, and specifically the General Budget Department, and Ministry of Health with options to increase allocative efficiency across programs and geographies over the next five years. No matter what roles the MOH and Civil Insurance Fund/Civil Health Insurance (CIF or CHI, used interchangeably) are required to play, maximizing every dinar will be critical to financing universal health coverage given reasonable expectations of flat budget allocations in the face of stagnant public revenues.

Figure 3.4 below demonstrates the complexity of the flow of money from funding sources, through financing agents to providers, and the degree of difficulty posed in untangling that web to achieve a system that provides cost-effective universal coverage.

39 World Bank Health Finance Review 2014.

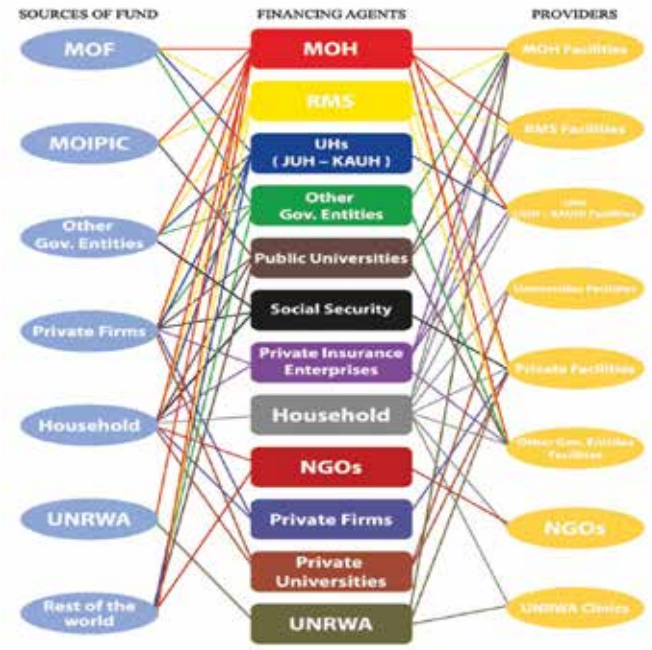


Figure 3.4: Jordanian Health Sector's Flow of Funds (Source: Jordan National Health Accounts 2012)

Impact of Syrian Refugees in the Health Sector

According to the Ministry of Planning and International Cooperation, Jordan is currently hosting 1.4 million Syrians, 646,700 of whom are classified as refugees. 4 out of 5 of these refugees are not living in camps, but among host communities across Jordan.[40] The impact of refugees on the health sector is most felt in the northernmost parts of the country, closest the Syrian border, and has generated pressure on the timeliness and quality of health service delivery despite the presence of UNHCR and the international community setting up a parallel health system to serve refugees in and outside official camps. Until November 2014, MOH provided free medical care to any Syrian refugee registered with the Ministry of Interior, but the ministry has since rescinded that policy as is its prerogative.[41] Syrians can still seek free medical treatment only at select clinics funded and operated by UNHCR. Treatment sought at MOH facilities, usually specialty treatment that UNHCR cannot provide through its own system of care, are charged to Syrian patients at the subsidized rate for non-Jordanians if individuals pay at the point of service. If individuals cannot pay, then UNHCR is billed at the much higher foreigner rates.

That policy change should relieve, but not eliminate, the fiscal pressure resulting from the influx of Syrian refugees on MOH moving forward, though the increased demand for health services in the north will continue through the foreseeable future so long as the conflict continues in Syria, and very likely, to a lesser extent, beyond the end of that conflict. The GOJ Jordan Response Plan indicates that the total cost of Jordan's hosting up to a million refugees was $850 million, and an additional cost to the health sector of around $93.6 million.[42] Since the High Health Council's most recent National Health Accounts Review of health finance data through 2012, it is difficult to confirm these estimates. However, the variance between MOH spending projections for 2013 and actual spending recorded in this year's budget was 25 percent, or JOD 158 million. Not all of that growth in MOH spending can be attributed to the influx of refugees (such as a 40 percent increase in management and support services or a near doubling in human resource management costs despite lower numbers of clinical staff). However, there is likely a partial relationship between the increase in total population, estimated at around 20 percent (assuming 1.4 million Syrians), and increases in health spending of:

- +45 percent in primary care;
- +15 percent in hospital-based care; and
- +22 percent in drug procurement.

Clearly, in areas of high concentrations of Syrians, attending to their needs has crowded out some Jordanians from receiving the care they have come to expect. Since 2012, the ratio of hospital beds per 1,000 inhabitants has declined from 1.8 to 1.75, reflecting the influx of Syrian patients into the national health system outside the UNHCR response on a national aggregate basis.[43] However, according to MOH data, the ratio of hospital beds per 1,000 inhabitants has remained quite steady since 2010, fluctuating between 1.85 and 1.9 over the period 2010-2014.[44]

However, the availability of quality data from GOJ is an essential ingredient to evaluating the economic cost of the Syrian crisis on the health system. While it is logical to link the refugee crisis with the spike in public spending, until productivity data is released by MOH and HHC that reflects proportionally higher numbers of patient encounters, occupancy rates, and other indicators that rule out variables other than population change, one cannot draw a definitive link.

40 Jordan Response Plan for the Syria Crisis 2015. Executive Summary.
41 UNHCR Temporary Health Policy for Out-of-Camp Refugees, December 28, 2014. Received via email from UNHCR.
42 World Bank Health Finance Review; GOJ Rapid Response Plan.
43 World Bank Health Finance Review 2014.
44 MOH Statistical Handbooks 2010 through 2014.

3.2 AGGREGATE BUDGET TRENDS

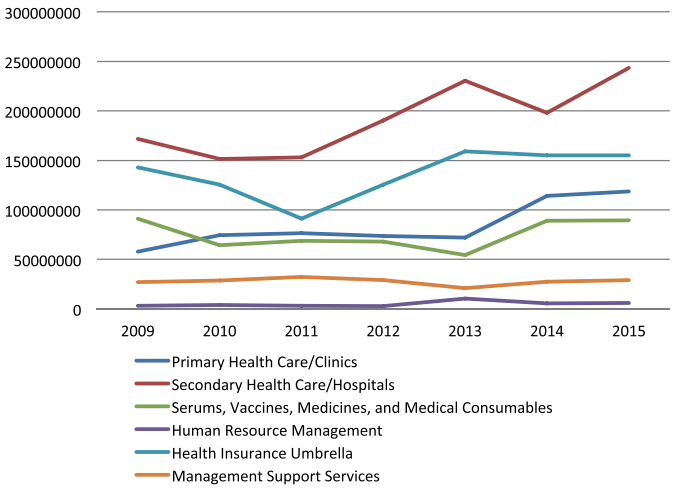


Figure 3.5: Ministry of Health Budget by Program, 2009-2015 (Source: Budget Laws 2011, 2013, and 2015)

Since the global financial crisis, the Ministry of Health's budget has nearly tripled in nominal terms and more than doubled in real terms, while total domestic revenue has declined by a third over the same time period. This dynamic is also reflected in broader financing trends, demonstrating a shift in the burden of healthcare costs from private to public spending along with the external shock of Syrian refugees.

This section will analyze trends in the different programs within the ministry's budget to diagnose the areas of increased spending and identify potential savings and efficiency gains. At the same time, it will also benchmark and evaluate the Key Performance Indicators—both performance against those indicators and the relative value of the indicators themselves, set out by the different program budgets and provide an assessment of value for taxpayer money delivered by the Ministry of Health in particular.

3.3 PROGRAM BUDGET TRENDS

Overall, the most significant budget increases have been in the Primary Care Program—the size of which has more than doubled since 2007 despite the strong growth in the private medical sector—though it is still far behind the Secondary Care/Hospitals program. Through 2012, the dynamics of the budget were much more of growth in Secondary Healthcare/Hospitals, though that momentum appears to have slowed in 2013. The entirety of the Jordanian healthcare system is focused on curative care delivered through relatively costly hospital settings, suggesting that although Jordan has very good health outcomes given its income levels, it is likely paying more than it must to achieve those outcomes. The most recent 2013 budget figures may signal a reversal in that trend, but the shift toward primary care spending could also be temporary.

The second main theme is a trend that could have been viewed in the 2011 PEP Report as a temporary measure by the government to shoulder a greater burden of healthcare costs to alleviate the burden of a poor economy, but given the continuation of that trend, it should now be more definitively viewed as a new entitlement that has solidified and entrenched medical coverage into citizens' expectations of government, to which they should not be expected to significantly contribute. That entitlement mentality is difficult to legislate against or otherwise change now that it has taken root, as the Kingdom has confronted in its efforts to reform other subsidy programs (e.g. food, energy, water). This dynamic is reflected most clearly in growing spending on serums, vaccines, and pharmaceuticals and expansions to the Civil Health Insurance umbrella.

Primary Care/Health Services Centers Program

This program is MOH's main vehicle for delivering preventive, outpatient medical services throughout the country. The program operates 1,510 clinics of different sizes and capacities, which are collectively responsible for:

- Establishing new and maintaining existing physical space for clinics;
- Monitoring and combating the spread of communicable diseases;
- Delivering health education and healthy lifestyle programs designed to combat the rising prevalence of non-communicable diseases;
- Implementing community nutrition programs;
- Delivering services and programs that improve health behavior patterns, specifically for children; and
- Environmental health, specifically of water quality.

The Primary Health Care/Health Service Centers Program encompasses the activities of four distinct types of centers: comprehensive, primary, secondary, and maternal health. Also included in this program is a large number of dental and mother and child health centers. Figure 3.6 shows the variance in primary care centers by type and location from 2009-2014.

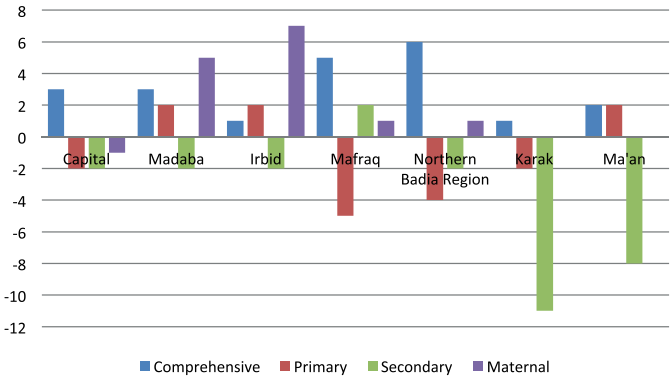


Figure 3.6: Variance in Clinics by Governorate (Source: MOH Statistical Book 2014)

Since 2009, 28 new comprehensive care centers have opened while 34 secondary care clinics closed,[45] signaling a shift in the preferred clinic format that MOH uses to deliver primary health care. Similarly, 21 maternity and child health care centers have been added.[46] Dental clinics also saw robust growth with 48 new clinics opening since 2009.

The services offered by the different types of centers vary. Comprehensive health centers, for example, generally offer a full range of services, including, at a minimum, obstetrics and gynecology, internal medicine, pediatrics, and outpatient surgery. A dental or mother and child care center is generally co-located with each comprehensive center. Primary health care centers, on the other hand, offer outpatient services by general practitioners and, in some cases, family practitioners. They may also have a dental and/or a mother and child care center co-located. The opening of new comprehensive care centers should consistently trigger an opportunity to consider merging existing primary care clinical staff with the comprehensive care clinic as the breadth and depth of services available there will be more attractive to patients.

Together, the centers are MOH's primary vehicle to promote family planning, school health, and behavioral changes through patient information. They also serve as the "front line" in combating communicable diseases and developing non-communicable disease registries and they function as screening mechanisms for early detection of diseases.

The emerging epidemiological challenges confronting Jordan are increasingly of chronic and/or non-communicable disease. Unhealthy lifestyle choices like the high incidence of smoking, particularly among men, and unhealthy diets are growing in prevalence and causing the spike in diabetes and increases in heart disease rates. Diabetes far outstrips all growth in morbidity in terms of Disability Adjusted Life Years from 1990-2010, an international standard measure of morbidity developed by the WHO, with mental health diagnoses of major depression also emerging (likely underdiagnosed in the past). Primary and preventive care plays a critical role in educating and sensitizing people to the impact of lifestyle choices on their health and Figure 3.7 below demonstrates the non-communicable diseases (in blue) that primary care providers can help prevent and address through lifestyle change and advice.

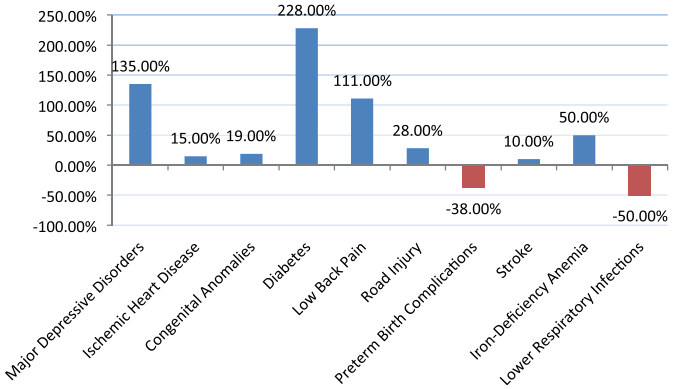


Figure 3.7: Percent Changes in Disability Adjusted Life Years by Morbidity, Jordan, 1990-2010[47]

Human behavior is also heavily influenced by context and messages received from surrounding social groups and society. Behavior change communications for healthy lifestyles is an evidence-based approach to complement clinical care and advice by addressing root causes of many chronic non-communicable diseases (such as smoking for heart disease and a wide range of cancers, obesity for diabetes, and disabilities). MOH has a separate budget for stop-smoking and health awareness campaigns, which could be utilized increasingly as a tool to enhance primary care outcomes and combat the growth in lifestyle-affected, non-communicable diseases nationwide. By broadening the scope of how primary care can address these emerging health challenges, MOH can take greater ownership for not only treating the effects of disease, but also for taking innovative approaches to prevent those diseases.

The Primary Care Program's KPIs are intended to provide performance information to the GBD and Jordanian citizens on the value for money that it provides. "Actual values" for 2012 are equal to those reported in 2011 across the board in the MOH budget, thus this chapter must recommend that

45 These are referred to as "peripheral health centers" in the MOH Statistical Handbooks.
46 Ministry of Health Statistical Books 2013 and 2014.
47 Chart from World Bank Health Finance Review, with data from Institute for Health Metrics and Evaluation, 2010.

Budget KPI Review

Performance Indicator	Base Year	Base Value	Actual Value 2011	Actual Value 2012	Actual Value 2013	Initial Evaluation 2014	Target Value 2015
Percentage of public drinking water supplying systems compliant with the health standards to total supplying systems	2008	92	92	92	96.5	97	97
Percentage of children at the age 0-12 months who took all vaccines of the national program for vaccines	2008	99	97	97	99	98.5	98.5
Percentage of newborns subject to newborn survey to total births annually		32.5	60	60	75	80	80
Percentage of children under the first year who have been transferred to disabilities diagnosis of total checked children			2	2	.5	.9	1
Number of health centers that obtained accreditation certificate at the Health Ministry (accumulative value)					36	86	101
Percentage of health centers that obtained certificate of national objectives for quality and safety of healthcare at the Health Ministry						70	75
Number of families benefitting from early childhood parental care services	2,010	24,000	24,000	24,000			

Figure 3.8: Primary Health Care/Health Services Centers Program KPIs

data for these indicators be rigorously collected and reported for these KPIs to have any significance in the budget review process. Updated figures for 2013 and a Self-Evaluation were collected and reported, along with revisions of what KPIs are reported against, with dashes signifying old indicators to be abandoned as budget KPIs in the future. Progress against KPIs in this program reflects that.

- According to the 2014 Self-Evaluation, water quality has improved markedly from the base year (2008), but MOH is not solely responsible for this indicator, making it difficult to evaluate whether and to what degree MOH should be credited for reaching the target.
- Vaccination rates for children under 12 months have gone down, but can still be considered universal. The slight dip is perhaps understandable given the influx of Syrian refugee children who received their primary care outside the Jordanian health system. Improving performance here remains an important goal for the health system. How refugee children are counted in these statistics each year should be clearly disclosed by MOH.
- Percentage of newborns subject to the newborn survey appears to have increased, but this indicator concerns data collection and is better suited as a management indicator internal to MOH, as it does not offer GBD information on primary care performance in Jordan.
- For the KPI "percentage of children under 12 months transferred to a disability diagnosis," the evaluated value of 0.5 percent appears to indicate strong performance in preventive care, though this report would caution against the potential for creation of perverse incentives by managing this indicator too rigidly and preventing children from receiving disability care when medically necessary, particularly because treatment of disabilities early in life can prevent more pernicious and costly issues later in life.
- Two health center accreditation indicators were added as KPIs in the 2015 budget and while these are good indicators of clinical quality and adherence to standards, there is concern about increasing the number of KPIs. This chapter recommends a maximum of 5 per program and preferably 3 to encourage focus on the very top priorities.
- "Number of families benefitting from early childhood parental care services" has been discontinued as a budget KPI, which this chapter fully supports.

There has been significant improvement in the KPIs used by the Ministry of Health from 2014 to 2015 budget proposals. Zero-to-12 month vaccination rates are an excellent indicator of provision of post-natal care and serve as a proxy for maternal child health more broadly and should continue to be rigorously evaluated, disaggregated by type of vaccines (DPT3, Hepatitis B, Polio, etc.)

Governorate	Population[49]	Total No. of Beds	No. of Beds by Sector					Rate per 10,000 of population
			MOH	RMS	JUH	KAH	Private	
Capital [50]	2,584,600	6,842	1,674	1,326	577	0	3,265	26
Irbid	1,188,100	2,008	818	292	0	523	375	17
Zarqa	994,500	940	399	226	0	0	315	9
Balqa [51]	447,200	388	388	0	0	0	0	9
Mafraq	313,700	243	203	0	0	0	40	8
Karak	260,400	430	206	126	0	0	98	17
Jerash	200,300	174	159	0	0	0	15	9
Madaba	166,900	188	158	0	0	0	30	11
Ajloun	153,500	130	130	0	0	0	0	8
Aqaba	145,500	280	0	193	0	0	87	19
Ma'an	126,900	203	203	0	0	0	0	16
Tafilah	93,400	106	0	106	0	0	0	11
Total	6,675,000	11,932	4,338	2,269	577	523	4,225	18

Figure 3.9: Hospital Beds by Population, by Governorate 2014

Sector	No. of Beds	Death Rate (%)	Avg. Length of Stay	Occupancy Rate	Outpatient Visits (%)	Surgical Operations (%)	Deliveries
MOH [52]	4,468	1.8	3.2	68.0	41.4	25.9	44.1
RMS	2,439	2.9	3.9	82.0	39.3	19.2	19.1
Jordan University Hospitals	534	1.7	4.0	69.0	5.1	6.3	2.4
King Abdullah University Hospital	501	1.9	3.6	62.6	3.0	4.0	2.0
Private [53]	3,788	0.9	2.1	46.8	11.2	44.5	32.4
Total	11,730	1.7	3.0	63.9	100.0	100.0	100.0

Figure 3.10: Comparative View of Kingdom Hospitals by Managing Institution

	2010	2011	2012	2013	2014
Admissions	337,708	332,607	339,628	347,929	354,699
Alive	332,276	326,917	334,017	341,744	348,065
Dead	5,322	5,536	5,454	6,157	6,351
Death Rate %	1.6	1.7	1.6	1.8	1.8
Occupancy Rate %	68.2	66.8	68.3	68.0	65.4
Average Length of Stay	3.1	3.1	3.3	3.2	3.1
Surgical Operations	91,329	79,567	88,173	87,422	90,048
Deliveries	77,909	73,340	73,399	74,188	78,823

Figure 3.11: MOH Hospitals Critical Statistics, 2009-2013

However, given Jordan's public health challenges, primary care indicators should include indicators on the growth in non-communicable disease. Specifically, this report recommends tracking the growth rate of diabetes due to its status as the fastest growing source of morbidity in the Kingdom and deploying more resources to slow its growth. Measuring this growth and holding health officials accountable for

49 As estimated by Department of Statistics, 2012.
50 Figures do not include Karameh (150 beds), National Center for Addict Rehabilitation (30 beds).
51 Figures do not include National Center for Psychiatry (265 beds); Al Rasheed Al Nafsi (120 beds).
52 Karameh Hospital not included.
53 Data from Al Ahli, Al Aqsa, Al Jazeera, Melaad, Al Doaly, Al Zarka, Al Watanee, and Malhas Hospitals are not included.

combatting it through the budget process would give MOH a strong incentive to utilize budget resources in innovative ways to address the most important emerging health trends. Smoking cessation treatment program utilization, coupled with total prevalence of smoking and childhood obesity rates would also be excellent indicators of the most important issues dictating the direction of primary care in Jordan.

In exchange, this report recommends discontinuing the use of:

- The water quality indicator as MOH is not solely responsible for this task;
- The newborn survey indicator as it measures an output and not an overall health outcome; and
- The two accreditation indicators as budget KPIs, though they should remain high-level management indicators to track progression in modernizing primary care.

From a strictly fiscal perspective, spending more money on preventing chronic, and therefore expensive and difficult to treat, illnesses is the best way to reduce the cost of curative care. 2013 reflected positive movement in this direction. Over the next 5 years, MOH should rebalance resources toward a revamped primary care effort, complete with a roll-out of electronic medical records, quality data collection and management, and funding and encouragement of behavior change communications and other innovative technologies as a complement to traditional clinic-based preventive care.

These primary care budgets should be built from the bottom up, from clinics together with civil society and patient advocates, feeding upward in an inclusive process guided by experts in behavior-change communications and primary care. The initiatives identified through this process can be funded over the short and medium term by merging low-demand, high-cost hospital facilities with higher-performing facilities and outsourcing to the private sector, without compromising care.

Secondary Health Care/Hospitals Program

This is the largest program in the Ministry of Health (MOH). Hospital care is provided through a network of 31 hospitals comprising 4,783 beds in 2014.[48] MOH estimates that every citizen is within a 30-minute drive of one of its hospitals.

Hospital bed capacity in Jordan went up by 6.1 percent between 2010 and 2014, owing mostly to expansions by MOH (320 additional beds) and an increase of 457 beds in the private sector.

The overall objective of the Secondary Health Care/ Hospitals Program is to provide and supervise quality health services through all hospitals nationwide, per international standards. Services provided under this budget include:

Budget KPI Review

Performance Indicator	Base Year	Base Value	Actual Value 2011	Actual Value 2012	Actual Value 2013	Actual Value 2014	Target Value 2015
Occupancy percentage in hospitals	2008	70	66.8	66.8	64	65	66
Number of the Ministry's hospitals that were accredited by the Health Care Accreditation Council	2009		4	4	4	12	
Infection occurrence rate inside the Ministry's hospitals (%)	2008	10.4	8	8	8	5	
Number of hospitals in which dialysis departments work in a 3 shift system	2010	3	2	2	5	6	7
Number of hospitals where at least one specialist in emergency medicine works there	2009	5	2	2	4	4	5
Number of hospitals re-accredited in the Health Ministry					4	5	5
Percentage of hospitals that obtained the certificate of national objectives for quality and safety of health care at the Health Ministry						70	75
Number of hospitals where at least one pediatric specialist works	2010		0	0	4	6	

Figure 3.12: Secondary Health Care/Hospitals Program KPIs

48 According to the Ministry of Health Statistical Book 2014 there are 104 hospitals and 12,497 beds total across Jordan. 31 hospitals are the responsibility of the Ministry of Health.

- Establishing new and expanding existing hospitals;
- Seeking accreditation for those hospitals; and
- Providing specialized and emergency hospital-based care.

Figure 3.9 shows hospital beds by population and by governorate, broken down by each of the main healthcare providers (notable exceptions are listed as footnotes to the chart). Hospital bed capacity provides contextual information on the amount of secondary and tertiary care capacity with Amman well ahead of all other governorates, bolstered significantly by the private sector which provides 45 percent of beds in Amman.

Figure 3.10 provides aggregate efficiency and quality-of-care indicators along with aggregate patient types to further contextualize hospital care in Jordan. First, in terms of hospital capacity, the chart below demonstrates the wide variance in the supply of hospital beds by 10,000 in population.
Further to the comparison of institutions in Figure 3.10, the main indicators specific to MOH have held steady since 2009, also notably not reflecting significant aggregate increases due to the influx of Syrian refugees. Average length of stay holds steady over three days and occupancy rates in the high 60 percent range with surgeries and deliveries holding steady.

Important lessons learned from the evolution of the indicators in Figure 3.12 above are:

- Occupancy percentage, benchmarked at 70 percent in 2008, is an excellent indicator of overall efficiency of the hospital system. By international

Hospital	No. of Beds	Occupancy Rate	Average Length of Stay
Al Basheer	1,101	70.1	3.2
Prince Hamza	433	63.5	3.6
National Center for Psychiatry	265	64.4	28.6
Al Zarqa	221	74.8	2.9
Princess Basma	202	92.6	3.1
Prince Faisal Bin Al Hussein	178	69.2	2.7
Jerash	159	46.2	2.5
Al Hussein/Salt	152	62.4	2.8
Dr. Jameel Al Totanji	140	76	2.9
Ma'an	131	66.3	4.9
Al Iman	130	45.7	2.4
Al Karak	124	59.4	2.1
Al Nadeem	120	81.6	3.2
Prince Al Hussein Bin Abd Allah II	118	46.3	2.6
Princess Rahma	112	94.4	3.1
Al Mafraq/Gynecology and Pediatrics	112	101.4	3.4
Al Ramtha	110	54.6	2.1
Princess Badea	98	77.8	2.2
Princess Raya	94	57.5	3.1
Ghor Al Safi	82	77.3	3.0
Mu'ath Bin Jabal	75	41.4	2.5
Queen Rania Al Abdullah	72	39.2	2.4
Al Mafraq	70	86.6	3.1
Al Yarmouk	67	55.6	2.8
Al Shuneh (South)	60	35.9	2.4
Abu Obeidah	60	40.8	2.1
Princess Eiman/Ma'adi	58	38.2	2.2
Princess Salma	38	48.4	2.0
National Center for Addiction	30	31.1	11.7
Al Rueshid	21	17.6	2.2

Figure 3.13: Top and Bottom 5 Performing Hospitals in terms of Occupancy Rates (Source: MOH Statistical Book 2014)

comparison, 80-85 percent is considered an optimal occupancy level,[54] meaning that the 2013 value of 64 percent is considerably less than would be hoped in efficiency terms. The Royal Medical Service, by contrast, has consistent aggregate occupancy rates in the low 80 percent range;

- Average length of patient stay (ALOS) is also an excellent, internationally accepted efficiency indicator for hospitals. When compared to the private sector on ALOS, MOH performs poorly. The private sector's death rate is also half that of MOH. The type and complexity of cases each institution receives is an important variable and mitigating circumstances exist, but targeting a more aggressive ALOS goal would increase overall efficiency in MOH considerably (the target for 2016 is 2.9), with many hospitals in the system performing closer to an ALOS of 2;
- Accreditation is also an excellent measure of quality and adherence to international standards. Though this is a relatively new area of interest for MOH, targets for this indicator could be made more ambitious;
- If used, the number of re-accreditations should instead be made a ratio of hospitals re-accredited to hospitals evaluated for accreditation as the number by itself provides inadequate context;
- Infection occurrence rate is an excellent measure of facility management and a proxy for public confidence in the facility, but appears to have been eliminated in favor of other indicators;
- The remaining indicators pertain more to inputs and offer minimal additional value to budget analysts. While these indicators are useful management indicators to evaluate dialysis care, the presence of emergency capacity and pediatric expertise, each of these indicators would be more usefully expressed in terms of outcomes (e.g. pediatric bed occupancy rates, emergency room wait times, trauma death rates, etc.).

Overall, 9 indicators is above the recommended maximum of 5 (simply to focus the attention and energy of managers to the most important issues). Accreditation could be stated more broadly and made into one indicator, dialysis shifts can be made a management rather than budget indicator, and the presence of particular clinical specialists is also more appropriately a management or Human Resource Development program issue.

Internationally, it has been estimated that an empty hospital bed costs up to two-thirds as much to maintain as an occupied hospital bed, due to fixed capital investment, maintenance, and personnel costs. If this broader standard holds in Jordan, then there are opportunities to achieve significant cost savings by reducing the number of beds maintained.

Figure 3.13 below demonstrates the wide variance of occupancy rates across the Kingdom, and in some cases reveals that some of the busiest hospitals are neighbors to the least productive. In particular, Irbid has the three busiest adult hospitals in the country (Al-Mafraq Pediatric and Obstetric was excluded not to count Al-Mafraq Hospital twice, which is also listed among top performers). Two hospitals, Princess Rahma and Princess Basma display occupancy rates over 90 percent. Princess Badea Hospital shows 77.8 percent occupancy, but also hosts the 75-bed Mua'th Bin Jabal Hospital with an occupancy rate at 41.4 percent. Princess Raya and Abi Obaidah hospitals, also in Irbid, have occupancy rates under 60 percent (57.5 percent and 40.8 percent, respectively). The 523 beds within the state-of-the-

	2000	2001	2007	2008	2011	2012
Total Expenditures	160.2	184.6	344.9	496.5	427.8	445.4
Per capita Pharmaceutical expenditures	31.8	35.6	60.3	84.9	68.46	69.73
Pharmaceutical Expenditure as a percent of GDP	2.70%	3%	3.2%	3.1%	2.09%	2.03%
Pharma as a % of total health expenditure	29.10%	30.90%	34%	35.9%	27.07%	26.75%
Public	-	5.70%	11.30%	13.8%	12.22%	12.17%
Private	-	25.20%	22.7%	22.1%	14.85%	14.58%
Public	19.80%	18.50%	33.40%	38.40%	45.12%	45.49%
Private	80.20%	81.50%	66.70%	61.60%	54.88%	54.51%

Figure 3.14: Trends in Pharmaceutical Spending (Source: MOH Statistical Book 2013)

54 Studies by the Australian Medical Association and the Australasian College of Emergency Medicine, Irish Medical Organization, and UK Department of Health indicate that occupancy levels over 85% can be problematic for providing acute and emergency care in some situations, and should be avoided. OECD countries have an average occupancy rate of 75%, with the UK setting its target occupancy rate at 82% and the US Department of Health and Human Services at 80%. http://www.adf.com.au/archive.php?doc_id=168

art King Abdullah University Hospital outside the city center offers further rationale to re-examine the utility of maintaining low-productivity hospitals there. 11 out of 30 hospitals run by MOH have occupancy rates of 50 percent or less. These findings indicate both oversupply and significant misallocation of hospital resources in overlapping jurisdictions.

A series of policy questions must be confronted by MOH as a result of this finding and they should also be posed by the GBD due to near-flat budget growth expectations and rapidly growing NCD burdens for which the Primary Care program is best suited to address and prevent.

- Specifically for Irbid, is there a short and/or medium-term rationale for keeping low-productivity hospitals open in the presence of alternative hospitals with capacity? Or should that human resource capacity be reallocated and hospitals shut, sold, or repurposed? Could low productivity hospitals in sparsely populated locations be better served by a comprehensive care center with rapid transfer options (there is no comprehensive care center near Mua'th Bin Jabal or Yarmouk hospital, for example)?
- In Amman, despite having the highest population density, MOH does not operate a single hospital with an occupancy rate in the optimal range (80-85 percent), with the closest being the massive Al-Basheer hospital with an occupancy rate in the mid-70 percent year-on-year. Given the presence of the private sector, RMS for military families, and university hospitals, is there a compelling reason to maintain sub-optimal productivity among MOH hospitals in Amman? If not, MOH should prioritize reductions in hospital capacity and reallocate scarce human and capital resources elsewhere.
- Given the comparison with the private sector with an ALOS of 2.1 currently, why is MOH only targeting an ALOS of 2.9 in the future?

Serums, Vaccines, Medicines, and Medical Consumables

The Procurement and Supplies Directorate in MOH manages the procurement of needed serums, vaccines, medicines, and medical consumables. This is done

Budget KPI Review

Performance Indicator	Base Year	Base Value	Actual Value 2011	Actual Value 2012	Actual Value 2013	Actual Value 2014	Actual Value 2015
Percentage of medicine local procurement (out of central tenders) to total medicine tenders	2008	12%	0.99%	0.99%	0.02%	0.65%	0.66%
Percentage of medicines, vaccines and consumables destroyed annually	2009	0.0015	0.00083	0.00083	0.0003	0.0003	0.0003
Number of times chronic disease medications to (hypertension, diabetes and cholesterol) are missing from health directorates for more than one week in a year	2008	20	7	7	3	2	1
Percentage generic medicines to total value of purchased medicines	2008	40.00%	55%	55%	65%	65.00%	-
Percentage of children vaccines and plasma tenders to total vaccines and plasma tenders	2010	65.70%	65.70%	65.70%	65.70%	65.70%	-

Figure 3.15: Serums, Vaccines and Medical Consumables Program KPIs

	MOH	RMS	JUH	KAUH	Private	UNRWA	Total
Physicians	4,476	1,611	520	419	11,560	18,697	28.6
Dentist	761	288	125		5,600	6,804	10.4
Pharmacist	484	243	31	27	10,852	11,639	17.8
Registered Nurses	4,686	3,307	545	443	8,710	17,736	27.2
Associate Degree Nursing	2,341	2,313	93	45	0	4,792	7.3
Assistant Nurses	2,261	0	66	44	1,692	4,247	6.5
Midwives	1,455	153	4	16	822	2,484	3.8

Figure 3.16: Health Personnel by Selected Category and Employer as of2013 (Source: MOH Statistical Handbook 2014)

through an annual tender process, conducted by the Joint Procurement Department (JPD) based on a request from MOH. The Directorate stores these supplies at locations throughout the country and distributes them to facilities in the governorates as needed. If shortages arise prior to delivery of the next round of annual procurement, then local procurement can be authorized, though at relatively high cost. [55]

In 2009, pharmaceutical expenditure spiked from JOD 60 million in 2008 to over JOD 90 million and fears of a longer-term increase in the cost of medical consumables swirled. In 2012, the cost to the government of drugs, vaccines, and other consumables came back down to earth, increasing only nominally since 2008.

As seen in the chart below, pharmaceutical expenditure as a percent of GDP and total health expenditure had actually gone down as of 2012. Since the 2011 PEP Report, pharmaceuticals et. al. cost 27 percent of total health expenditure versus 35 percent in 2008 and even higher in 2009. However, though data are not available on total pharmaceutical spending in the economy as of this writing, MOH spending in 2013 spiked to levels similar to those of 2008. Spending in 2013 was JOD 89.4 million with projected spending in 2014 of JOD 89 million, likely reflecting the increase in demand from Syrian refugees. Perhaps surprisingly, the budget KPIs for 2013 do not reflect an increase in local procurements (higher cost), leading one to conclude that greater quantities purchased are responsible for the uptick and not a deterioration in price terms from prior years.

Of interest to MOH and GBD analysts is that the trend in public coverage of medical consumables has risen from only 20 percent of spending on drugs to close to a 50/50 split between private and public funding sources. With demand up from increased population pressure, spending on medical consumables is volatile with the potential for large swings up or down rather than a steady rate of growth.

The program does not now separately identify the relative amounts and values of medicines, vaccines, and serums. For example, it should identify separately the drugs, amounts, values of drugs, etc., that have to be destroyed because of expiration dates. If its data system includes expiration dates, then it is able to sell to the private sector, at a significant discount, those drugs that it cannot use within the coming year. Assuming there is a demand for them in the private sector, this would make cheaper drugs available, reduce total spending on pharmaceuticals, and provide revenue to the government.

The 2012 NHA identifies provider prescription behavior as the most significant reason behind pharmaceutical spending, because of a lack of evidence-based, enforced standards and regulations governing what treatments are prescribed under what circumstances. Compounding this is the general lack of continuing medical education, but what does take place is mostly sponsored or organized by private pharmaceutical companies.[56] The Clinical Pharmacology Department at MOH has developed and distributed evidence-based standards for prescribing the most-commonly used drugs, but continuing medical education and overall change management has not been sufficient to ensure broad compliance with those standards. Increasing compliance will lead to evidence-based first line treatment and higher levels of generic prescriptions than currently targeted (see KPI discussion below), and overall cost savings for taxpayers.

Important lessons learned from the evolution of the indicators in Figure 3.15 above are:

- Percentage of local procurements is a good indicator of the quality of MOH planning. The future target rightly is not zero as emergencies, outbreaks, and difficult to forecast contingencies are always possible, but the program could aspire to improve, particularly as the flow of migrants has stabilized;
- The amount of expired or tainted drugs destroyed annually is similarly a good indicator of good planning and a high functioning medical supply chain. The targets set are good relative to the already high performance against this indicator and could be improved ever further if the recommended procedure of selling soon-to-expire drugs is implemented;
- Stock-outs of chronic disease drugs is a good indicator of planning and supply chain management, though it is questionable what additional value it adds for budget managers over the previous two indicators;
- While generic medicines generally imply lower costs, sticking rigidly to this target could compromise care in particular cases and the 2015 budget seems to have rightly stopped tracking this indicator for the budget; and
- The final indicator on pediatric vaccines and plasma is a management indicator and not relevant to evaluating program performance. The 2015 budget seems to have rightly stopped tracking this indicator for the budget.

55 Interview with MOH Financial Manager. Authorization for local procurement was not done in 2014; however, it is a clause within the General Supplies System for more than ten years.

56 2012 Jordan NHA, HHC.

Since this program is highly complementary with the clinical care programs, it may make more sense to consider re-organizing this budget so that pharmacology indicators can be evaluated together with clinical outcomes, rather than evaluating pharmacology strictly on financial performance; currently more commensurate with a procurement department's KPIs. For instance, compliance rates of clinicians with prescription standards or percentage of medical errors arising through the prescription process would be good indicators of the effective and safe clinical use of pharmaceuticals. This chapter recommends that MOH reconsider how this program is managed by reintegrating it into clinical programs so that pharmacy is more effectively tied to a system of quality care provision within MOH bureaucracy.

Human Resource Development

The Human Resource Development program is primarily concerned with training MOH employees and the attraction and retention of health professionals needed by MOH to provide clinical care. The program overall is quite small and focuses mostly on training and continuing education. Low budget execution rates of even this low annual amount points to the need to reinvigorate the culture of continuous education so important to a culture of quality and evidence-based clinical practice among providers. In addition, the major challenge facing this program is retention of clinical employees (primary care physicians, specialists, and registered nurses in particular). Therefore a renewed focus on tactical interventions to improve retention could yield significant dividends, saving the ministry money in the medium-term.

"Brain Drain" is cited as one of the most important problems confronting MOH, but the ministry has seemed to reverse the trend of skilled professionals leaving public service, as seen in Figure 3.17 below, where recruitment of physicians (MDs) and registered nurses (RNs) is up significantly since 2009 and the last PEP Report. The drop in assistant nurses is more than compensated for by the increase in associate nurses and RNs. So in terms of aggregate numbers, the presence of qualified personnel should not be a hindrance to quality care.

That being said, the 2015 MOH budget reported a significant attrition rate of physicians and nurses anecdotally attributed to increased workloads with Syrian refugees combined with the chronic issues of low salaries relative to other market opportunities. MOH is targeting a return to normal levels of attrition, but the steep drop in 2013 deserves close monitoring over the next several years and renewed attention to policies that can strengthen retention and recruitment as discussed below.

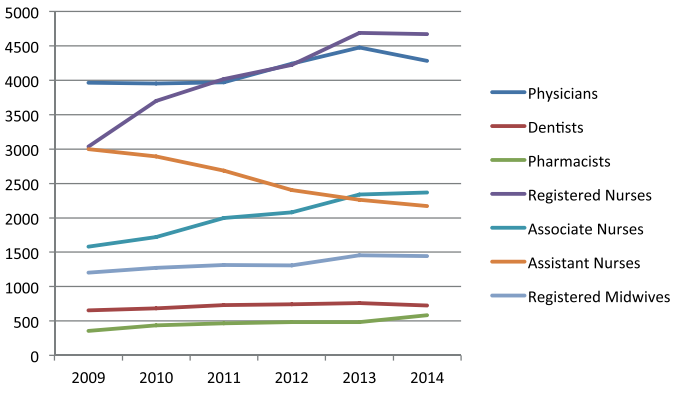


Figure 3.17: MOH Personnel by Clinical Profession (Source: MOH Statistical Book 2013 and 2014)

The design and preparation of incentives and penalties to increase recruitment and retention will be an important component of MOH's long-term needs. The chart above indicates the trends by profession in the shares of the overall availability of health professionals that MOH employs. A more detailed description of where the various types of physicians, (administrative, general practice, specialty, etc.), are employed, (by headquarters, hospital, and clinic assignments), would be a useful addition to the Annual Statistical Book published by MOH.

Budget KPI Review

Performance Indicator	Base Year	Base Value	Actual Value 2011	Actual Value 2012	Actual Value 2013	Target Value 2015
Percentage of graduates of the Ministry's colleges and institutes who passed the comprehensive exam to total graduates of these colleges and institutes	2008	90%	90%	90%	87%	88%
Percentage of employees who have been trained to total employees in the Ministry	2009	14%	30%	30%	35%	35%
Number of technical staffs (doctors) brain drain from the Ministry annually to total number of doctors	2009	5.60%	1.60%	6.4	2.2%	2.1%
Percentage of technical staffs (nurses) drained by the Ministry annually to overall number of nurses	2009	6.20%	1.60%	5.1%	1.9%	1.9%

Figure 3.18: Human Resource Development Program KPIs

The major recruitment and retention difficulty experienced by MOH is the ability to retain clinical physicians, as opposed to physicians in administrative positions. According to MOH staff, the principal difficulty is low salary levels and compensation practices, e.g. the treatment of allowances that may represent as much as 500 percent of base pay, are disallowed in certain circumstances and apportioned to all of MOH rather than targeted toward high-value, "high risk" (of departing) civil service staff.

Jordan is part of a larger physician labor market that includes Saudi Arabia and the Gulf states. Thus, MOH must compete most immediately with both the private health sector in Jordan and the wider geographic area surrounding Jordan. As part of its mission, MOH provides residency training opportunities for physicians. For both recent medical graduates and trained residents, however, anecdotal estimates of annual turnover are high. Documenting this turnover in order to design appropriate interventions is an important task.

Physicians who receive residency training at MOH hospitals make a commitment of two years of MOH service for each year of residency training. Nevertheless, "buy outs" are relatively inexpensive: as little as JOD 2,000 for each year of unfulfilled commitment. Such "buy-outs," particularly in light of the potential earnings available to qualified specialists in the private sector and Gulf countries, suggest an undervaluing of the residency training provided by MOH. The Human Resource Management program should collect and maintain data on clinical staff's reasons for leaving the ministry and develop better financial and non-financial incentives to improve retention, recognizing that the Civil Service pay scale is unlikely to change significantly enough in the short-term to financially compete with offers from the private sector in Jordan and abroad. However, win-win exchanges with medical students in exchange for years of service, particularly in underserved parts of the country, are possible, but remain underutilized (due to the ease of buyouts to escape the commitment) ultimately leaving MOH facilities understaffed.

Important lessons learned from the evolution of the indicators in Figure 3.18 above are:

- Tracking pass rates of students from ministry colleges and training institutes is a decent indicator of educational quality, but suffers from causal issues. This indicator could go up and down for reasons other than the quality of their education, specifically if the exam itself is not sufficiently demanding to ensure quality, certified graduates and it also does not provide context against non-ministry colleges and institutes;
- Percentage of employees trained is far too broad and needs refinement to focus on competencies and results—not simply whether or not an employee received training, which does not indicate that the employee is job-ready;
- Attrition rates of doctors and nurses is a relevant indicator for this program to track and unfortunately both took a blow in 2013 with retention rates returning to the quite negative benchmark levels of 2009, reinforcing the need to reinvigorate a retention strategy.

Expanding Health Insurance Umbrella

The Civil Health Insurance (CHI) Fund primarily exists to provide health insurance coverage to public servants and their dependents, the analog to the Royal

Budget KPI Review

	Performance Indicator	Base Year	Base Value	Actual Value 2011	Actual Value 2012	Actual Value 2013	Initial Evaluation 2014	Target Value 2015
Expanding Health Insurance Umbrella Program	Percentage of citizen covered by civil health insurance	2008	33%	41.3%	45%	44%	46%	47%
	Percentage of poor people covered by the health insurance to total poor people in Jordan	2008	84%	85%	95%	96%	97%	98%
	Percentage of citizen uncovered officially by any type of health insurance	2008	15%	12%	12%	11.3%	8.7%	7.8%

Figure 3.19: Expanding Health Insurance Umbrella KPIs

Medical Service for the military.[57] However, there is a large number of other groups that have been admitted under its umbrella in the name of expanding access to healthcare and mercy to the particularly afflicted. Those covered by the CHI Fund include:

- Public sector employees and their dependents;
- The poor, who have established themselves as such by "social studies," in possession of a card;
- The disabled;
- Blood donors;
- Pregnant women;
- Children under 6 years old;
- Persons over 60 years old; and
- "Other categories". [58]

Those afflicted with costly diseases are insured according to special standards (the Royal Court reimburses the CHI for the cost of treatment), which includes the following:

- Mental diseases according to the minister's discretion;
- Inpatients recommended by the Ministry of Social Development;
- Alcohol, drug addicts, and drug poisoning cases;
- Snake and scorpion bites;
- HIV/AIDS patients;
- Chronic blood diseases including hemophilia, thalassemia, sickle cell anemia, aplastic anemia, inherited immunodeficiency diseases, gamma globulin deficiency, cystic fibrosis, and cancers and their side effects.

The World Bank, MOH, and HHC conducted two assessments using different methods to evaluate the degree of insurance coverage in Jordan.[59] One method used a rapid assessment based on a questionnaire targeted at direct beneficiaries of insurance coverage. The second method was a direct household survey. The outcomes had significant variations in their results, but concluded that between 70-93 percent of Jordanians possess some form of health coverage. The 93 percent figure does not take into account known issues, such as duplicate insurance policies known to be held by a significant percentage of the population. The conclusion is that despite improvement in the data, there remain "severe ambiguities" with respect to total population coverage and the type of insurance coverage that different population groups possess.[60]

Broadly speaking, the insurance coverage of Jordanians breaks down as follows:

- The Civil Health Insurance (CHI or Civil Insurance Program, CIP, which are synonymous) program (through MOH) and Military Health Insurance Program (through RMS) cover 60 percent of the total population. Most of the enrollees in these two forms of coverage are the civil service and their dependents (CIP) and the military and their dependents (MHIP), the Royal Court then grants exceptions for particular illnesses or groups listed above. The CIP is primarily funded through the MOH budget (45 percent) and through household contributions from the insured (49 percent);
- 8-11 percent of Jordanians possess private insurance coverage, almost all of which is employer-provided;
- UNRWA provides preventive care and health education for Palestinian refugees in conjunction with MOH, though UNRWA's budget is a paltry JOD 12.5 million;
- All university hospital employees and their dependents are covered by a different insurance scheme, which accounts for about 34,000 citizens (about 0.5 percent of the population);
- A certain percentage of Jordanian citizens are covered twice by different forms of insurance, but no group has been able to determine what exactly that percentage is, leading to a situation where it is impossible to determine the number or range of citizens that have no form of health insurance with a meaningful degree of confidence.[61]

Disconnected from the other forms of insurance coverage in Jordan, a thorough review of the CIP Fund's performance is of minimal utility. Even a review of budget KPIs sacrifices the context of what the optimal levels of funding are between different sources, the level of public-private cost-sharing desired or possible, and a political commitment to push through structural reforms of the sector to maximize efficiency. Given a strategic goal of universal healthcare coverage, the focus of attention should be on the most cost-effective blend of different coverage for different groups, coupled with their funding sources. The options for achieving this are many, as several developing countries have moved toward, and in many cases achieved, universal health care (e.g. Turkey, Kyrgyzstan, and Colombia). Going back to the fragmented and highly complex system of funding and financing actors in Figure 3.3, the CHI Fund plays a large but incomplete role in that financing picture.

57 CHI coverage include Optional Health Insurance (Articles 30 and 31 of the Health Insurance System)
58 Jordan NHA 2012.
59 World Bank Health Finance Review 2014
60 World Bank Health Finance Review 2014.
61 Jordan NHA 2012, MOH Budget 2015 and World Bank Health Finance Review 2014.

The CHI Fund requires JOD 63 per covered individual as of 2013 (inclusive of household contributions), and the RMS requires nearly twice that at JOD 121 per individual.[62] Coverage under the CHI is clearly a more cost-effective option for expanding the health insurance umbrella given the available options, though private alternatives, including high-deductible/low-premium options, could also provide appropriate and even lower-cost coverage for younger, healthier segments of the population. In general, the government needs to develop a more comprehensive strategy for how to expand health insurance access in pursuit of its strategic goal of universal coverage; the CHI Fund will likely take a central role along with MOH.

- While the value of the first indicator is very significant, what is unclear is what percentage of citizens should be covered by CHI given strategic goals. Specifically, in public health institutions' drive toward universal health coverage, how much will the CIP contribute to that overall goal, assuming the answer cannot be 100 percent, or 100 percent-RMS coverage? Until this more fundamental policy question is answered, the meaning of the value of this indicator year over year is opaque, though it will go some way toward explaining expenditure levels;
- Covering the poor through CHI is a worthy strategic goal, explicitly stated as the purpose of the CIP, and the increase of JOD 45 million in spending appears to have been well spent given the results of this indicator. The target value for this indicator should be 100 percent, though it appears that the use of this KPI has been discontinued, which would be regrettable if true;
- Given the above, the figures listed for coverage are more accurately expressed as a range between 70-93 percent instead of a definitive number.

3.4 FINDINGS AND RECOMMENDATIONS

With very limited fiscal space for new expansions of health budgets for public health service providers, the following recommendations provide practical policy and operational decisions that senior leadership has the power to make and middle management and clinicians can capitalize upon to both improve efficiency and equity across regions without sacrificing quality over the next 3-5 years. While certain issues like increasing decentralization of the budget process likely require policy changes, the practice of increasing ownership and accountability over resource allocations at clinical facilities can be implemented immediately as an operational approach to developing the next fiscal year's budget. Other recommendations—such as strengthening the collection and use of high quality data for decision-making—would be supported by the implementation of a nation-wide Electronic Medical Record system; there is no need to wait for large-scale IT modernization to implement badly needed data collection practices that would support efficiency and service delivery via traditional means. Implementing the recommendations below will yield efficiency gains that allow the government health sector to take tangible steps toward universal health coverage without increasing their current share of the budget. Budget and health officials can work together to ensure that increased value is reaped from every dinar allocated over the next 3-5 years, and in many cases much sooner than that.

Recommendation 1

Finding: One of the key insights of this update is the potential efficiency gains available with decentralized budget planning and management at the health area/district or governorate level.

Recommendation: Decentralize budget process and management authority to the facility level with oversight from health areas/districts.

This chapter recommends that the Ministry of Health conduct an in-depth assessment of hospitals with de-centralized management structures in order to understand lessons and practices from those experiences and then use those lessons to develop and execute hospital-based management transition plans to additional hospitals across the Kingdom.

Additionally, the significant variation in supply and demand for services across governorates suggests that centralized management from Amman does not yield optimal outcomes. This report recommends that the Ministry of Health consider decentralizing management functions to the health district or governorate level and pushing for more budgetary independence (depending on future decentralization reforms) so that managers with more direct and immediate knowledge of needs can make resource allocation decisions in response to evolving productivity.

Recommendation 2

Finding: In its budget request and strategic plan, the Ministry of Health identifies data-driven decision-making as a weakness it seeks to address. Decentralized management, proposed in Recommendation #1, allows

62 2013 expenditure figures divided by number of enrollees in each scheme in 2013. 2013 expenditure figures divided by number of enrollees in each scheme in 2013.

managers to be closer to the context within which data is collected and reported. However, decentralization will only enhance performance and efficiency if high quality data is collected, formatted in machine-readable format, analyzed by capable staff, and reported more rigorously and consistently. The highly questionable "actual values" for 2012 underscore the lack of attention given to developing and using quality data to manage resources and toward results.

Recommendation: Collect and use high-quality, disaggregated, and transparently-available data for management decision-making.

Sub-recommendation 2.1: At a minimum, the Ministry of Health's Information Technology Directorate and Health Economics Directorate should collaborate to collect and analyze productivity data on a monthly basis to compile a one-page "snapshot" through the Health Management Information System. Directors of the six different program budgets can adapt their allocation of resources accordingly at the central level. By the same token, the ministry should develop productivity standards to inform budget planning so that no clinic or governorate has an oversupply of health resources.

Sub-recommendation 2.2: For the Ministry of Health, this report recommends, at a minimum, enforced utilization of the HMIS to collect, collate, and analyze data. A more systemic change would be to begin transitioning primary health clinics to electronic medical records, which have much broader clinical benefits, but will also make data collection more systematic, more immediate, and of higher quality. Requiring use of the electronic system will dramatically improve data availability and quality. Providing this data will also inform the broader health sector National Health Accounts conducted by the High Health Council, which has also requested greater access to data in the 2012 National Health Accounts report.[63]

Sub-recommendation 2.3, to the GBD: This chapter recommends that the General Budget Department require the Ministry of Health to:

- Review its Key Performance Indicators submitted along with its budget—as this report is concerned that the volume of indicators may deflect attention from the most pressing issues;
- Budget a new line item with a reasonable allocation for collecting the data required to report against those indicators to increase confidence in data quality and regular reporting;
- Justify the need for additional human or facility capacity through a comparative analysis of capacity by health district or governorate, and the specific facility/clinic the new spending will benefit;
- Hold the Ministry of Health accountable for using performance data to manage and justify its annual budget requests.

Recommendation 3

Finding: In 2013, each MOH hospital bed is extremely expensive to maintain, on average, ignoring central administration and management costs.[64] Private sector hospital beds remain underutilized at 49 percent occupancy rates compared to 64 percent at MOH and 80 percent for the RMS, but the vast majority of private bed capacity is concentrated in Amman. Building new hospitals has, at times in the past, been a politically-charged gesture rather than addressing a clear gap in the health system. For example the new Zarqa hospital located well outside the city center with only private transport options for most of the local population to get there. The data reveal that despite the underutilization of hospital bed capacity in some jurisdictions, Jordan's hospital bed capacity overall is lower than expected given its per capita income and total health expenditure. Those two factors together strongly suggest that resources are misallocated between geographies; oversupplying some locations (Amman, Irbid, and Ma'an, with Aqaba excluded because all beds are managed by the RMS) and undersupplying others.

The governorate analysis has also revealed significant variations in the available beds by population. The Ministry of Health and university hospitals (Royal Medical Service excepted due to its specific patient base of the military and its dependents and its high occupancy rates that indicate minimal excess capacity) should enhance its partnership with the Private Hospitals Association to develop a 3-5 year action plan to shift patients toward private clinics and hospitals with negotiated reimbursement rates with the aim of reducing capital and operating costs for MOH. To reinforce this recommendation, MOH recommends that specific analysis be conducted on the cost effectiveness of the medical bill for the maintenance of hospital beds in the public sector.

Recommendation: Target aggregate 80 percent occupancy rates for MOH hospitals to match RMS performance.

63 Using data for decision-making is also a tool developed under the HFG Project and can be accessed here: http://bit.ly/1KHszbD

64 According to the 2013 Budget for Secondary Healthcare/Hospitals divided by 2013 hospital bed capacity, each bed may cost as much as JOD 55,000 (JOD 243,400,000/4,468 beds). Though this figure most likely does not take all factors into account, it is illustrative of the extreme costs at play.

Sub-Recommendation 3.1: Expand contracting and referral system with the private sector, in Amman specifically, to downsize excess public hospital bed supply.

This chapter recommends that the Ministry of Health enhance its existing referral regime, targeting an aggregate 15 percent reduction in available MOH bed capacity (or roughly 700 beds using 2014 numbers) to bring occupancy rates to 80 percent, particularly for specialized care due to the availability and prevalence of private hospitals concentrated in the capital. The goal of these referrals is to retire excess MOH hospital bed capacity to reach a more even equilibrium among MOH, university, and private hospitals while also reducing the pressure to recruit and retain MOH-hired specialists on relatively low salaries. Hospital employees could then be redistributed to other health centers as needed. Such a reform would produce equivalent service for significantly reduced cost. A more in-depth analysis should be conducted as to what specific wards, clinics, or specialties have the greatest excess capacity (and conversely which have the least) in order to target patient shifts most appropriately toward currently over-resourced clinics.

Sub-Recommendation 3.2: Re-examine wide disparities in hospital occupancy by health district, and target bottom performers for merger, re-purposing, or sale.

Outside Amman, this report recommends that MOH establish service delivery standards against which it can make data-driven decisions to build, renovate, or close facilities to respond to evolution in demand for publicly-provided health services. For example, in rural areas of the country, rather than building remote hospitals with very low productivity, MOH could develop lower-cost hospital transfer options, including helicopter medical evacuation for very remote regions, to substitute for new construction. Conversely in a location like Irbid, MOH could repurpose, retire, or sell unnecessary buildings to reduce operating costs.

Recommendation 4

Finding: Based on the bulk of public health spending on curative care and recent economic analysis demonstrating the need for improvements in primary care to slow the growth of health costs,[65] this chapter is updating this recommendation. While MOH should develop similar standards for new construction and renovation of primary care or comprehensive care facilities, as this report has recommended for secondary care/hospitals, this review does not find compelling evidence suggesting that there is an over-supply of primary care in the Kingdom—though the planned opening of any comprehensive care centers should trigger a review of whether or not local primary care centers can be merged into the comprehensive care center. One of the most significant reforms MOH could make is to shift significant resources away from curative care—financed in part through implementation of the recommendations above—and toward primary care. The epidemiological transition of the Kingdom toward chronic and non-communicable disease like diabetes, obesity, heart disease, and cancer underlines the need for more effective and available primary care along with healthy-lifestyle education and communications.

Recommendation: Re-distribute existing public resources away from curative care and into primary care.

This report recommends that the GBD require MOH to submit its annual budget with a breakdown by primary and curative care, with supporting raw data available, and aggressive targets for transitioning public spending toward primary/preventive care, therefore shifting some of the burden for secondary and tertiary care to the private sector. Savings for this redistribution in the secondary health care/hospital budget can be found by implementing the first three recommendations.

Recommendation 5

Recommendation: Implement innovative solutions to promote healthy lifestyles and curb growth in non-communicable disease.

Sub-recommendation 5.1: Propose and advocate for the establishment or increase of excise taxes on unhealthy consumer products such as tobacco, high-calorie fast foods, and high-sugar drinks. "Sin Taxes" are a popular means to increase the cost of unhealthy behavior and the Kingdom already has heavy excises in place on alcoholic beverages, so the concept is well-known. The World Health Organization, Rockefeller Foundation, and other global health authorities have recommended heavy tobacco taxes as a means to reduce smoking rates for years. In the context of stagnant public revenues, increasing the tobacco tax is a highly attractive win-win proposition to reduce the high smoking rate among Jordanians and raise badly needed public revenue.

Reducing sugar and calorie intake of the population is also a key to staving off the rapidly growing prevalence

65 Institute for Health Metrics and Evaluation 2010.

of diabetes in Jordan. Experimental efforts in Berkeley, California (soda tax) have embraced a similar economic logic as the tobacco tax—make the behavior that leads to chronic disease more expensive.

Sub-recommendation 5.2: Reorganize health communications under primary care to provide greater means for preventive care to implement behavior-modifying communications strategies as a complement to strengthened preventive care.

Changing behavior, particularly of adults, is rarely successful with a lecture from a doctor on its own. Sustained economic, social, and societal pressure against unhealthy behaviors is the key to combatting their growth. The 2011 PEP Report recommended enforcing "No Smoking" regulations in public places, particularly in government office buildings, and this update agrees with that basic recommendation. But more broadly, the authors of this report believe the expansion of behavior change communication (1) to promote physical activity and exercise, (2) educate the public about healthy eating habits, and (3) smoking cessation, could all have a hugely beneficial impact if the campaigns are designed and executed in ways and communicated by means relevant to populations at greatest risk.

Recommendation 6

Finding: The 2011 PEP Report recommended steps to be taken to create more patient friendly hospitals; this chapter re-emphasizes that recommendation, with caveats.[66] Given current fiscal stressors, improving optional services, such as cafeteria services or gift shops, should not be among top priorities for additional public funding. The functions of cafeteria services, gift shops, and optional pay-services should continue to be contracted to the private sector as hospital-based businesses and re-tendered periodically to ensure quality services. Making MOH hospital beds an attractive competitor for clients may not be the strategic direction that MOH officials wish to pursue given the presence of specialized care in private hospitals and other public centers of excellence, combined with MOH's difficulty in retaining clinical specialists.

Further studies and market research should be done to analyze costs and their drivers in this area so that decisions to outsource to the private sector can be accurately weighed.

Recommendation 7

Finding: Jordan as a country does an excellent job training clinical providers (doctors, nurses, midwives, pharmacists) and the Ministry of Health and Royal Medical Service provides regionally-demanded and recognized medical and clinical (residency) training programs. The downside as articulated by senior Ministry of Health officials, as well as by their annual budget requests, is the departure of doctors from civil service ("brain drain") to more lucrative career opportunities in the private sector or abroad in the Gulf—specialists in particular, saw a significant spike in their attrition rates in 2013. Despite this, Jordan's average clinical staffing levels remain above the mean. In 2010, Jordan had 2.56 physicians per 1,000 people, compared to 1.72 per thousand across all upper middle income countries.

The Joint Learning Initiative set a threshold for density of physicians, nurses, and midwives of 25 per 10,000 to achieve universal coverage for skilled birth attendance and measles immunization, compared to Jordan's 57 per 10,000, which clearly provides a much higher level of service.[67] This indicator provides a macro view of Jordan's human resources against an international benchmark, showing that there are much more than adequate resources in place for basic service provision; thus a much higher level of care should be expected for the human resources present in the sector.

Luckily, given Jordan's robust, existing medical training programs, focus need only go to slowing attrition rates down in certain areas, considering the following: MOH currently makes "incentive" payments to every employee to compensate for very low basic salaries. Paying "incentives" to every employee means that there is no targeting of those payments toward high-performing staff, staff that are at relatively greater risk of leaving public service, or expensive-to-train/recruit clinical specialists. A staff survey cited by the 2011 PEP Report revealed that posts in undesirable parts of the country were also a major reason for staff departure. MOH will rarely be competitive through external recruitment for experienced specialists and instead "privatize" high-cost specialties where possible by referring and contracting with the private sector in specialties where retention has been consistently difficult for MOH.

Recommendation: Reform incentives to attract and retain health professionals

66 Public Expenditure Perspectives 2011, pg. 62.
67 USAID Health Finance Governance project website www.hfgproject.org

The 2011 PEP Report made recommendation to reform incentives to attract and retain health professionals—a recommendation that this chapter re-emphasizes.[68] MOH should not pay all employees incentive payments and instead should allocate incentive payments more selectively for primarily clinical employees and management who are both high performers and at a high risk of leaving civil service.

Strengthen the system for retention of locally-trained clinicians including, for example:

- Signing bonuses in exchange for commitments of time;
- More sizeable penalties ("buy-outs") of sufficient size to discourage clinical staff from breaking their commitments for offers from the private sector and neighboring countries;
- Implement a "hardship pay" system where doctors willing to move to localities without sufficient clinical providers can be paid an additional allowance to compensate them for their relative sacrifice.

MOH and HHC should track the relative costs of training, recruitment, retention and treatment versus the cost of outsourcing/privatizing specialized care as part of its Annual Statistical Book to understand cost dynamics over time.

Recommendation 8

Recommendation: MOH should consider re-integrating the Serums, Vaccines and Pharmaceuticals program and its KPIs into the budgets of primary and secondary care, reflecting the essential role that pharmacists play in clinical care and not just as procurement and financial managers

Currently the program is evaluated on the availability of drugs and the extent to which those drugs are procured through the annual tender process, which is an evaluation more appropriate for public procurement professionals. Pharmacy is an essential element to the provision of all clinical care and pharmacists should be evaluated on their patient safety record, providing unbiased continuing education of clinical staff on current pharmaceutical research and their contribution to patient satisfaction. Since program budgets are designed to deliver products and results in exchange for budget allocations, this program in particular appears to still focus completely on financial management instead of technical results.

KPI's for the Serums, Vaccines, and Pharmaceuticals program regarding pharmacists' role in clinical care and their performance should be revised as some KPI's do not currently reflect the full scope of pharmacists' activities and responsibilities across MOH centers.

Sub-recommendation 8.1: In parallel with the above, it is further recommended that the Ministry of Health tender period for pharmaceuticals is extended and strategies are put in place to adopt the Zero Stock concept across ministry departments.

Recommendation 9

Finding: Pharmaceutical spending is volatile, even though nearly all vaccines, serums, and pharmaceuticals are procured through open tender rather than ad hoc at much higher prices. Pharmaceutical expenditure as a percent of GDP has gone down by a third since 2007. However, even though overall costs have gone down, the proportion covered by the government has shot up since 2007, with the government now covering 12 percent more of total pharmaceutical expenditure in Jordan. Efficiency gains from adoption of more standardized prescription procedures, as recommended in the 2011 PEP Report, are within reach. New prescribing standards have been enacted, but the necessary sensitization and change management needed to increase the uptake of those procedures among prescribing physicians has been minimal.

Recommendation: Implement new pharmaceutical prescribing procedures through training, communications, change management, and enforcement; continue to introduce new pharmaceutical prescribing practices and regulations where needed.

This report recommends that MOH rapidly evaluate compliance with current prescription procedures and then devote sufficient internal resources to increase and enforce compliance with an eye toward reaping substantial dividends for the government by reducing the use of heavily marketed, high cost, brand name drugs. New standards and regulations should also be introduced whenever advantageous for clinical care and better financial management.

Sub-recommendation 9.1: Establish a program that permits sales to the private sector of any drugs within 6-12 months of expiration at a discount, in line with a 2011 PEP recommendation.

68 Public Expenditure Perspectives 2011, pg. 62

Recommendation 10

Finding: Explaining the regressive nature of the current system requires more in-depth analysis of the CHI coverage of public employees and their dependents in terms of the correlation between the households' income earning percentage and that of their contributions. Clearly, the lack of means-testing and the extent of both explicit and implicit subsidies could in fact reflect CHI coverage of the vast majority of healthcare costs for the middle class who can afford to shoulder a greater share of the cost of healthcare, while anywhere between 20 to 30 percent of the population remains uncovered by any type of insurance.

Recommendation: Work with MOPIC, RMS, university hospitals, MOF, and the private sector to develop a comprehensive plan for financing universal health coverage, including efficiency gains within the CHI. This may include consolidating all insurance funds into one, similar to what is practiced in Turkey.

Sub-recommendation 10.1: Set strategic direction and role for CHI prior to any major reform effort. Efficiency gains can be achieved within the CHI as it stands now (quoted below), but if universal coverage is to be pursued, the CHI will be heavily reformed if not reconstituted to cover a broader group of Jordanians on a more systematic basis than currently exists (civil servants and their dependents plus a list of add-on conditions that qualify via Royal Court reimbursement of the CHI.

Sub-recommendation 10.2: Introduce means-testing for the CHI and a sliding scale of required contributions to better protect the poor.

REFERENCES

1. World Development Indicators 2014. Accessed 17 November 2015
2. WHO Global Health Expenditure Database. Accessed 17 November 2015
3. Jordan Population and Family Health study figure from 2007
4. World Bank Health Finance Review 2014: http://ieg.worldbank.org/evaluations/wbg-support-health-financing
5. Jordan Response Plan for the Syria Crisis 2015. Executive Summary
6. https://drive.google.com/file/d/0B2ulC5rjYSnceVZvdmJveGpfcVU/view
7. UNHCR Temporary Health Policy for Out-of-Camp Refugees, December 28, 2014. Received via email from UNHCR
8. Ministry of Finance Statistical Handbooks 2010 through 2014
9. Chart from World Bank Health Finance Review, with data from Institute for Health Metrics and Evaluation, 2010
10. http://www.adf.com.au/archive.php?doc_id=168
11. Interview with Ministry of Finance Financial Manager. Authorization for local procurement was not done in 2014; however, it is a clause within the General Supplies System for more than ten years.
12. Public Expenditure Perspectives 2011, pg. 62
13. USAID Health Finance Governance project website www.hfgproject.org
14. High Health Council National Health Sector Strategy (2015-2019)

ELECTRICITY

4.1 INTRODUCTION

Why is an assessment of the electricity sector important?

Electricity is an essential input to economic growth. Jordan's electricity sector has historically provided reliable electric power at a reasonable cost with adequate reserve margins. The sector had benefited from the availability of low-cost natural gas supplies from Egypt, which was used as the primary fuel for power generation. However, starting in 2010, the supply of gas from Egypt has been substantially reduced and Jordan has been forced to rely on much more expensive fuels such as heavy fuel oil (HFO) and diesel. The substantially higher cost of these fuels has placed tremendous financial pressures on the electricity sector and has severely impacted the national budget. The operating losses incurred by the National Electric Power Company (NEPCO) in each of the years 2011 through 2014 were about 5 percent of GDP and resulted in an increase in the national public debt from 65.5 percent of GDP in 2011 to 80.8 percent of GDP in 2014. The supply of gas from Egypt continues to be disrupted and it is unlikely that Jordan can rely on future low cost gas imports. It is therefore very important to consider strategies to develop alternative supply sources and manage electricity demand to prevent continuing adverse financial impacts on the national debt.

Challenges Faced by the Sector

Jordan's economy has been growing at a healthy rate and correspondingly electricity demand has grown 7 percent annually. Jordan traditionally has imported 97 percent of its energy, but recently has been obliged to import energy at international spot market prices. The major challenge faced by the electricity sector is securing long-term reliable fuel supplies at a reasonable cost.

Jordan is blessed with good potential for wind and solar energy together with oil shale and uranium resources. However, the development of these resources requires policies that encourage investment, development of technical and regulatory capabilities, and a long-term planning horizon. Even with aggressive development of renewable energy and shale oil resources, in the short term (i.e. the next five years), the electricity sector will have to rely on fuel imports.

An important development in 2015 is the import of liquefied natural gas (LNG) through the newly-constructed facility in Aqaba. This new facility increases the reliability and diversity of fuel supply in Jordan and for the moment provides a price advantage compared to liquid fuel imports. However, the LNG price is linked to world oil price and thus exposes Jordan to the risk of escalating world oil prices.

Other challenges faced by the electricity sector include investing in scaling up renewable energy resources such as solar PV and wind energy, developing infrastructure to integrate new power generation resources into the grid, developing shale oil resources, and addressing non-technical losses and potential loss of higher tariff consumers due to retail flight.

These challenges need to be addressed to ensure a secure, reliable, and affordable supply of electricity for Jordan's future development.

IMF Standby Agreement

To adjust to the significant external and fiscal vulnerabilities stemming largely from the negative shock to the electricity sector from the repeated and extensive disruptions to the supply of natural gas from Egypt and high oil prices, the Government of Jordan (GOJ) and the International Monetary Fund (IMF) reached an agreement in 2012. This IMF Standby Agreement focuses on fiscal consolidation aimed at gradually resolving Jordan's structural fiscal issues. Some of the provisions of this agreement are short- and medium-term fiscal adjustments including structural reforms aimed at improving the business environment, enhancing transparency, and fostering trade. One of the most important elements of the agreement is comprehensive reform in the electricity sector to bring NEPCO back to cost recovery, through development of lower cost electricity supplies from diversification of energy sources and increases in electricity tariffs.

Moving Forward

The Ministry of Energy and Mineral Resources (MEMR), NEPCO, and the Energy and Minerals Regulatory Commission (EMRC) have undertaken a number of important initiatives to address the challenges faced by the electricity sector and the requirements of the IMF Standby Agreement. A LNG terminal has been constructed in Aqaba and is expected to be operational in July 2015. A contract has been signed with Shell to secure 150 million cubic feet per day (MMCFD) of LNG. Additional LNG resources may be acquired through tenders. Development of wind and solar energy resources has been prioritized and a number of projects are scheduled to be on line from 2015 to 2017. An agreement has been signed with a private sector consortium for purchasing power from a new shale oil power plant. Retail tariff increases have been

planned for each year from 2015 to 2017, and the first stage (2015) has been implemented.[69] These initiatives are likely to lead to NEPCO reducing its operating losses in the coming years and moving towards cost recovery. However, the financial performance of NEPCO and its resulting fiscal impacts will be influenced by uncertainties in a number of external variables and by additional strategic initiatives. This chapter addresses these uncertainties and initiatives and their potential impacts.

4.2 OBJECTIVES

The objectives of this chapter are to:

- Review the current status of the electricity sector and its major characteristics;
- Conduct benchmarking and cross-country comparison of Jordan's electricity sector with neighboring countries in the Middle East and North Africa (MENA) region;
- Document the fiscal impact of the NEPCO operating losses;
- Identify and document the initiatives undertaken to reduce the operating losses;
- Define major challenges and uncertainties faced by the electricity sector and their impacts;
- Identify and assess strategic options and opportunities; and
- Develop recommendations.

4.3 OVERVIEW OF THE ELECTRICITY SECTOR

Structure

The structure of the electricity sector in Jordan is shown in Figure 4.1. NEPCO is at the heart of the sector. NEPCO purchases of HFO and diesel fuel from the Jordan Petroleum Refinery Company (JPRC) and other suppliers, gas from Gasco, owner of the Arab Gas Transmission Pipeline Company. The purchased fuels are provided to the generators[70] at no cost, but the cost of the fuel is included by NEPCO as a direct component of the cost of power generation. NEPCO pays the generators agreed-upon payments for the capacity costs and fixed operation and maintenance costs, with adjustments made for the actual heat rate relative to the committed heat rate by the generators. For most of the generating plants, the fuel is purchased by NEPCO. However, two of the newer generators purchase their own fuel and pass on the fuel costs through the electricity sale price.

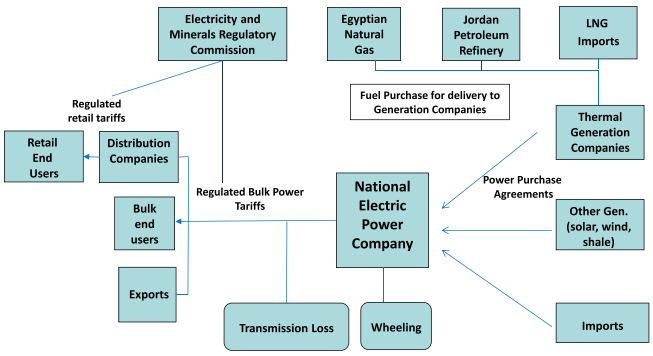


Figure 4.1: Structure of the Electricity Sector

NEPCO is responsible for the management, operation, maintenance and control of the transmission network, the dispatch of power stations, and the operation of the high voltage grid.[71] NEPCO sells the power in bulk, at bulk tariffs established by EMRC, to its customers. The major bulk power customers are three distribution companies: Jordan Electric Power Company (JEPCO); Electricity Distribution Company (EDCO); Irbid District Electric Company (IDECO); and a group of large industrial customers.

The distribution companies deliver power to retail customer end-users at regulated prices set by EMRC. The retail tariffs are uniform country-wide. The bulk tariff for each of the three distribution companies are determined by EMRC to meet the concession agreements between the EMRC and each distribution company and are designed to ensure a specified guaranteed rate of return on the value of the used and useful assets in service for each distribution company.

Besides direct sales to bulk power customers, NEPCO also exports and imports small amounts of power to and from neighboring countries (Syria, Egypt, and Palestinian Authority) and "wheels" (transports electric power) from one neighboring country to another as required by regional interconnection agreements.

NEPCO Role and Responsibilities

NEPCO is a public shareholding company owned by the government, responsible for the construction, operation, and maintenance of the transmission system within the national borders as well as the electric transmission system which connects with other neighboring countries' systems.

69 Note, however, that the scheduled 2015 tariff increase of 15% was cut in half as a compromise between the government and parliament in light of the large drop in international oil prices in 2014.

70 The generators in Jordan are Central Electricity Generation Co (CEGCO), Samra Electric Power Generating Co (SEPGCO), AES-Jordan, East Amman Company (IPP 1), Qatrana Power Plant (IPP 2), and Amman Asian generation Company. NEPCO also purchases some power from King Talal Dam and Egyptian Electricity Transmission Company.

71 NEPCO 2014.

	2008	2009	2010	2011	2012	2013	2014
Power Purchases							
CEGCO	8,356	7,555	7,194	7,561	7,306	6,901	7,498
SEPGCO	3,629	3,564	3,390	3,504	4,490	4,426	4,408
AES-JORDAN	891	2,333	3,238	2,223	1,561	2,251	1,946
QEPCO	0	0	53	437	2,312	2,397	1,484
Amman Asian Generation Company	0	0	0	0	0	0	1,128
East Amman Company (Levant)	0	0	0	0	0	0	774
King Talal Dam	15	14	15	13	16	14	19
Imports	547	383	670	1,738	784	381	434
Total Purchases	13,438	13,849	14,560	15,476	16,469	16,719	17,691
Transmission Losses	637	343	295	343	346	347	321
Bulk Power Sales							
JEPCO	7,772	8,176	8,677	9,217	9,813	9,871	10,304
EDCO	2210	2318	2576	2667	2846	2,979	3,160
IDECO	1802	1996	2201	2377	2454	2,595	2,840
Bulk Sales to Industry	982	879	753	786	906	868	1,002
Exports	35	137	58	86	104	59	64
Total Sales	12,801	13,506	14,265	15,133	16,123	16,372	17,370

Figure 4.2: NEPCO Electricity Purchases and Sales (GWh) – 2008 to 2014 (Source: NEPCO Annual Reports)

NEPCO is responsible for transmission system planning and expansion, system operation, fuel supply to generators, dispatching of generators, procuring power from the generators, and cross-border electricity imports and exports. NEPCO acts as the single buyer of the purchase of electric power generated from the licensed electric power generation companies, industrial companies, and neighboring countries, and the single supplier of bulk electric power to the distribution companies, large industrial consumers, and neighboring countries at prices and conditions appropriate for its objectives and consistent with EMRC regulations.

Figure 4.2 shows the NEPCO purchases and sales of electric power from 2008 to 2014. The figure shows the bulk power purchased from the generators and delivered to the distribution companies and large industrial customers of NEPCO. Smaller amounts of power are imported or purchased.

Tariff Structure

Electricity is sold by the three distribution companies (JEPCO, EDCO and IDECO) at tariffs established by the EMRC. The retail tariff structure includes 17 customer classes and some of these have six tariff blocks or tiers. The Household and Standard tariffs have seven tariff tiers. The Commercial, Telecommunication and Small Industry classes have two tariff tiers, and larger customers such as Medium and Large Industry, Mining and Quarrying have tariffs that include demand charges, peak and off-peak energy charges, and power factor penalty.

The tariff structure is not cost-based. It is designed to keep tariffs very low for the lower electricity consuming customers (first 4 tiers, with consumption less than 600 kWh per month). While the average retail tariffs have increased over the years (see Figure 4.3), and are projected to increase further through 2017, EMRC has decided to keep the tariffs in these 4 lower tiers constant.

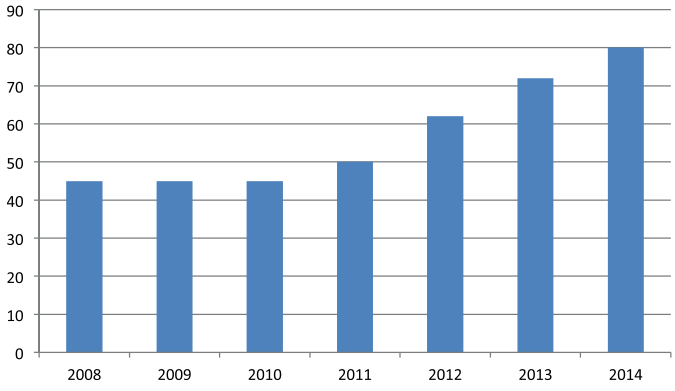


Figure 4.3: Average Retail Tariff in Fils per kWh, 2008-2014 (Source: EMRC 2015a)

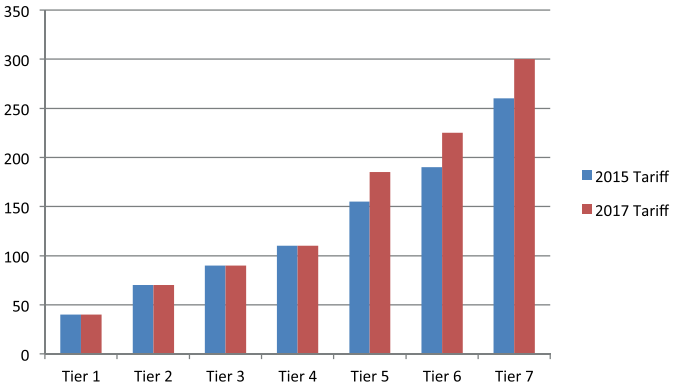


Figure 4.4: Residential Tariffs by Tier in Fils per kWh (Source: EMRC 2015a)

This tariff structure has given rise to substantial cross-subsidies from the higher consuming tiers to the lower consuming tiers. These cross-subsidies are economically inefficient and have led to the price increases being absorbed by customers in Tiers 5 through 7. The result is that the highest tier customers pay a unit cost per kWh almost 9 times as much as customers in the lowest tier (see Figure 4.4). [72]

4.4 BENCHMARKING: JORDAN VERSUS MENA COUNTRIES

This section presents an overview of the benchmarking of the electricity sector in Jordan relative to other MENA countries.

Electricity Intensity (GWh/GDP)

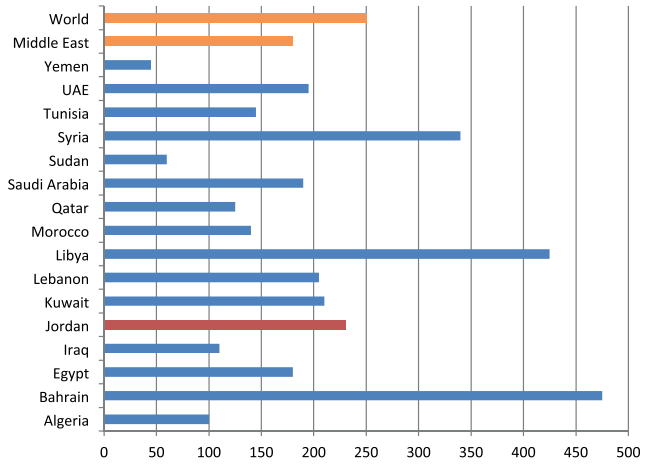


Figure 4.5: Electricity Intensity (GWh/Billion $ GDP (PPP) (Source: IEA 2014)

Figure 4.5 shows the electricity intensity of Jordan[73] in 2012 compared to 15 other countries in the Middle East and North Africa (MENA) region as well as compared to the average of Middle East countries and the world. Jordan has higher electricity intensity than the other MENA countries except Bahrain, Libya, and Syria.

Electricity Consumption per Capita

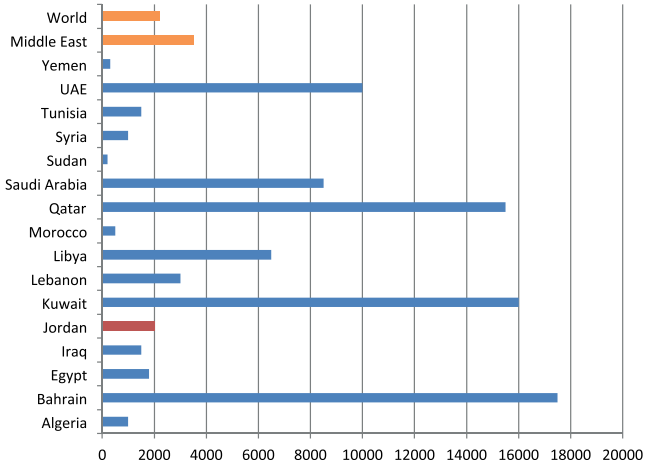


Figure 4.6: Electricity Consumption per Capita (kWh/capita) (Source: IEA 2014)

Figure 4.6 presents a comparison of the electricity consumption in kWh per capita in the MENA countries. Jordan has relatively low per capita electricity consumption, particularly when compared to Saudi Arabia, UAE, Qatar, and Bahrain. The per capita consumption in Jordan is lower than the Middle East and world average.

Peak Electricity Demand

Peak electricity demand in Jordan more than doubled from 2003 to 2013, an annual average growth of 7.7 percent. Figure 4.7, based on a report by the Regional Center for Renewable Energy and Energy Efficiency (RCREEE), shows a comparison of the peak load and growth in the peak load for the MENA countries ranked by the percent load growth. Jordan's peak demand growth is one of the highest in the region (RCREEE 2015).

Tariffs

Jordan has a tiered tariff structure based on monthly electricity consumption. The comparison of the tariffs in Jordan with other MENA countries for the lowest and highest tariff classes (2013 data) is shown in Figure 4.9 and Figure 4.10 (RCREEE 2015). As can be seen from Figure 4.8 the electricity tariff in the lowest tariff tier in Jordan is low, but is higher than all of the neighboring MENA countries except Morocco and Tunisia.

72 The average cost per kWh for the different tiers does not reach such extremes because all customers enjoy the same subsidies for their consumption in the lower tiers.

73 Expressed as GWh per billion US$ of GDP on a purchasing power parity (PPP) basis.

Country	Peak Load (2003)	Peak Load (2013)	Increase (MW)	Growth (%)
Qatar	2,312	6,000	3,688	160%
Yemen	577	1,358	781	135%
Jordan	1,428	2,995	1,567	110%
Saudi Arabia	26,272	53,764	27,492	105%
Algeria	5,206	10,264	5,258	101%
Iraq	7,372	14,527	7,155	97%
Libya	3,381	6,520	3,139	93%
Bahrain	1,535	2,917	1,382	90%
Morocco	2,977	5,580	2,603	87%
Egypt	14,401	27,000	12,599	87%
UAE	9,603	16,798	7,195	75%
Sudan	1,151	2,011	860	75%
Kuwait	7,480	12,060	4,580	61%
Tunisia	2,010	3,144	1,134	56%
Syria	5,018	7,703	2,685	54%
Lebanon	1,820	2,744	924	51%

Figure 4.7: Peak Load Growth in MENA Countries (Source: RCREEE 2015)

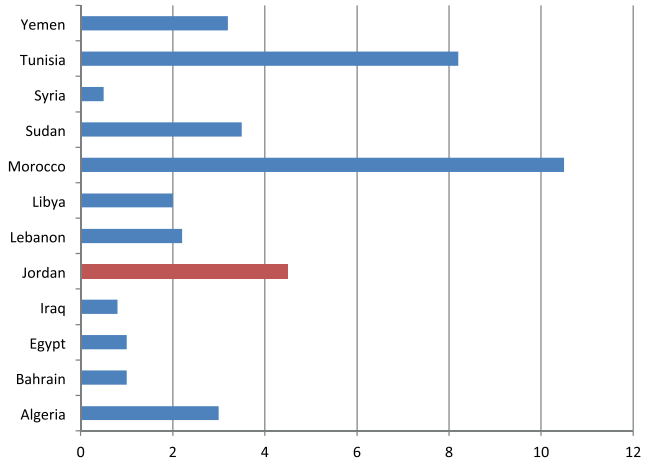


Figure 4.8: Electricity Tariff - Lowest Tier US cents/kWh (Source: RCREEE 2015)

However, in the highest tariff tier, Jordan's tariffs are the highest among the countries shown.

In 2013, the tariff in the highest consuming tier in Jordan (more than 1,000 kWh per month) was almost six times as high as that in the lowest tariff tier (less than 50/kWh per month). This tariff discrepancy has led to substantial cross-subsidies and has increased even further in 2015 (as discussed above) as the tariffs in the higher tiers have increased, but those in the lower tiers have remained constant.

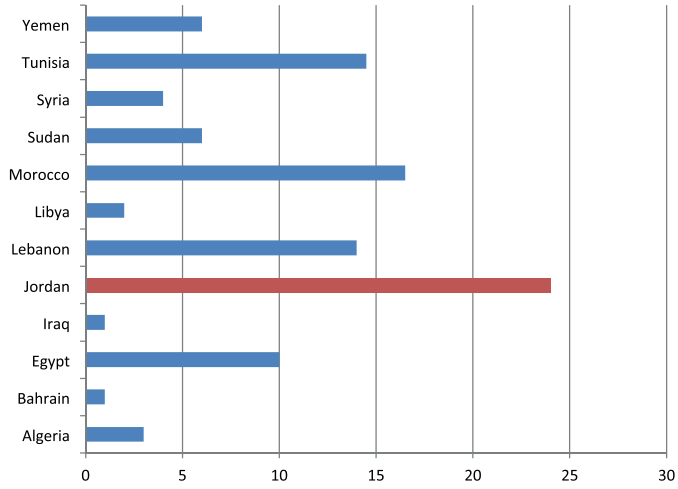


Figure 4.9: Electricity Tariff - Highest Tier US cents/kWh (Source: RCREEE 2013)

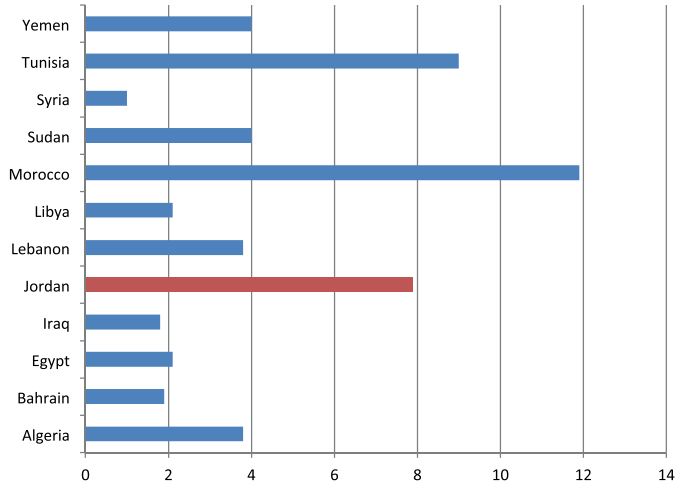


Figure 4.10: Average Retail Tariff US cents/kWh (Source: RCREEE 2013)

The average retail tariffs in the MENA countries are shown in Figure 4.10. Jordan's dependence on expensive energy imports has resulted in tariffs that are among the highest in the region. As shown in Figure 4.10, the average retail tariff in Jordan is the third highest in the region (after Morocco, and Tunisia).

Subsidies

Most MENA countries have subsidized their electricity sectors. The exact amount of the subsidies in the electricity tariffs cannot be easily calculated due to the complexity of subsidy schemes and production costs as well as a general lack of transparency. RCREEE has estimated the implied subsidies in the electricity sector based on the price-gap approach (see Figure 4.11).

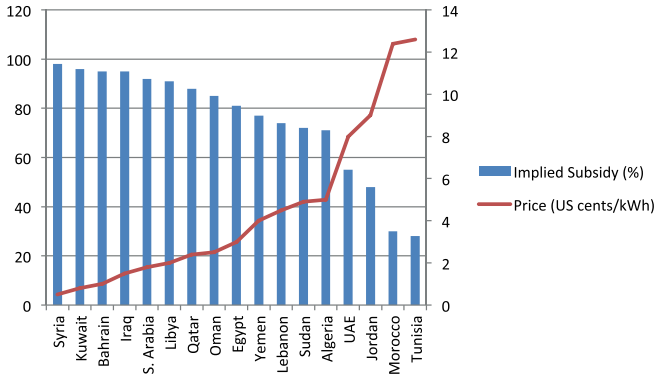


Figure 4.11: Residential Electricity Prices and Implied Subsidies (Source: RCREEE 2015)

This method uses Palestine's retail electricity tariffs as a reference price because the electricity prices in Palestine are close to market prices and represent the approximate true retail cost. In all other Arab countries, prices are currently set by the national governments. While Jordan has large subsidies to its electricity sector, the percent subsidy is much smaller than the other MENA countries except Morocco, Tunisia, and Palestine.

Transmission and Distribution Losses

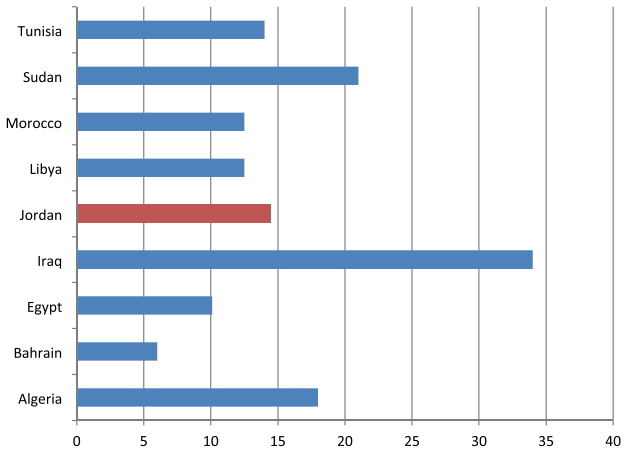


Figure 4.12: Transmission and Distribution Losses (%) (Source: World Bank 2014)

It is difficult to benchmark transmission and distribution losses in Jordan against other MENA countries due to insufficient data. Based on NEPCO data, the estimated transmission losses in the Jordanian electricity system are about 2.3 percent while the distribution losses (which include both technical and non-technical losses) are about 13 percent. Figure 4.12, based on World Bank for 2011, compares transmission and distribution (T&D) losses in several MENA countries. Jordan's T&D losses are substantially lower than Iraq, Sudan, and Algeria, and about the same as Tunisia, Libya, and Morocco. The losses in smaller countries such as Kuwait and Bahrain are much lower due to the smaller size of their distribution networks.

Energy Efficiency Activities

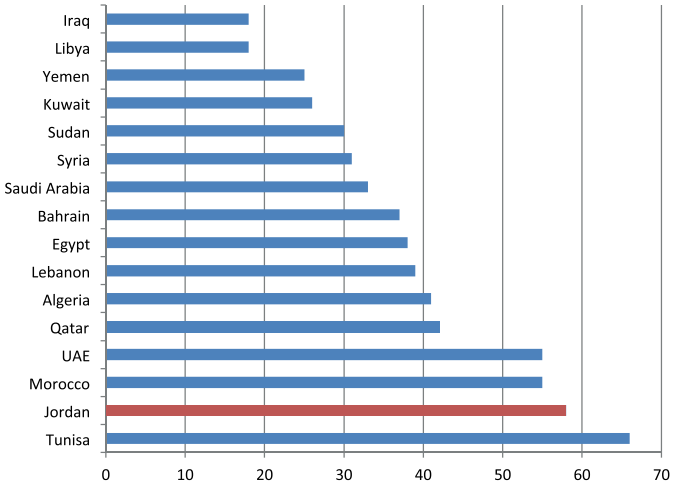


Figure 4.13: Ranking of Energy Efficiency Activities of MENA Countries by Energy Efficiency Score (Source: RCREEE 2015)

RCREEE recently completed a comparative assessment and benchmarking of energy efficiency (EE) activities in MENA countries. The factors considered by RCREEE included energy pricing, overall EE policy and regulatory framework, institutional capacity, and utility activities. Based on these factors an overall score was developed, as shown in Figure 4.13. Jordan ranks second in this assessment (next to Tunisia).

4.5 NEPCO LOSSES RESULTING FROM NATURAL GAS SUPPLY PROBLEMS

Starting in 2003, the electricity sector in Jordan benefited from imported natural gas from Egypt under very favorable prices of JOD 3-4 per million Btu (MMBtu). The generators in Jordan used steam turbines, open-cycle combustion turbines, and combined-cycle turbines for generating electricity. The low cost of natural gas kept NEPCO's fuel costs for these

generation resources quite low. However, starting in 2010, there were substantial disruptions in the Egyptian natural gas supply and NEPCO was forced to rely on imports of much more-expensive heavy fuel oil (HFO) and diesel fuel for power generation.

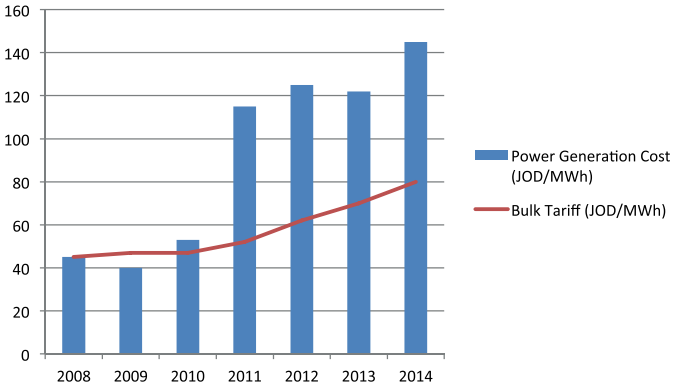


Figure 4.14: NEPCO Generation Cost and Bulk Tariff (Source: NEPCO Annual Reports)

The average cost of fuel purchased by NEPCO increased from about 3.0 JOD/MMBtu in 2009 to 19.8 JOD/MMBtu in 2014, an increase of over 550 percent. These increases in fuel prices led to the power purchase cost for NEPCO increasing from 39.9 JOD/MWh to 146.6 JOD/MWh.

During the same period, the Government of Jordan (GOJ), through the EMRC, did not increase the retail electricity tariffs to allow NEPCO to pass on the increased fuel costs to the distribution companies and large industrial consumers through its bulk tariffs. Figure 4.14 shows the trajectory of average cost of power purchases and bulk tariffs (average revenue from power sales) from 2008 to 2014. While the retail tariffs and the resulting bulk tariffs did increase, the increases were much smaller than the fuel cost increases. From 2009 to 2014 the bulk tariff increased from 47.0 JOD/MWh to 80.1 JOD/MWh (increase of 70 percent) while the power purchase cost increased by over 260 percent.

Impacts of NEPCO Losses

	Units	2008	2009	2010	2011	2012	2013	2014
Power Sales	GWh	12,801	13,506	14,265	15,133	16,123	16,372	17,370
Power Sales Revenue	Million JOD	608.6	635.3	670.3	795.3	1,026.2	1,166.5	1,391.7
Power Sales Revenue	JOD\MWh	46.5	47.0	47.0	52.6	63.6	71.3	80.1
Average Cost of Fuel Purchase	JOD\MMBtu	3.5	3.0	4.5	11.5	13.8	16.6	19.8
Power Purchases	GWh	13,438	13,849	14,560	15,476	16,469	16,719	17,690
Power Purchase Cost	Million JOD	610.6	610.6	610.6	610.6	610.6	610.6	610.6
Power Purchase Cost	JOD\MWh	45.4	39.9	52.6	112.3	126.3	124.8	137.1
Net Operating Profit (Loss)	Million JOD	-2.0	24.7	59.7	184.6	415.6	555.9	781.1
Other Revenues (Costs)	Million JOD	-38.5	14.1	-219.8	-1,192.8	-1,573.4	-1,641.8	-1,960.5
Net Profit (Loss)	Million JOD	-41	39	-160	-1,008	-1,158	-1,086	-1,179

Figure 4.15: NEPCO Fuel and Power Purchases, Power Sales, Revenues, Costs and Losses (Source: NEPCO Annual Reports)

	Units	2011	2012	2013	2014
Gross Domestic Product	Million JOD	20,477	21,966	23,852	25,437
NEPCO Losses	Million JOD	1,088	1,158	1,095	1,100
NEPCO Losses as % of GDP	%	4.9%	4.6%	4.6%	4.3%
Government Deficit	Million JOD	2,598	1,957	1,957	1,820
NEPCO Losses as % of Government Deficit	%	38.8%	56.0%	56.0%	60.4%

Figure 4.16: NEPCO Losses as % of GDP and Government Deficit (Source: Ministry of Finance)

	Units	2011	2012	2013	2014
Government & Guaranteed Net Debt	Billion JOD	13.4	16.6	19.1	20.6
Net debt as of GDP	%	65.5%	75.5%	80.1%	80.8%
NEPCO Debt	Billion JOD	1.8	2.8	3.90	5.1
NEPCO Debt as % of Govt. Debt	%	13.4%	16.9%	20.4%	24.8%
NEPCO Debt as % of GDP	%	8.8%	12.7%	16.4%	20.0%

Figure 4.17: NEPCO Debit as % of Government Debt (Source: Ministry of Finance)

Due to this mismatch between high power purchase costs (resulting from the high costs of fuel purchases) and the relatively low bulk tariffs, NEPCO incurred substantial losses from 2010 to 2014. Figure 4.15 presents a summary of NEPCO fuel and power purchases, power sales, revenues, costs, and losses from 2008 to 2014. The cumulative losses incurred by NEPCO from 2010 to 2014 are about 4.6 billion JOD.

The losses incurred by NEPCO have resulted in major fiscal impacts. As shown in Figure 4.16, the NEPCO losses from 2011 to 2014 represent about 5 percent of GDP each year and amount to 38.8 to 60.4 percent of the government fiscal deficit.

Figure 4.17 shows the impact of the NEPCO losses on the increase in NEPCO's debt and its impact on the national debt. From 2011 to 2014 the net government debt increased from 65.5 percent to 80.8 percent of GDP. The major reason for this increase was the NEPCO debt, which has increased from 13.4 percent to 24.8 percent of the government debt and from 8.8 percent to 20 percent of GDP.

IMF Stand-by Arrangement

The Government of Jordan entered into an agreement with the International Monetary Fund in 2012 (referred to as the Stand-by Arrangement or SBA) for IMF support to GOJ's economic reform program. The SBA includes a number of provisions designed to correct the fiscal and external imbalances and support the exchange rate peg. The program provides the authorities with a framework to achieve a gradual fiscal consolidation and thus address fiscal and external vulnerabilities without jeopardizing growth prospects and social stability. IMF support is providing the necessary liquidity to maintain reserves at a safe level until alternative sources of energy are put in place.

Key elements of the SBA address the issue of NEPCO losses. The SBA proposes a number of measures including:

- Increasing retail tariffs to generate additional revenue for NEPCO from the distribution companies and large industrial consumers;
- Developing alternative sources of fuel including the construction of a LNG facility in Aqaba to import LNG as a fuel for power generation;
- Diversifying supply resources through development of renewable energy resources such as wind and solar energy; and
- Developing Jordan's oil shale resources for power generation.

In addition, the SBA established ceilings on the borrowing and the arrears of NEPCO and required GOJ to develop a medium-term electricity/energy strategy incorporating inputs provided by the World Bank, including a time table and measures for bringing NEPCO back to cost recovery.

4.6 GOVERNMENT ACTIONS TO MEET COST RECOVERY OBJECTIVES

Overview of New Initiatives

Since the signing of the SBA in 2012, NEPCO has continued to incur substantial losses due to the non-availability of gas supply from Egypt. While it had been assumed that Egyptian gas would be available at a level of about 100 million cubic feet per day (MMCFD), the actual availability was only about 86 MMCFD in 2013 and 22 MMCFD in 2014. It appears unlikely that larger amounts of Egyptian gas would be available due to increased internal demand within Egypt. Therefore, to achieve cost recovery for NEPCO, measures to obtain additional fuel resources and diversification of supply are needed.

GOJ has undertaken a number of important initiatives in this regard,[74] including:

- Establishment of a LNG terminal in Aqaba and securing a contract for supply of 150 MMCFD of LNG;
- Plans to obtain an additional 150 MMCFD of LNG thorough public tenders;
- Aggressive development of renewable energy resources such as wind and solar energy;
- Initiatives to promote the development of oil shale resources for power generation and execution of a

RE Resource	Tariffs (Fils/kWh)
Wind Energy	80
Solar Thermal	135
Solar PV	100
Biomass	90
Biogas	60

Figure 4.18: Reference Prices for Renewable Energy Resources (Source: MEMR 2014b)

74 Expressed as GWh per billion US$ of GDP on a purchasing power parity (PPP) basis.

power purchase agreement for purchase of electric power from the first shale oil power plant;
- Exploration of options to acquire supply of Eastern Mediterranean gas; and
- Exploration of the development of nuclear power plants.

A brief review of each of these initiatives is provided below.

LNG Facility

A new LNG terminal and floating storage and regasification unit (FSRU) were constructed in Aqaba and began deliveries in early July 2015. These facilities will provide LNG for thermal power plants at a cost somewhat lower than HFO and substantially lower than diesel. The capacity of the FSRU is 490 MMCFD.

Renewable Energy

MEMR has moved forward with the acquisition of renewable energy (RE) resources with the help of several enabling frameworks adopted in recent years (MEMR 2014b). Feed-in tariffs for purchase of power from renewable resources were established by the Energy and Mineral Resources Commission (EMRC) in late-2012. Jordan also enacted in 2012 the Renewable Energy and Energy Efficiency Law. This law allows investors to identify and develop grid-connected electricity production projects through unsolicited or direct proposals. The Law also established the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) to support financing of RE resources. Figure 4.18 shows the reference prices (ceiling prices) for various RE resources.

Four approaches are being utilized for acquiring RE resources:
- Direct proposals;
- Competitive bidding;
- Turnkey EPC contracts; and
- Net metering for small scale RE (such as roof-top solar).

Jordan has large wind resources with wind speeds in many areas in the range of 7.5 to 11.5 meters per second (m/s). Electric power from wind energy resources can be obtained at prices at or below the reference prices. NEPCO has signed agreements with a number of developers for purchasing power from wind energy using direct proposals and the EPC approaches.

Jordan also has abundant solar energy resources with high solar radiation figures of 5 to 7 kWh/m2 per day with about 300 sunny days per year. As a result, there is a very large potential for development of solar energy resources. In the first round of solar projects, proposals were received from developers and about 200 MW are being contracted at the reference price. In the second round, which used competitive bidding, a large number of proposals were received at very attractive prices and are currently being evaluated. It is anticipated that contracts will be signed for 4 projects of 50 MW each.

Substantial activity is also underway with energy consumers installing roof-top solar units, although the total contribution from these to power supply is small. Figure 4.19 shows the planned installations of wind and solar power plants.

It is quite likely that additional wind and solar resources will be available in the period 2018 to 2020.

Shale Oil Power Plants

Jordan has large resources of oil shale, estimated over 70 billion tons, that can produce more than 7 billion tons of oil (MEMR 2014a). GOJ has awarded several local and global companies the concession rights for investing in production of shale oil by surface and deep distillation and direct combustion and has signed memoranda of understanding (MOUs) with other companies. Oil Shale areas were classified for interested companies based on criteria approved by the Natural Resources Authority (NRA).

Type of Resource	Project Name	Date Available	Capacity (MW)	Generation (GWh)	Price (fils\ kWh)
Wind	Tafilah	3Q 2015	117	389	85
Wind	King Hussein University	2Q2016	66	145	85
Wind	Various Projects	2017-2018	317	694	80
Solar PV	Round 1 – 11 small Projects	4Q2015-1Q2016	154.6	339	120
Solar PV	Round 1 – 1 Large Project	4Q2015-1Q2016	52.5	115	105
Solar PV	Qwera	2016	75	164	50
Solar PV	Round 2 – 4 Projects	4Q2015-1Q2016	200	438	45-60

Figure 4.19: Planned Renewable Electricity Generation in Jordan (Source: NEPCO)

The first oil shale power plant is expected to commence operations in mid-2017 or early 2018. This plant is being developed by the Estonian Company Esti Energia using the technology of direct burning of oil shale available at Atarat area in Jordan. A power purchase agreement has been signed for this project which has a capacity of 470 MW (2 units of 235 MW each). The output from this plant, guaranteed at 88 percent capacity factor, is expected to be 3,623 GWh. Additional resources of shale oil are being developed and it is possible that a second shale oil power plant may be operational by 2019 or 2020.

Mediterranean Gas

A recent USAID study concluded that some of Jordan's immediate neighbors in the Eastern Mediterranean region are likely to have high gas production capacity and limited domestic demand for gas. Therefore, if appropriate transmission can be constructed, Eastern Mediterranean gas could offer the potential of reliable and low-cost supply for power generation compared to the other gas or liquid fuel options. This option will provide further diversification of fuel supply sources.

MEMR has initiated discussions with neighboring countries for the import of Mediterranean gas into Jordan. At this stage the possible quantity and cost of Eastern Mediterranean gas and the date of availability are quite uncertain and this option has not been included in the analysis.

Nuclear Power

The development of nuclear power is being explored by the Jordan Atomic Energy Commission, created in 2008 to implement the national strategy for nuclear energy. The program consisted of several phases: utilizing and investing natural nuclear resources in Jordan; installing nuclear power plant to generate electricity; desalinating sea water; building qualified domestic human resources; supporting activities and nuclear sciences; and applications of the nuclear program. However, due to the lead times required for construction and operation of a nuclear power plant and the regulatory, technical, commercial, and other related issues, it must be considered a long-term option (possibly eight to ten years in the future), and it is unlikely that nuclear power will be available within the time frame of this analysis. The nuclear power option is therefore not addressed in this chapter.

4.7 ASSESSMENT APPROACH

Analysis Framework

The electricity sector will undergo many important changes over the next five years, mainly in view of the new supply options being developed by NEPCO in order to reach cost recovery. These new supply options, such as LNG, renewable energy, and shale oil, will provide resources that will avoid the need for expensive imported HFO and diesel. The analysis of the effects of these options on the NEPCO bottom line and related fiscal impacts has been conducted using the following approach:

- Develop a baseline projection of NEPCO purchases, sales, revenues, costs and profit/loss annually for the period 2015 to 2020. The key assumptions underlying the projection are detailed below.
- Identify key external events and uncertainties that are likely to have potential impacts on NEPCO.
- Estimate the impacts of these uncertainties on NEPCO's profit or loss, related fiscal impacts, and on NEPCO's ability to achieve cost recovery.
- Define strategic options and opportunities for NEPCO to address potential adverse impacts of external events.
- Estimate the benefits of these options and opportunities to NEPCO.
- Develop recommendations for NEPCO and GOJ.

Baseline Scenario and Key Assumptions

The major assumptions utilized in developing the Baseline Scenario are summarized below.

Actual			Projected			
2014	2015	2016	2017	2018	2019	2020
6.1%	6.9%	6.5%	6.5%	6.5%	6.5%	6.5%

Figure 4.20: Projected Annual Growth in Retail Electricity Consumption (%)

Actual			Projected			
2014	2015	2016	2017	2018	2019	2020
80.1	82.4	84.1	85.8	87.5	89.2	91.0

Figure 4.21: Projected Average Bulk Tariffs (JD/MWh)

Growth in Electricity Demand

The assumptions for growth in retail electricity consumption are based on the historical growth and the current NEPCO load forecast.[75] These projections are summarized in Figure 4.20.

EMRC has established the tariffs through 2017. These tariffs are unchanged for the lower four tariff tiers (monthly consumption less than 600 kWh) and increase annually for the higher tiers. For this assessment, it is assumed that the tariff structure remains the same beyond 2017 with increases for the higher tiers and unchanged tariffs for the lower tiers. The projected average bulk tariffs are shown in Figure 4.21.

International Oil Price

The current projection by the General Budget Department (GBD) for NEPCO assumes constant oil prices. This assessment assumes the same. The Brent crude oil price currently[76] is about USD 64.50 per

	Unit	2013 Actual	2014 Actual	2015 Projected	2016 Projected	2017 Projected	2018 Projected	2019 Projected	2020 Projected
Power Sales									
Power sales growth rate	%	1.5%	6.1%	6.9%	6.5%	6.5%	6.5%	6.5%	6.5%
Average sales tariff	JOD/MWh	71.3	80.1	82.4	84.1	85.8	87.5	89.2	91.0
Revenue from power sales	Million JOD	1,167	1,391	1,531	1,664	1,807	1,963	2,133	2,317
Power Purchases—Take or Pay									
Power purchases-total take or pay	GWh	0	0	97	900	3,222	5,264	5,946	7,977
Purchase costs-total take or pay	Million JOD	0	0	8	90	293	486	534	720
Other Power Purchases									
Power purchase-other	GWh	381	435	400	400	400	400	400	400
Power purchase costs-other	Million JOD	41	39	40	40	40	40	40	40
Fuel-Based Power Generation									
Fuel-based power generation needed	GWh	16,324	17,237	18,517	18,951	17,945	17,304	18,115	17,675
Fuel Needs	MMBTu	109,139	10,5691	129,621	132,655	125,615	121,128	126,806	123,722
Total fuel purchase cost	Million JOD	1,812	2,096	1,364	1,077	982	947	991	967
Total Power Purchase Costs									
Payments to generators	Million JOD	2,044	2,386	1,691	1,421	1,318	1,281	1,351	1,329
Payments for take or pay contract	Million JOD	0	0	8	90	293	486	534	720
Other power purchase	Million JOD	41	39	40	40	40	40	40	40
Total power purchase costs	Million JOD	2,085	2,425	1,739	1,551	1,651	1,807	1,925	2,089
Power purchase costs per unit	JOD/MWh	124.7	137.1	91.5	76.6	76.6	76.6	78.7	80.2
Bulk tariff to breakeven	JOD/MWh	127.4	139.6	93.6	78.4	78.4	78.4	80.6	82.1
Operating Profit (Loss)									
Total Revenues from power sales	Million JOD	1,167	1,391	1,531	16,664	1,807	1,963	2,133	2,317
Total cost of power purchases	Million JOD	-2,085	-2,425	-1,739	-1,551	-1,651	-1,807	-1,925	-2,089
Operating profit (loss)	Million JOD	-918	-1034	-208	112	156	157	207	228
Other costs	Million JOD	167	145	196	225	176	150	140	140
Net Profit (Loss)	Million JOD	-1,085	-1,179	-405	-113	-19	6	67	88

Figure 4.22: Summary of Baseline Scenario Results (Source: Projections by authors using Baseline assumptions)

75 NEPCO 2013.
76 As of June 23, 2015

barrel. This is the price assumed for the period 2015 to 2020 in the Baseline Scenario.

LNG Supply

The base LNG supply is from the Shell contract. The contract supply is assumed to be constant over the projection period at 150 MMCFD. It is assumed that NEPCO acquires additional LNG supplies of 150 MMCFD through competitive tenders. The supply from these tenders is assumed to begin by the end of 2015.

When additional supplies of LNG are needed, NEPCO will obtain the needed quantities of LNG from the spot market starting in 2017.

LNG Costs

The LNG price for the Shell contract (150 MMCFD) is linked to the price of Brent crude. The LNG price (in $/MMBtu) is anticipated to be about 12 percent lower than the current price of HFO and substantially lower than the cost of diesel. Consistent with the assumption of constant Brent prices, the LNG price is also assumed to be constant over the period 2015 to 2020.

NEPCO anticipates purchasing additional LNG supplies through competitive tenders. It is assumed in this assessment that the tender price will be about 10 percent higher than the contract price with Shell. NEPCO will also pay for the fixed cost of the LNG terminal and FSRU. This cost is assumed to be JOD 70 million annually.

Planned Acquisition of Renewable Energy Resources

The planned acquisition of wind and solar resources through 2017 is assumed to be as shown in Figure 4.19 above. It is assumed that in late 2018, an additional 200 MW of wind resources will be acquired. Also, it is assumed that starting in mid-2019 additional 200 MW of solar power will be acquired through competitive tenders.

Renewable Energy Prices

The prices of wind and solar power through 2017 were shown in Figure 4.19. It is assumed that the additional wind power in 2019-2020 will be purchased at the reference price of 85 fils/kWh. For solar energy, the current competitive tenders indicate prices in the range of 43 to 60 fils/kWh. In the Baseline Scenario, it is assumed that solar power will be acquired at a purchase price of 50 fils/kWh.

Shale Oil Power Plant

The baseline assumptions regarding the first shale oil power plant were listed above. It is assumed that a second shale oil power plant with approximately the same capacity will come on line in 2020 and power from this plant will be purchased at the same price as the Eesti Energia plant.

Summary of Baseline Scenario Results

Figure 4.22 presents a summary of the Baseline Scenario results. These projections indicate that under the assumptions in the Baseline Scenario NEPCO will continue to incur operating losses in 2015 (JOD 384 million) and 2016 (JOD 107 million), but due to the reduced fuel costs from imported LNG the losses will reduce over time and NEPCO will come very close to cost recovery by 2017 with a net operating loss of JOD 19 million. In 2018 and subsequent years NEPCO will show an operating profit.

The baseline projections show the dramatic changes in the energy resources for power generation from 2014 to 2020. From the extremely heavy reliance on HFO and diesel in 2014 (about 90 percent), the resource mix in 2017 is projected to change to 68.8 percent LNG, 17.1 percent shale oil, and 6.9 percent solar and wind, with Egyptian gas at 6.4 percent and imports at 1.9 percent. By 2020, the additional development of shale, solar, and wind resources changes the mix to 56 percent LNG, 28.2 percent shale oil, and 9.0 percent solar and wind, the rest from Egyptian gas and imports. Figure 4.23 illustrates the changing resource mix for power generation from 2014 to 2017 and 2020.

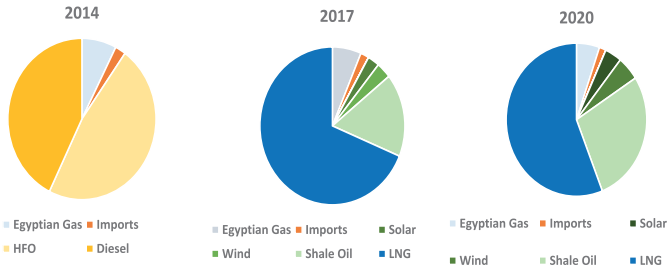


Figure 4.23: Changing Resource Mix for Power Generation (Source: Projections by authors using Baseline assumptions)

The diversification of the supply resource mix and the lower cost of the LNG, solar, wind and shale resources lead to a significant reduction in NEPCO's fuel costs and allows NEPCO to achieve cost recovery by late 2017. Figure 4.24 summarizes the actual and projected operating losses for NEPCO from 2013 to 2020.

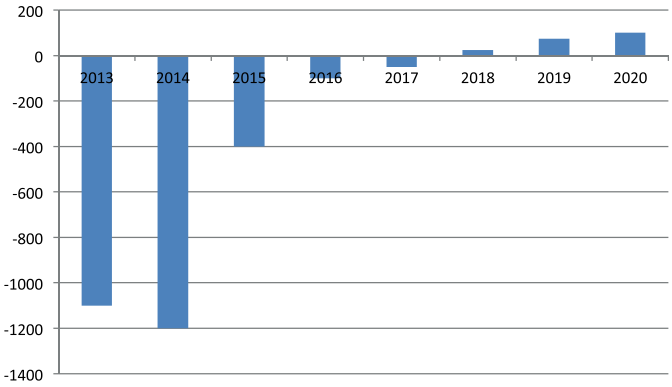


Figure 4.24: NEPCO Operating Losses/Profits in Millions JOD

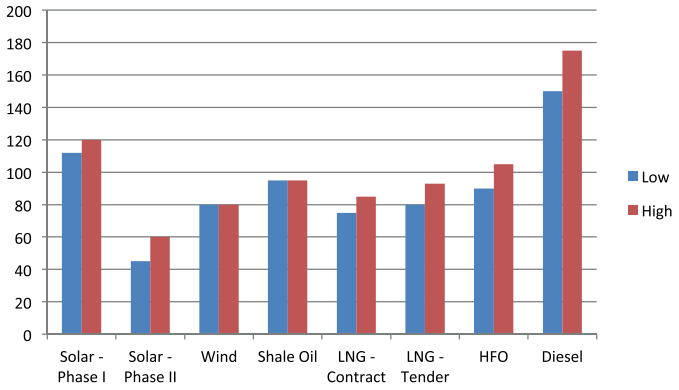


Figure 4.25: Generation Cost per Unit from Different Sources, JOD per MWh

A major reason for the reduction in operating losses of NEPCO is the price of LNG which is lower than the prices of HFO and diesel. LNG supplies a very large portion of the power generation in the years 2016 and beyond (about 68 percent from 2016 to 2019, and 56 percent in 2020) is from LNG.

It should be noted that these baseline projections assume constant oil prices (as assumed for the current projections by GBD and NEPCO. Since the LNG price is linked to oil price, the projections therefore assume LNG price to be constant over the projection period. However, should oil prices increase as a result of changing conditions in world oil markets, the LNG price will also increase and the resulting increase in fuel purchase costs will most likely lead NEPCO to incur continuing operating losses. The effects of changes in oil price and other market uncertainties are discussed below.

To address some of the potential impacts of major uncertainties, such as changes in world oil price, GOJ can consider several strategic options. Some of these options and their potential impacts are discussed below.

In assessing the impacts of major uncertainties and strategic options, it is important to consider the relative costs of the different resource options in the diversified resource mix for power generation. Figure 4.25 shows the low and high values of these costs.

- The Solar Round I costs are the prices to be paid under the PPAs signed with solar developers in the first round.
- The Solar Round II costs are estimated from the recent bids received in the second round.
- The wind power costs are based on the reference price established by EMRC.
- The shale oil costs are based on the PPA signed with the developer of the first shale oil plant. It is assumed that future shale oil contracts will be signed at the same price.
- The LNG price has been estimated based on the Shell contract. The low LNG price assumes constant world oil price, while the high price is estimated based on world oil from the IEA mid-term projection (see discussion below).
- The tender and spot prices of LNG are assumed to be 10 percent higher than the contract price.

Figure 4.25 shows that the cost of power generation from renewable energy sources, shale oil, and LNG (contract and tender) are all lower than HFO and substantially lower than diesel. Among these resources, solar power (estimated based on the recent competitive bid prices) is by far the least expensive. Wind power costs are slightly more than the low cost of the LNG contract price (Baseline Scenario) but lower than LNG tender and spot price. Power purchases from the shale oil plants are more expensive than LNG contract and tender prices, even compared to the higher LNG price consistent with the higher Brent crude price as projected by IEA.

Assessment of Impacts of Major Uncertainties

Oil Price Changes

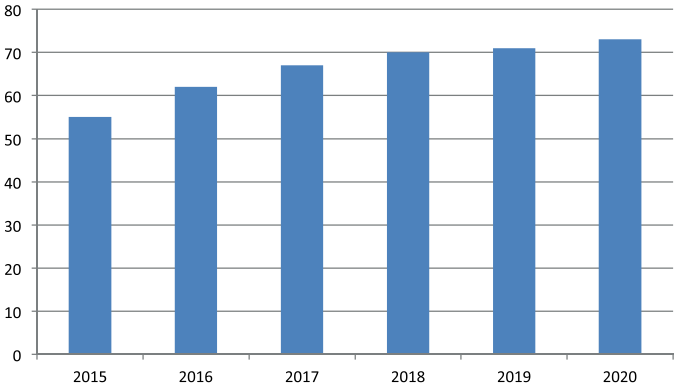


Figure 4.26: IEA Mid-Term Oil Price Projection for Brent Crude Oil, USD per BBL (Source: International Energy Agency)

As shown in the baseline projections above, NEPCO will achieve cost recovery by 2018 under the assumption that fuel prices (particularly LNG prices) remain constant at current levels. World oil markets are influenced by a number of political, economic, technical, and institutional factors, and it is possible that oil prices will not remain constant as assumed in the Baseline Scenario. The International Energy Agency's mid-term oil price projection (IEA 2015) shows an increase in oil prices by about 17 percent from 2016 to 2020 (see Figure 4.26), and the world oil price as of June 2015 already exceeds the IEA 2016 price.

The result of oil price increases as projected in the IEA forecast (considered herein as the "High Oil Price" Scenario) will be corresponding increases in the LNG contract price, which is pegged to the Brent crude price, and will also affect LNG tender and spot market prices. While the fixed costs for the LNG terminal and FSRU will remain constant, the increases in LNG prices will have an adverse impact on NEPCO's operating profits.

Figure 4.28 shows the projected LNG prices for the Baseline and High Oil Price Scenarios and the corresponding operating profits/losses for NEPCO from 2015 tom 2020.

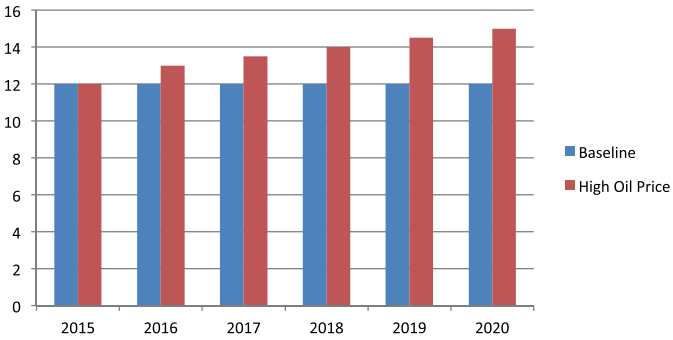


Figure 4.27: LNG Prices, Baseline and High Oil Scenarios, USD per MMBtu

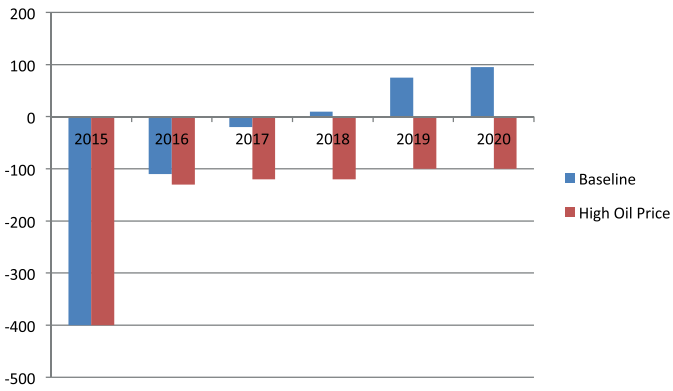


Figure 4.28: NEPCO Profit/Loss Baseline and High Oil Price Scenarios, in Millions of JOD

The high LNG price results in NEPCO continuing to incur losses throughout the projection period, with the losses amounting to JOD 121, JOD 133, JOD 95 and JOD 98 million, respectively, in years 2017, 2018, 2019, and 2020. As shown in Figure 4.28, the net difference between the baseline and the High Oil Price Scenarios over the period 2016 to 2020 is JOD 617 million. These losses will lead to continued adverse fiscal impacts on the national deficit and the national debt. This projection of the High Oil Price Scenario highlights the vulnerability of the electricity sector to world oil prices.

Revenue Erosion due to "Retail Flight"

A key issue faced by the electricity sector is the cross-subsidy paid by customers in the higher-tariff tiers to those in the lower-tariff tiers. As a result the burden of increases in tariffs is borne by the higher-tariff tier customers because the EMRC has decided not to increase tariffs in the tariff tiers 1 through 4

	2015	2016	2017	2018	2019	2020
Baseline	82.4	84.1	85.8	87.5	89.2	91.0
Retail Flight	82.4	83.2	84.1	84.9	85.7	86.5

Figure 4.29: Average Bulk Tariff – Baseline vs. Retail Flight

	2016	2017	2018	2019	2020
Baseline	-113	-19	6	67	88
Retail Flight	-129	-56	-53	-18	-28
Difference	-17	-36	-60	-85	-116
Net Difference from Baseline 2016 to 2020				-313	

Figure 4.30: NEPCO Operating Losses—Baseline vs. Retail Flight Scenario

(consumption less than 600 kWh per month). The result of the increasing tariffs combined and the lower cost of solar technologies, together with the regulatory initiatives allowing net metering and retail wheeling, are making alternative energy systems such as PV and solar water heating economically attractive to the higher-tariff tier customers. This situation is leading to the phenomenon referred to as "retail flight"—the decision by large energy users to construct their own electricity systems and go fully or partially off grid.

An example of this is the telecommunication industry, which pays the highest retail tariff (300 fils per kWh). A recent decision was made by the telecommunications firm Orange to install PV systems for their facilities—5 MW for the northern region, 24 MW for the central region (multiple locations), and 4 MW for the southern region. To the extent that such high consumption customers partially or wholly leave the utility system, there will be sales and revenue losses to the distribution utilities. These in turn will lead to lower sales and revenues to NEPCO.

The magnitude of this problem cannot exactly be quantified. In order to estimate the potential impacts of such retail flight, it was assumed in this assessment that about 10 percent of the consumption of high tier retail customers is met by sources other than distribution companies by 2020. This will lead to a loss of revenue to the distribution companies of about 7 percent (assuming the high tier customers pay about 70 percent of the total revenues to the distribution companies). It is further assumed that the revenue loss is gradual, amounting to 1.4 percent per year from 2016 to 2020. Then the average bulk tariff will change as shown in Figure 4.29.

While 1 percent per year retail flight may appear to be a small number, it has a significant impact on the NEPCO bottom line due to the lower revenue from the bulk tariffs. The revised operating losses are shown in Figure 4.30.

As shown in the figure NEPCO's operating losses will continue beyond 2020 if the retail tariffs are not adjusted by EMRC to address the revenue erosion due to retail flight. Figure 4.31 shows the results.

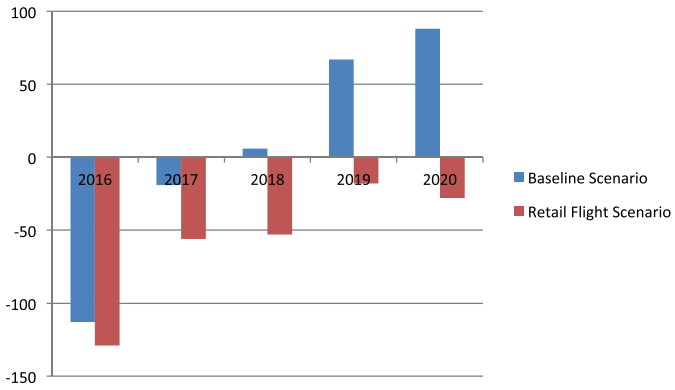


Figure 4.31: Effect of Retail Flight on NEPCO Operational Losses, in Millions of JOD

The increases in retail tariffs in the higher-tariff tiers (residential customers with consumption exceeding 600 kWh/month and most non-residential customers) has already led to some increases in non-technical losses. Such losses are very important from NEPCO's perspective because they lead to electricity consumption with no revenues. There is no current data or any assessments of the potential increases in non-technical losses resulting from increased tariffs.

For this analysis a simple assumption was made that

	2016	2017	2018	2019	2020
Baseline	-113	-19	6	67	88
Increased Non-Tech Losses	-121	-38	-24	25	30
Difference	-8	-18	-30	-43	-58
Net Difference from Baseline 2016 to 2020				-157	

Figure 4.32: Increase in Non-Technical Losses

	2016	2017	2018	2019	2020
Baseline	-113	-19	6	67	88
Low Demand	-106	-30	-11	40	49
Difference	7	-10	-18	-27	-39
Net Difference from Baseline 2016 to 2020				-87	

Figure 4.33: Impacts of Low Demand Growth

non-technical losses increase by 0.5 percent annually during the period 2016 to 2020 (an increase of 2.5 percent by 2020). These losses would reduce revenue to the distribution companies and therefore reduce NEPCO's bulk tariff. The result would lead to continued operational losses for NEPCO through 2020. Figure 4.31 shows a summary of the results. The net difference from the Baseline Scenario over the five-year period 2016 to 2020 is JOD 157 million.

Impacts of Low Demand Growth

The Baseline Scenario assumed that the retail demand for electricity will continue to grow at an annual growth rate of 6.5 percent, consistent with the growth in prior years. If economic conditions change and the retail demand for electricity grows at a lower rate, NEPCO's fuel purchase needs will be reduced. However, since NEPCO is committing to power purchases from wind, solar and oil shale resources under power purchase agreements on a "take or pay" basis, it is possible that NEPCO may have to reduce purchases of LNG, which, under the Baseline Scenario, costs less than power from wind or shale resources.

To assess the potential impacts of low demand growth, it was assumed that retail electricity sales would grow only at 4 percent annually. The impacts on NEPCO's bottom line are shown in Figure 4.33. The net difference between the Baseline and the Low Demand Growth Scenarios is increased operating losses of JOD 87 million over the five year period 2016 tom 2020.

Impacts of Very High Oil Prices

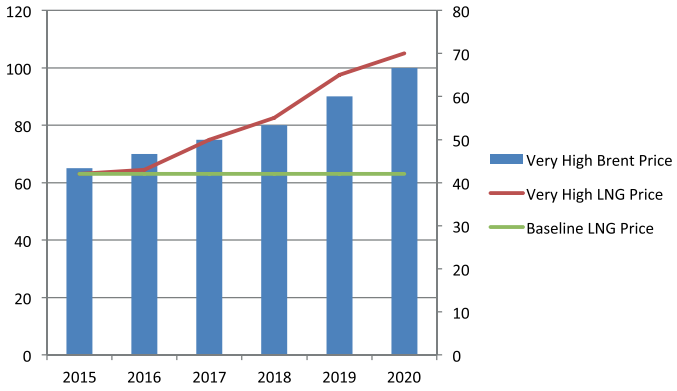


Figure 4.34: LNG Prices in Very High Oil Price Scenario

	2015	2016	2017	2018	2019	2020
Baseline	-405	-113	-19	6	67	88
Very High Oil	-405	-141	-165	-272	-374	-485
Difference	0	-28	-146	-278	-442	-573
Net Difference from Baseline 2016 to 2020					-1,466	

Figure 4.35: Effect of Very High Oil Prices on NEPCO's Operating Losses

	2016	2017	2018	2019	2020
Baseline	200	400	400	600	600
High Solar	400	600	800	1,000	1,200

Figure 4.36: Baseline vs. High Solar Scenarios – MW Solar Capacity

	2016	2017	2018	2019	2020
Baseline	-113	-19	6	67	88
High Solar	-70	-9	27	95	122
Difference	42	10	21	27	33
Net Difference from Baseline 20116 to 2020				134	

Figure 4.37: High Solar Development Scenario in Millions of JOD

	2016	2017	2018	2019	2020
Baseline	188	117	117	117	117
High Wind	188	400	650	1,000	1,200

Figure 4.38: Wind Power Capacity (MW) – Baseline vs. High Wind Scenario

	2016	2017	2018	2019	2020
Baseline	188	117	117	117	117
High Wind	188	400	650	1,000	1,200

Figure 4.39: Impacts on NEPCO Profits – High Wind Scenario

As indicated in the earlier discussion, world oil prices are influenced by a number of political, economic, technical, and institutional factors and it is conceivable that turmoil in world oil markets could drive the Brent crude oil price much higher, possibly as high as $100 per barrel. Figure 4.34 shows the effect of such high oil prices on the price of LNG.

Such high LNG prices will have a major negative impact on NEPCO's operating losses. Figure 4.35 shows the projection of NEPCO's bottom line under the Very High Oil Price Scenario.

The results show that very high operating losses would be incurred by NEPCO if Brent crude oil prices rise to USD100/BBL by 2020.

The net difference between the Baseline and the Very High Oil Price Scenarios is a total of about JOD 1.5 billion over the five year period 2016 tom2020.

Impact of the Syrian Crisis on the Electricity Sector

As a consequence of the continuing conflict in Syria, Jordan is hosting about 1.4 million Syrians, of whom 646,700 are refugees, with roughly four out of five living in host communities outside camps.[77] While UNHCR takes care of the refugees in the camps, providing for the needs of the refugees outside the camps has severely impacted Jordan's public finances, increasing government expenditure on subsidies, public services, and security.

The electricity sector is facing the need for increased power supply to meet the needs of the Syrian refugees. EMRC has estimated that the electricity consumption of Syrian refugees (outside camps) is about GWH 363 in 2012 (EMRC 2015b). This represents about 2.2 percent of total electricity sales in 2012.

In the refugee camps, UNHCR pays the electricity bills at a tariff higher than the average retail tariff and NEPCO's power cost, thereby providing a small net benefit to the electricity sector. However, outside the camps, most Syrians are purchasing electricity at the lower tier tariffs. EMRC has estimated the subsidy to the Syrians outside the refugee camps based on the difference between NEPCO's cost for power and the average retail tariff paid by households. By netting the benefits from UNHCR payments from these subsidy estimates, EMRC has estimated that in 2012 the electricity subsidy paid to Syrian refugees was about JOD 36 million or about 5 dinars per month per refugee (for 600,000 refugees).

In 2015, the number of refugees increased to roughly 650,000, but the difference between NEPCO's cost for power and the average retail tariff paid by households has decreased from 2012. As a result, the net impact of the refugees is estimated to be around the same as the 2012 estimate or about JOD 36 million.

Assessment of Strategic Options: Impacts and Benefits

The assessment conducted above quantified the potential impacts of emerging trends on NEPCO's operating losses. To mitigate the risks of some of these external changes, GOJ and NEPCO can undertake a number of strategic initiatives. These include:

- Aggressive development of grid-connected solar PV power plants;
- Increasing purchases of wind energy;
- Aggressive implementation of DSM in the lower tariff tiers;
- Reducing non-technical losses; and
- Securing alternative sources of gas supply.

These options are briefly discussed below.

Aggressive Development of Solar PV Power Plants

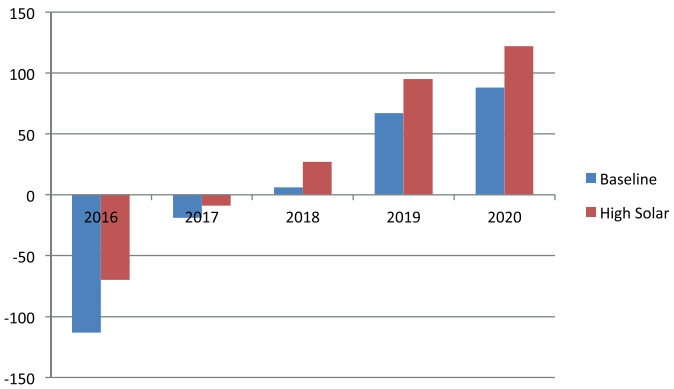
As shown above in the comparison of the costs of power generation from the various resource options,

77 Jordan Response Plan 2015

solar PV power appears to be the least expensive, based on the bids received in the recent competitive procurement by NEPCO. Therefore GOJ and MEMR should consider aggressive development of additional large solar power plants to reduce the future costs of acquisition of supply resources. The Baseline Scenario assumed 200 MW of solar power coming on line in 2017 from the Round 2 competitive bids and an additional 200 MW installed and operational by mid-2019.

The "High Solar" Scenario assumes a more aggressive development of solar power with 200 MW of solar power added each year from 2016 to 2020. Figure 4.36 illustrates this scenario.

The results are a substantial improvement in NEPCO's profits, as shown in Figure 4.37. The aggregate net increase in NEPCO's profits in the High Solar Scenario compared to the Baseline is JOD 134 million.



Increasing Purchases of Wind Energy

In the future resource mix for power supply, wind energy may also provide a somewhat attractive option because it can replace some of the tender or spot purchases on LNG. Detailed information on the potential for wind energy in Jordan is not available. In this assessment, a High Wind Power Scenario was developed in which it was assumed that aggressive promotion of wind energy will lead to additional 150-200 MW of wind power in each of the years 2017 to 2020. The total wind power capacity in the Baseline and High Wind Scenarios is shown in Figure 4.38.

However, in the Baseline Scenario, the difference between the cost of power from wind generation and from LNG tenders is rather small so the additional development of wind resources provides only a small change in NEPCO's profits. Figure 4.39 shows the results—an aggregate net increase of JOD 8 million over the period 2016 to 2020.

However, it should be noted that additional development of wind will provide greater diversification of supply resources and less reliance on LNG; this could be very attractive if LNG prices increase due to world oil price increases.

Implementation of DSM in the Lower Tariff Tiers

Implementation of demand-side management initiatives in the lower-tariff tiers can reduce the consumption in these tariff tiers. Since customers in these tiers are subsidized, the reduced consumption will lead to less subsidies and increase the average revenues of the distribution companies and in turn result in higher bulk tariffs for NEPCO.

The distribution companies have received approval from EMRC for implementation of some initial DSM programs for efficient lighting and solar water heating. These programs can be scaled up and additional DSM programs targeted at the subsidized customers. International experience indicates that DSM programs have achieved energy savings in the range of 1 percent to 3 percent annually. In this assessment, two DSM scenarios were developed: (1) a Moderate DSM Scenario that achieves annual reductions of 1 percent; and (2) an Aggressive DSM Scenario that achieves 2 percent annual reductions.

The results of these two scenarios are summarized in Figure 4.41. The net aggregate increase in NEPCO's profits over the period 2016 to 2020 are JOD 24 million in the Moderate Scenario and JOD 48 million in the Aggressive Scenario.

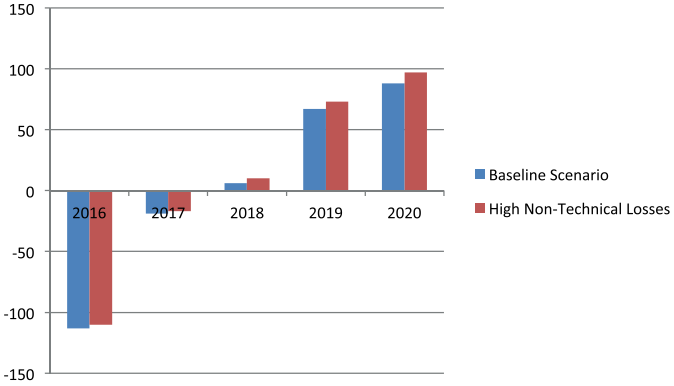


Figure 4.40: Moderate DSM Scenario in Millions of JOD

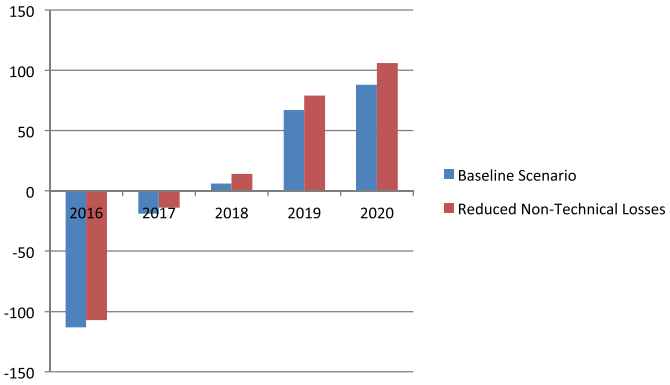


Figure 4.41: Aggressive DSM Scenarios in Millions of JOD

Reducing Non-Technical Losses

Non-technical losses in the distribution systems lead to electricity consumption with no revenues to the distribution companies. A program to reduce non-technical losses could be undertaken by imposing and enforcing higher penalties to electricity consumers who use electricity without paying the appropriate tariff. In this assessment, it was assumed that aggressive development and enforcement of regulations and procedures can cut the non-technical losses by 2.5 percent over the five year period 2016 to 2020.

If non-technical losses are reduced by 0.5 percent annually for the five years 2016 to 2020, the results would be increased revenues to the distribution companies. These increased revenues would lead to an increased bulk tariff from NEPCO to the distribution companies. A small reduction of 0.5 percent annually can have significant benefits to NEPCO, as shown in Figure 4.42

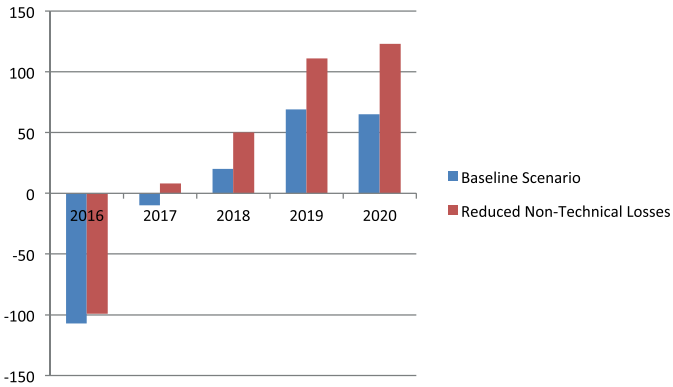


Figure 4.42: Reduced Non-Technical Losses in Millions of JOD

The net aggregate increase in NEPCO's profits under the Reduced Non-Technical Losses Scenario are JOD 156 million over the 5-year period 2016 to 2020.

Securing Alternative Sources of Gas Supply

A 2013 USAID study concluded that some of Jordan's immediate neighbors have the potential to supply reliable and low-cost gas for power generation relative to the options considered in the Baseline Scenario. GOJ and MEMR are currently discussing with British Gas and other neighborhood country suppliers options for acquiring gas supplies. If such supplies can be available at prices lower than the contract or spot LNG prices, they will reduce NEPCO's fuel costs and improve its bottom line.

The specific details of the quantities and costs of such alternative gas supplies have not yet been worked out. However, to examine the potential benefits, a "Neighborhood Gas" Scenario was developed in this assessment. This scenario assumes the availability of neighborhood gas supply amounting to 150 MMCFD starting in 2019 at a price 5 percent lower than the Shell LNG contract price. The results are a substantial improvement in NEPCO's bottom line. The aggregate net increase in NEPCO's profits will be JOD 80 million (in 2019 and 2020).

4.8 RESPONDING TO CHALLENGES

The *Jordan 2025* strategy outlines a plan to navigate the challenges and opportunities ahead for Jordanian citizens and their families. *Jordan 2025* articulates a set of strategic choices and principles to guide the transformation of Jordan's prevailing development model so as to restore the nation's finances, create jobs for Jordanians, and improve the standard of living and wellbeing for Jordanians families. It also calls for urgent action to be taken to implement significant regulatory reform to achieve sustainable improvements in the quality of the business environment. To accomplish these objectives, it is essential to have secure, reliable and affordable electricity.

The high fuel costs for power generation faced by the electricity sector during the last 5 years have led to large financial losses for NEPCO which have created substantial pressures on the nation's finances. The resulting increases in the national deficit and debt have limited the government's ability to dedicate more resources to areas such as education and health. The electricity sector therefore needs to meet the goal of restoring NEPCO's finances to a cost recovery basis.

The previous sections of this chapter have provided an overview of NEPCO' current situation and initiatives being undertaken to reduce NEPCO's operating losses and reach cost recovery by 2018. It has also been pointed out that the electricity sector faces a number

of major uncertainties and challenges that could influence NEPCO's ability to achieve cost recovery and thereby minimize the fiscal impacts. This section addresses some of these uncertainties and challenges and provides a set of recommendations.

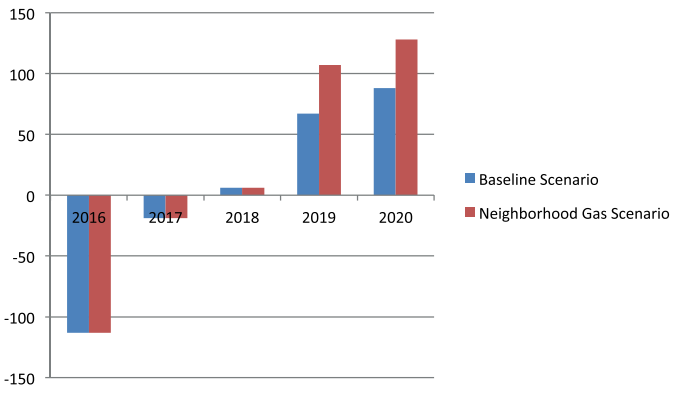


Figure 4.43: Benefits from Neighborhood Gas Purchases

The important initiatives that need to be undertaken are (see Figure 4.44):

- Diversification of fuel supply;
- Aggressive development of renewable energy resources;
- Reduction of subsidies through DSM programs;
- Minimization of retail flight through tariff reform; and
- Reduction of non-technical losses.

These initiatives need to be part of the national strategy and action plan for the electricity (and energy) sector.

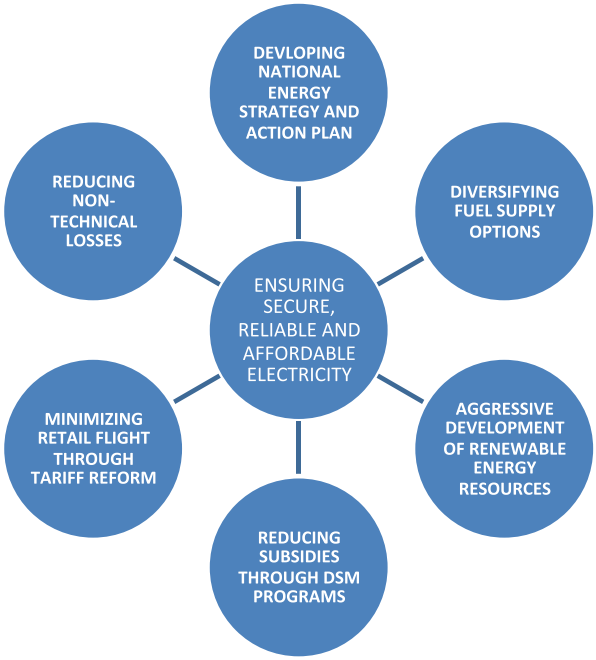


Figure 4.44: Major Recommended Initiatives

Updating Energy Strategy and Development of Action Plan

A Master Strategy for the Energy Sector in Jordan (for the period 2007 to 2020) was originally developed in 2007 and updated in 2010. This strategy outlined the energy supply and demand situation for electricity, natural gas, and petroleum products and defined the issues and challenges related to meeting future energy needs of the Jordanian economy and developing renewable energy, oil shale, and domestic energy resources.

Since 2010, the major factors influencing the energy sector, and in particular the electricity sector, have changed dramatically. Low-cost gas supply from Egypt is no longer available in large quantities, prices of HFO and diesel used to replace the gas supply have been very high (although they have come down in the last year), renewable energy technologies have been rapidly developing and their costs have been substantially reduced, oil shale development has become a reality, and natural gas resources are now available in the form of LNG.

The Japan International Cooperation Agency (JICA) has initiated the development of a comprehensive electricity sector master plan that will include consideration of economic efficiency, energy security, and environmental and social considerations (JICA 2014). The need for a secure, reliable and affordable electricity supply has also been emphasized in the *Jordan 2025* strategy. The importance of electricity in the national economy has been highlighted by the unfortunate losses incurred by NEPCO and the resulting fiscal impacts on the national deficit and debt. It is therefore essential that an updated national energy strategy and related road map and action plan be developed to complement the JICA master plan consistent with *Jordan 2025* and address the major issues and challenges faced in this sector.

Recommendation #1: Immediately undertake an effort, in collaboration with all the stakeholders, to develop a National Master Plan for Energy and Electricity and develop a Roadmap and Action Plan.

Diversifying Fuel Supply Sources

The events of the last five years have demonstrated that Jordan cannot rely on a single supply source for its power generation. The disruption of the supply of low-cost Egyptian natural gas has led to the use of alternative fuels (HFO and diesel) that have proven to be extremely expensive and resulted in serious financial issues. GOJ has taken steps to alleviate the financial

pressures by investing in the construction of the LNG terminal in Aqaba and securing contract supply of LNG, with plans to acquire additional supplies of LNG through competitive tenders. As a result, the power generation mix will change from 65 percent reliance on HFO and diesel in 2014 to over 67 percent on LNG from 2016 to 2019. Since these LNG supplies will be obtained at costs lower than HFO and diesel, NEPCO is expected to achieve cost recovery within about 3 years.

However, the assumption of cost recovery is based on the world oil price remaining constant at the current level. It is well-known that the world oil price is subject to a wide range of political, economic, technical and institutional factors and is therefore subject to considerable uncertainties. It has been pointed out above in the High Oil Price and very High Oil Price Scenarios that, since LNG prices are linked to world oil prices, increases in world oil prices will have severe detrimental impacts on NEPCO's financial situation.

It is therefore important for Jordan to consider further diversification of fuel supply resources. One clear option is aggressive development of renewable energy (discussed below). Another important option to consider is the acquisition of Eastern Mediterranean gas. As indicated in the discussion above, gas from some neighboring countries could offer the potential for a reliable and low-cost supply for power generation, compared to LNG or other fuel options, and can provide further diversification of fuel supply sources. As shown in the Neighborhood Gas Scenario, under certain conditions, such gas supplies could be quite beneficial to NEPCO.

Recommendation #2: Jordan should continue the exploration of options for Eastern Mediterranean gas supplies and negotiate a better pricing structure for such gas compared to LNG prices.

Aggressive Development of Solar PV and Wind Energy Resources

The cost of power from solar PV, based on the recent result of NEPCO's tenders, is very attractive, with the lowest bids in the range of 43 to 60 JOD/MWh, which are substantially below the cost of generating power from LNG. While the cost of wind power is not as low as these solar resources, wind power is price-competitive with LNG at today's prices and is likely to be less expensive than LNG if world oil prices increase by more than 20 percent over current prices. Further, solar and wind power will be acquired using long-term fixed-price power purchase agreements and will therefore not be influenced by changes in oil prices. While solar and wind power cannot provide 100 percent of the power resources due to their intermittent nature, it may be possible to obtain contributions of 20-40 percent from these resources in the generation mix.

Therefore aggressive development of solar and wind resources will provide significant benefits to NEPCO and consequently to Jordan's economy. Developers of solar and wind power plants have pointed out some of the issues and challenges they face in developing these resources and making the power available to the grid. These include land acquisition, licensing and permitting, financing, grid interconnection, etc. The government needs to facilitate and promote the rapid deployment of solar and wind resources. Actions that the government may implement include additional tenders for solar and wind power, streamlining the licensing and permitting processes, constructing interconnection and power evacuation facilities, and possibly establishing a "one-stop shop" for solar and wind developers.

Recommendation #3: The Government of Jordan should take immediate steps to address and remove the barriers to the scaling up of the deployment of solar and wind power plants.

Reducing Subsidies through DSM Programs

Electricity sales to lower-tier customers in Jordan are heavily subsidized. Residential consumers in tariff tiers 1 through 4 (consumption less than 600 kWh per month) paid in 2014 an average of about 55 fils/kWh (55 dinars/MWh). Since the average bulk tariff was 80 dinars/MWh. The subsidy is therefore over 30 percent. As a result, NEPCO incurs losses for every kWh sold to these consumers.

The implementation of demand-side management programs for these subsidized consumers will reduce their consumption and therefore reduce the subsidies and losses incurred by NEPCO. DSM programs are now being initiated in Jordan by JREEEF in collaboration with the three distribution companies. Scaling up these programs can help achieve substantial reductions in the electricity use by subsidized customers. International experience indicates that 1-2 percent annual reductions are feasible with moderate to aggressive DSM efforts.

Recommendation #4: The Government should encourage EMRC and the distribution companies to develop and implement aggressive DSM programs targeted at the lower tariff tier consumers to reduce

their electricity consumption and thereby reduce the subsidies and losses incurred by NEPCO.

Minimizing Retail Flight through Tariff Reform

The tariff structure in Jordan results in very high tariffs for consumers who have high monthly consumption. Residential consumers in the higher tariff tiers (tiers 5, 6, and 7) and commercial consumers in sectors such as banking and telecommunications pay very high tariffs, which result in substantial cross-subsidies to lower tier consumers. Moreover, future price increases, as planned by EMRC, will further increase the tariffs for these consumers. As the costs of solar PV systems are reduced by technological improvements, these consumers are finding it very attractive to consider installing PV systems and partially or wholly go off the grid. The EMRC regulations related to net metering and retail wheeling provide additional incentives to high tariff consumers to consider installing PV systems. This is leading to the phenomenon of retail flight, as discussed above.

While the exact magnitude of retail flight cannot be quantified due to limited data, the assumptions in the Retail Flight Scenario show that the decisions by higher tariff customers to install PV can have a significant detrimental impact on NEPCO. To minimize such impacts, it is necessary to reform the tariff structure. Such reforms could include restructuring the tariffs to reduce the cross-subsidies and lower the tariffs for the higher-tier consumers. Alternatively (or in addition), the tariffs for the higher tiers may be restructured to introduce a demand charge on electricity purchased from the distribution companies. Such a demand charge will protect the distribution companies' investments in the distribution network and reduce the attractiveness of switching to solar systems.

Recommendation #5: EMRC should conduct a comprehensive assessment of the existing tariff structure and its effects on cross-subsidies, potential retail flight, and resulting impacts on the electricity systems and NEPCO losses. Based on the results, EMRC should implement appropriate tariff reforms.

Reducing Non-Technical Losses

Non-technical losses refer to electricity consumption that does not produce any revenues to the distribution companies. While the exact quantification of non-technical losses has not been conducted (EMRC is currently conducting such an assessment), it is estimated that the current level of non-technical losses is about 5-6 percent. These losses lead to generation by NEPCO with no corresponding revenues. Therefore, reduction of non-technical losses can provide positive effects for NEPCO and reduce its operating losses. The Reduced Non-Technical Loss Scenario pointed out the estimated benefits to NEPCO under certain assumptions regarding reduced non-technical losses.

Recommendation #6: EMRC should conduct a detailed assessment, in cooperation with the distribution companies, of the level and causes of non-technical losses and measures to minimize or eliminate such losses. The Government should develop and enforce measures to penalize individuals and organizations that use electricity without paying the required tariffs.

REFERENCES

1. EMRC. 2015a. Energy and Minerals Regulatory Commission, Retail Electricity Tariff Instructions, Amman.
2. EMRC. 2015b. Energy and Minerals Regulatory Commission, Assessment of Syrians' (outside camps) Impact on Electricity Consumption, Amman.
3. IEA. 2014. International Energy Agency, Key World Energy Statistics, Paris.
4. IEA. 2015. International Energy Agency, Medium-Term Oil Market Report 2015, Paris.
5. IMF. 2012. International Monetary Fund, Jordan: Request for a Stand-By Arrangement, Washington, D.C., July 27, 2012.
6. JICA. 2015. Japan International Cooperation Agency, Project for the study on the Electricity Sector Master Plan in the Hashemite Kingdom of Jordan: Outline of the Study, Amman, April 2015.
7. JRP. 2015. Jordan Response Platform. Jordan Response Plan for the Syrian Crisis, Amman.
8. MEMR. 2014a. Ministry of Energy and Mineral resources, Annual Report - 2013, Amman.
9. MEMR. 2014b. Scaling Up Renewable Power in Jordan, presentation by Eng. Ziad Jebril Sabra, Amman, 10 April 2014.
10. MoPIC. 2014. Ministry of Planning and International Cooperation, Jordan 2025: A National Plan for Inclusive Growth and Sustainable Prosperity for All Jordanians, Amman, December 2014.
11. NEPCO. 2013. National Electric Power Company, Electricity Demand Forecast, Amman.
12. NEPCO. 2014. National Electric Power Company, Annual Report 2013, Amman.
13. RCREEE. 2013. Regional Center for Renewable Energy and Energy Efficiency, Latest Electricity Pricing Schemes in RCREEE Member States: RCREEE Research Brief 2013-1, Cairo.,
14. RCREEE. 2015. Regional Center for Renewable Energy and Energy Efficiency, Arab Future Energy Index (AFEX): Energy Efficiency 2015, Prepared for UNDP and the World Bank, Cairo.
15. UNHCR. 2014. Year in Review – 2014 UNHCR Jordan, Amman
16. World Bank. 2014. Electric Power Transmission and Distribution Losses (% of Power Output), Washington, D.C.

WATER

5.1 SECTOR OVERVIEW

The water sector in Jordan has made great progress over the past 4 years since the 2011 Public Expenditures Perspectives (PEP) report was issued. The Disi well field came on line in 2013, increasing the frequency of water supply to Amman from one day per week to three days per week. Miyahuna and Aqaba Water Company have continued to improve on most of their operating benchmarks.

The Water Authority of Jordan (WAJ) has drafted a 5-year Strategic Plan to address the issues facing the organization and create a world-class water organization. Water coverage is near 100 percent across the Kingdom and wastewater coverage exceeds virtually all other MENA countries. The quality of water delivered to customers has also improved from a very high level (98 percent of samples in compliance with water quality standards) in 2010, to over 99.7 percent in 2014.

Nonrevenue water has been decreasing in Aqaba but has been increasing virtually everywhere else. In Amman, nonrevenue water has increased in Amman since the Disi project came on line, largely due to more continuous water supply causing both real and apparent water losses. In Yarmouk, which hosts a greater relative share of Syrian refugees, nonrevenue water has predictably increased to very high levels. Across the Kingdom, nonrevenue water is approaching 50 percent.

Several large wastewater treatment plants have been constructed or are in the bidding stages. Reuse of treated wastewater is increasing at a rapid rate, which is a clear necessity in a water-stressed country such as Jordan.

While positive trends are occurring in certain areas of the water sector in Jordan, other, negative trends present serious problems going forward. First, water resources are severely stressed with increased water usage exceeding supplies in the future. New sources must be found or water consumption and irrigation reduced.

An agreement on the Red-Dead Project was announced in the interim since the previous PEP report, a significant new factor. The initial USD 900 million project will serve as a pilot for a USD 1 billion project to follow. The Red-Dead Project will increase water supplies in Jordan by 50-100 MCM/year at an estimated cost 0.7-1.1 JOD/M3 in Amman. The water from the project is expected to be available starting in 2020-22. These figures are all flexible as the timing and final costs are still being established for the project.

The nonrevenue (NRW) water situation must be addressed in both operational and capital budgets. From 2008-2011 NRW declined due to the efforts of WAJ and its water companies to extend metering and focus on eliminating leakage. However, since 2011, NRW across the Kingdom has been increasing and is approaching 50 percent. Losing the revenue from half of all water produced is clearly a critical situation that requires a remedy in the near-to-medium term.

Since the 2011 PEP report, electricity costs to the water sector have risen significantly, largely due to a combination of factors, including the IMF requirement to reduce or eliminate subsidies to the sector and the disruption of natural gas supplies from Egypt. While those supplies have now been restored, the new price is considerably higher. Since electricity represents approximately 68 percent of the cost of delivering water (excluding administrative costs), the impact of electricity price increases on the cost of water is significant.

Yet, while the electricity sector has been able to reduce government subsidies through tariff increases, no tariff increases have been approved for the water sector. The Jordan Valley Authority (JVA) has not had a tariff increase for irrigation water in over 20 years. The Water Authority of Jordan (WAJ) has not had a tariff increase in four years. As a result, operating cost recovery across the water companies in WAJ was 76 percent in 2014, compared to 99 percent in 2009.

The Syrian refugee crisis has impacted Jordan in all economic sectors, but the water sector has been particularly strained. The Government of Jordan estimates that 1.4 million Syrians have entered Jordan since the crisis began—with refugees totaling 646,700. This has strained the existing water and sanitation infrastructure and has necessitated an emergency program to build and operate new water and sanitation facilities to serve the camps. This crisis has negated many of the positive trends that had been occurring in the water sector in Jordan up to 2010, and will need to be a major focus of human and financial resources for some time.

5.2 KEY EVENTS IN THE SECTOR SINCE 2011 PEP REPORT

A number of key events have taken place since the original 2011 PEP Report that affect the water sector, as listed below:

Construction of the Disi Project. This is a private sector, Build-Operate-Transfer (BOT) project undertaken by the Ministry of Water and Irrigation

in a contract with a Turkish construction company to supply and transport water from the Disi well field to Amman and other cities in the north. The project, which was commissioned in 2013, is designed to pump 100 MCM for a period of about 25 years.

Elimination of electricity subsidies to all sectors of Jordan is required by the 2012 agreement between Jordan and the IMF. This has resulted in higher costs to all consumers of electricity in Jordan, including the water sector, which has seen annual increases of 15 percent and will continue to see such increases.

The Syrian refugee crisis has increased Jordan's population since 2012 by an estimated 1.4 million Syrians, approximately 646,700 of whom are refugees living in camps and host communities. This represents approximately a 20 percent increase in the Kingdom's population and has placed a great strain on already tight water resources and sanitation facilities.

Approval of the Red-Dead Project. After years of study, the project was approved in late 2014 by Jordan and Israel to desalinate up to 80 MCM/year of water with approximately 40 MCM/year to Jordan, plus an additional 50 MCM/year to Jordan from the Sea of Galilee.

All of these events have major impacts on the water sector. Those impacts, both positive and negative, will be discussed further in this chapter along with proposed actions to mitigate the negative effects.

5.3 ORGANIZATION OF THE SECTOR

Figure 5.1 shows the institutional organization of the water sector.

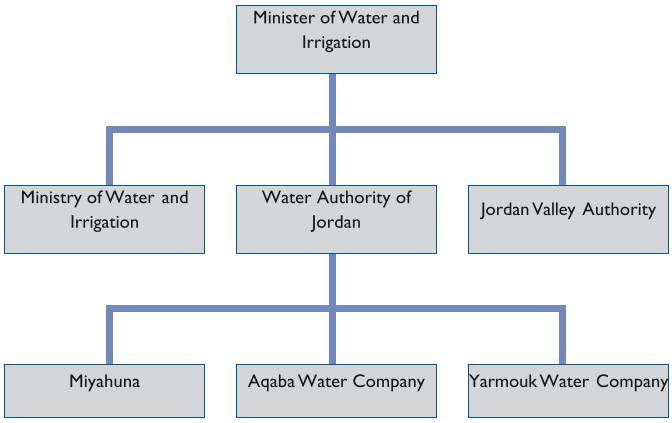


Figure 5.1: Institutional Organization of the Water Sector

Ministry of Water and Irrigation (MWI)

The Ministry of Water and Irrigation (MWI) is responsible for overall strategic direction and planning, in coordination with the Water Authority of Jordan (WAJ) and the Jordan Valley Authority (JVA). WAJ manages bulk water supply to 3 water companies and retail distribution to users where commercialization of distribution services has not occurred.

Water Authority of Jordan (WAJ)

Water Authority of Jordan (WAJ) was established by the Water Authority Law of 1988. In contrast to MWI and JVA, WAJ is a government unit, with authority to issue government-guaranteed debt and to retain cash from operations rather than returning it to the treasury.

The main functions of WAJ are:

- Surveying and preserving the Kingdom's water resources;
- Locating and drilling of public and private wells;
- Bulk-water supply to all water companies and governorates;
- Defining and executing the water and wastewater regulations;
- Overall management of the three water companies: Miyahuna (Amman), Aqaba Water Company, and Yarmouk Water Company. The three companies are government-owned utilities and operate as commercial entities to provide retail service, water distribution, and wastewater collection treatment and in the Greater Amman area, Aqaba, and the Yarmouk area, respectively; and
- Retail water and sanitation services to the middle and southern governorates.

Miyahuna (Jordan Water Company) was established and registered as a limited liability company in 2006. It serves the citizens of Amman and its main duties include the storage and distribution of potable water and the collection and treatment of wastewater.

The Aqaba Water Company was established and registered as a limited liability company in 2004. The main duties of the company are storage and distribution of potable water, the collection and treatment of wastewater, and the distribution of reuse water (treated wastewater).

The Yarmouk Water Company (YWC) began operations as a commercial water company in 2011 and serves Jerash, Ajloun, Mafraq, and Irbid. YWC is also responsible for servicing the water and sanitation

requirements of the Azraq and Za'atari refugee camps. WAJ manages these contracts with the water companies through its Project Management Unit (PMU) and WAJ.

In addition, WAJ also manages the bulk water supply and retail distribution of services to the middle governorates (Zarqa, Balqa, and Madaba), and to the Southern Governorates (Karak, Ma'an, and Tafilah). These governorates do not yet have the capacity to operate as a commercial entity.

Jordan Valley Authority (JVA)

The JVA is responsible for the socio-economic development of the Jordan Valley, primarily managing bulk water supply for irrigation, domestic, and industrial purposes, but also promoting land development. The JVA can recommend water tariff changes and propose capital projects, but the cabinet has ultimate regulatory authority, especially for tariffs.

The Jordan Valley Authority reports on annual water usage in Jordan by type: municipal, irrigation, and industrial. Since the 2011 PEP Report (2009 data), overall water usage has somewhat leveled off. Irrigation use has generally declined, as municipal use has steadily increased. The Disi Project has no doubt impacted municipal water usage, as the number of days of water availability in Amman has increased from 1 day to 3 days. Industrial water usage has remained generally flat.

	Metric	2007	2014	2022	Trend	Comment
Appropriate tariff to reduce irrigation usage	MCM/Year	597	481	852	No trend	Tariffs not adjusted
Reduce NRW	% of total bailed water	46%	49%	25%	No trend	Problem may be related to non-continuous supply
Water Supply						
Uninterrupted supply in Amman	Days/week supply	1 day/week	Aqaba-7 days Amman-3days Zarqa and Irbid -1 day	7 days/week	Trend is negative	Disi project instituted Red-Dead water projected in 2021-2022
Improve quality of water	% compliance with Jordanian standards	98.6%	-99.7%	Up to 100%	Trend is positive	World class performance
Institutional Reform						
Appropriate water tariff to recover 100% of operating cost	% of operating costs	110%	89%	100%	No trend	Water tariffs not increased since 2012-electricity costs increasing each year
Establish water regulatory commission	Commission established & functioning	none	none	Commission setting tariffs on cost recovery basis	Trend is negative	No regulatory yet
Water for Irrigation						
Reduce water allocation for irrigation	MCM/Year	597	481	852	Trend is positive	
Irrigation water tariffs raised to promote efficiency	Irrigation efficiency %		86%		No trend	
Maximize use of treated wastewater	% reused	-60%	-91%	Up to 100%	Trend is positive	
Wastewater						
Increase wastewater coverage	% of water customers served by sewerage	61%	68&	Up to 100%	Trend is positive	
Recover cost wastewater collection and treatment	% of operating costs	Unknown	Unknown	100%	No trend	Wastewater tariffs approximately half of water tariff ,not cost-based
Quality meets Jordanian standards	% compliance with Jordanian standards	Unknown	Unknown	Up to 100%	Trend is positive	

Figure 5.2: Comparison of MWI Progress on Key 2022 Strategic Goals

5.4 PERFORMANCE AGAINST STRATEGIC PLANNING OBJECTIVES

The Ministry of Water and Irrigation (MWI) and the Ministry of Planning have engaged in several planning exercises to address the long term needs of the water sector in Jordan. In 2009, the Jordanian Royal Commission for Water and MWI issued "Water for Life: Jordan's Water Strategy 2008-2022." This document outlines the Kingdom's goals and actions to ensure that sufficient water is available in the future for citizens, businesses, and nature.

In addition to the Jordan Water Strategy, the Ministry of Planning and International Cooperation (MOPIC) participated in the Millennium Challenge beginning in 2000. MOPIC submitted its Second National Millennium Development Goals (MDG) Report in 2010 regarding meeting its goals by 2015.

This section will describe the progress of the water sector against the strategic objectives outlined in these two documents.

Water for Life: Jordan's Water Strategy 2008-2022

Figure 5.2 is a snapshot of the progress on key indicators, contrasting the situation in 2007 when the strategy was conceived, the progress achieved to 2014, and the 2022 strategy goal. While the trends of the operational goals appear to be positive, the institutional and financial goals are lagging and may not meet the goals outlined in the strategy. This is discussed in more detail later in this section.

Millennium Development Goals

These goals were mutually established between the Government of Jordan and the United Nations in 2000. While not all goals are strictly related to the water sector, Figure 5.3 shows Jordan's progress in meeting those goals established for the sector.

It is clear from Figure 5.3 that the Jordanian water sector has made significant progress over the past 15 years and is very close to achieving its Millennium Development Goals. Again, while these goals appear within reach, many challenges to the water sector remain, from water supply shortages, nonrevenue water, and Syrian refugees, as will be discussed in the following sections.

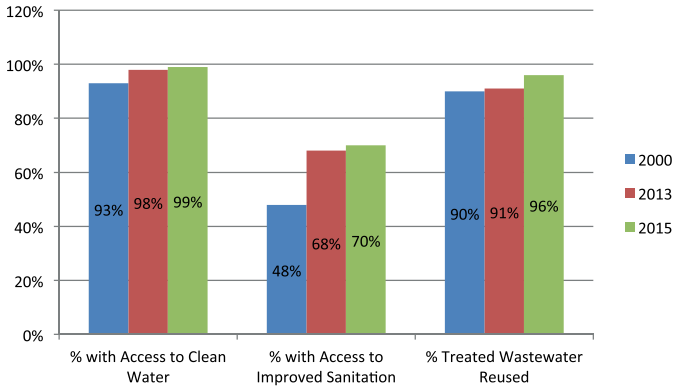


Figure 5.3: Comparison of MWI Progress on Millennium Development Goals in Water Sector

5.5 KEY CHALLENGES TO THE WATER SECTOR IN 2015

Significant progress has been made in the water sector since the 2011 PEP report. MWI and WAJ have provided almost complete coverage of potable water to the population and a steadily rising proportion of the population with access to sewerage.

The consistent quality of water supplied to the population meets world standards, as does the percentage of treated wastewater that is reused. Significant progress is being made in regards to the sector's strategic objectives. The Red-Dead agreement has been signed meaning great potential for permanently securing a consistent, continuous resource for potable and irrigation water for the long term.

However, major challenges remain:

- To develop a consistent, continuous water supply throughout Jordan;
- To provide for the water and sanitation needs of more than 686,700 Syrian refugees in the cities and in the camps;
- To cover the rapidly increasing costs of electricity, which represent a total of 33 percent of all operating costs;
- To reduce the level of nonrevenue water, in order to increase both available water resources and improve the financial condition of WAJ; and
- To establish cost-based tariffs for both WAJ and JVA to both improve the financial performance of each and to provide incentives for water supply and irrigation water reductions.

Development of a Consistent, Continuous Water Supply

The demand for water in Jordan for all categories is shown in Figure 5.4.[78] The figure shows some variation in overall water demand from 2000 through 2013. However, overall demand appears to be increasing, particularly domestic water demand, since the 2011 PEP Report.

This is likely due to a number of factors:

- Increasing local population;
- The commissioning of the Disi well field project; and
- The increased water demand from Syrian refugees.

The further development of the Disi wells provides needed water to Amman, but at a rate that is not sustainable in the long term. Further water sources are required.

The increased use of treated wastewater for irrigation purposes has allowed more potable water to be diverted from irrigation to domestic use, as seen in Figure 5.5.[79] Again, the figure measures the water use trends according to 2009 data. The percent of irrigation water used has steadily declined from 58 percent in 2009 to 53 percent in 2013.

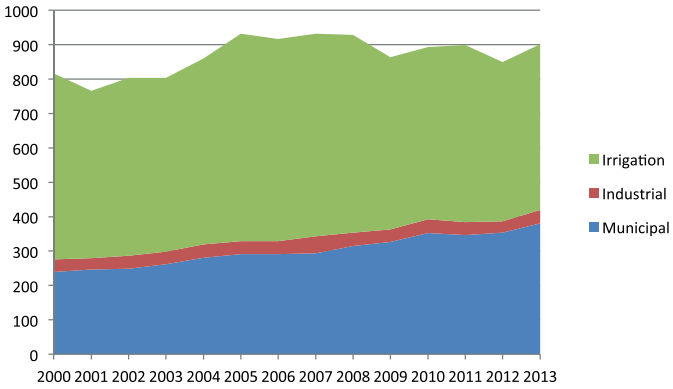


Figure 5.4: Water Usage by Category and by Year

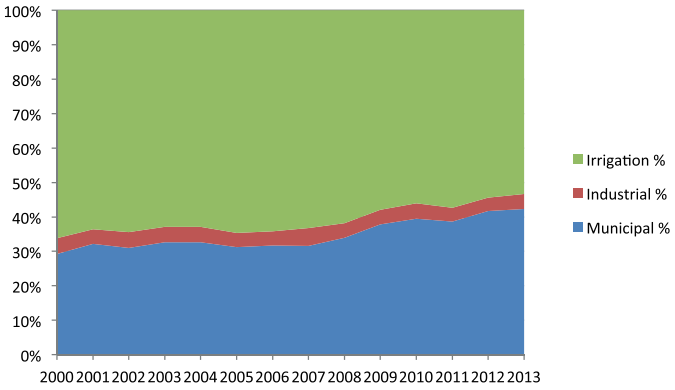


Figure 5.5: Water Usage Percentage by Category and by Year

Provide for Water and Sanitation Needs for Syrian Refugees

The Syrian refugee crisis has impacted Jordan in all economic sectors, but perhaps no more so than in the water sector. GOJ estimates that 1.4 million Syrians have entered Jordan since the crisis began.[80] The total number of refugees is estimated at 646,700, with four out of five spread throughout urban and rural areas.

This has placed strains on the existing water and sanitation infrastructure and has necessitated an emergency program to build and operate new water and sanitation facilities to serve the camps. This crisis has served to negate many of the positive trends that had been occurring in the water sector in Jordan up to 2010, and will need to be a major focus of human and financial resources for some time.

In addition, the Syrian refugee situation has placed large demands on water and wastewater resources throughout Jordan, but particularly in the northern governorates where the majority of refugees are located.

Using the Ministry of Planning and International Cooperation's (MoPIC) estimate of roughly 680,000 refugees located in host communities and refugee

		Assumed Per Capita Usage, l/cap/day	Daily Usage, Cu M/Day	Annual Usage, MCM/Year	Assumptions/ Comments
Refugee Camps	680,000	35	23,800	9	Using trucked water
Host Communities	720,000	80	57,600	21	Estimate
Total	1,400,000		81,400	30	

Figure 5.6: Estimate of Refugees' Water Usage in 2015, MCM/year

78 Jordan Water Sector Facts 2013.
79 Ibid.
80 MWI Jordan Response Plan.

camps and an average refugee water usage of 80 l/capita/day, the additional water demand for refugees is approximately 20 MCM per year. The MWI estimates that each Syrian refugee costs the water sector approximately JOD 500 per year or approximately JOD 298 million per year total.[81]

Municipal water usage has increased with the influx of refugees to Jordan. According to the 2015 Jordan Response Plan, the distribution of Syrians in Jordan is overwhelmingly heaviest in the northern governorates, where more than 60 percent of the total resides, both in host communities and in the refugee camps.

The majority of refugees are located in Mafraq (12 percent), Irbid (23 percent), and Zarqa (9 percent). Of the remainder, most refugees have relocated to Amman (28 percent). While precise water usage figures for the refugees are not known, the estimated impact of the current refugee crisis on water resources in Jordan in 2015 is shown in Figure 5.6. This estimate represents approximately 8 percent of the total municipal water usage shown in Figure 5.4.

UNICEF is currently constructing distribution systems within the camps to reduce overall operating costs related to trucking water. This will likely have an accompanying effect of increasing the per-capita water usage within the camps and overall water usage.

Increasing Electrical Costs

As result of the 2012 Standby Arrangement between GOJ and the International Monetary Fund, GOJ agreed to reduce subsidies to the energy sector.[82] As a result, the Electricity Regulatory Commission, now the Energy and Minerals Regulatory Commission, has imposed a schedule of increasing electricity tariffs across the Kingdom, including the water sector.[83]

Rising Energy Tariffs and the Impact on the Water Sector

Figure 5.7 shows average unit electricity costs for the water sector from 1993 through the approved increases of 2017. Because of falling oil prices, GOJ decided to reduce the annual increase in electricity tariffs to 7.5 percent for 2015. This increase has been assumed for 2016 and 2017. The impact of the increases of the water pumping rate from the period of August 2013 through 2017 is particularly striking.

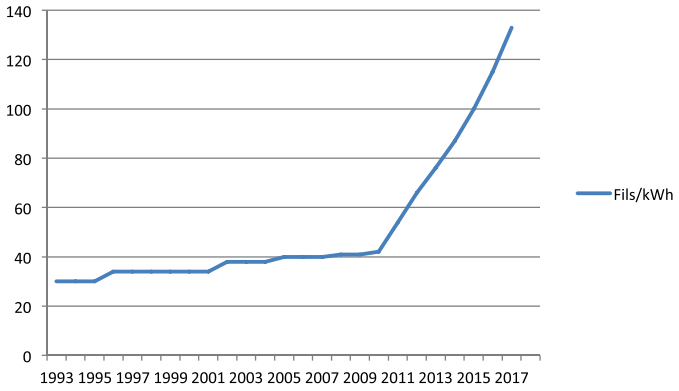


Figure 5.7: Comparison of Tariffs for Water Companies and Governorates

The major use of electricity in the water sector in Jordan is for pumping. This includes wells and water transfer pumps. Desalination plants are also large energy consumers. In addition, the increasing number of wastewater treatment plants and water-reuse pumping stations has also significantly increased energy costs to the water sector.

Currently electricity represents approximately 33 percent of the operating cost of WAJ.[84] This will no doubt continue to rise, as the new electricity tariffs increase each year. As energy costs rise, financial payback becomes more attractive on more efficient

Sample Payback to Replace 15 Kw Motor	Standard Efficiency Motor	High Efficiency Motor
Size of Motor, kW	15	15
Efficiency at 75% Load	89.3%	93.4%
Annual Operating Hours	8,000	8,000
kWh /Year	100,784	96,360
2017 Electrical Energy Charge, JOD/kWh	0.108	0.108
Operating Costs, JOD/Year	10,885	10,407
Operating Cost Savings, JOD/year		478
Capital Cost of High-Efficiency Motor, JOD		1,500
Payback Years		3.1

Figure 5.8: Payback Analysis on a 15-KW Motor at 2017 Electrical Rate

81 Jordan Water Sector Facts 2013.
82 IMF First Review 2013.
83 NEPCO Tariff Schedule 2014.
84 MWI Jordan Response Plan.

energy technologies such as replacing existing standard-efficiency electric motors on water pumps.

Recognizing the potential impact, WAJ entered into an agreement with the German KfW Development Bank in 2009 to evaluate energy saving measures in its water pumping operations. The survey by KfW showed pumping efficiencies of approximately 50 percent, far below standard efficiencies approaching 70 percent. KfW noted these inefficiencies were the result of improper pump selection, improperly sized transmission lines, and old technology, among other factors. [85]

As a result, KfW will replace a portion of WAJ pumps and motors and begin to implement their energy conservation recommendations. Following KfW's work, a full-scale hydraulic evaluation should be undertaken for the largest remaining wells and pumping stations to locate other inefficiencies and address them.

The strategy should consider the use of pressure management techniques during periods of low demand to reduce pumping pressures (and therefore reduce costs as well). This will have the added benefit of reducing real losses in the water distribution systems.

Other methods identified to increase energy efficiency and reduce water sector operating costs are:

- Use variable speed pumps in water supply systems which will reduce overall power consumption;
- Reduce energy charges by replacing aging motors with high-efficiency motors;
- Perform cost-effectiveness analysis to replace existing standard-efficiency motors with high-efficiency motors to reduce energy charges; and
- Perform cost-effectiveness analysis to consider replacing conventional electrical connections with renewable energy sources.

Sample Payback on High-Efficiency Motors

An example of the impact of the increased electrical rates is shown below in Figure 5.8. The analysis considers whether a high-efficiency motor can replace a standard-efficiency 15-kilowatt well pump motor cost-effectively. The analysis assumes that either motor will be operating 8,000 hours per year, or approximately 22 hours per day. The assumed 2017 electrical tariff for water pumping installations has been used to calculate the operating cost for each motor.

The analysis shows that the high-efficiency motor will yield an annual electric cost savings of 478 JOD per year. This generates a 3.1-year simple payback for the high-efficiency motor. Future payback periods would likely shorten further with the continued increases in electrical tariffs.

Increasing Nonrevenue Water (NRW)

After a decade of progress reducing nonrevenue water in Jordan, recent years have seen that progress slowing. In 2013, reported NRW was 48 percent countrywide.[86] In 2014, NRW was reported in the approved Ministry of Finance 2015 budget at 61 percent. While this number could not be confirmed, the trend is a concern.

The specific nonrevenue water problem within Jordan requires further analysis and discussion. Two general types of losses occur in all water utilities, apparent losses and real losses as follows:

Apparent losses: non-physical losses that occur due to inaccurate metering, billing errors, and unauthorized consumption or theft. Apparent losses are nonphysical losses: i.e., no actual leakage occurs. Apparent losses occur when the water is delivered to the customer, but is not measured or accurately recorded.

Real or physical losses: leakage from transmission and distribution mains, leakage at service connections, and leakage and overflows from storage tanks. Real losses are actual leakage from the system preventing delivery to the customer.

Apparent Water Losses in Jordan

The major causes of apparent losses in Jordan are unauthorized consumption or theft from the system and inaccurate water meters. Unauthorized consumption is largely a management problem. Utility managers can address the problem by regularly sending out crews to look for illegal connections, cutting off these connections, imposing fines on offenders, etc. Focus on the problem usually controls illegal consumption.

However, the nature of intermittent water supply and its effect on apparent losses in a system is a more difficult problem. With the exception of Aqaba, water in Jordan is not supplied continuously. In Amman, water is supplied 3 days per week. However, water may only be supplied for several hours per week in other cities.

In the case of intermittent supplies, apparent losses result from under-reading of low flows through the meters as the system empties after water supply is stopped, and as it fills when water is supplied. These inaccuracies are amplified by pumping from the system to roof top storage tanks, a very common practice in Jordan. Again the rate of pumping to the storage tank is often below the minimum flow from the meter, causing under-registration of flows. Both effects are amplified as meters age.

An interview with the Operations Director of Miyahuna Water Company revealed that a number

85 Jordan Water Sector Facts 2013.
86 Jordan Water Sector Facts 2013.

of studies were prepared by European companies that showed physical losses were not as significant as hypothesized. The Operations Director felt that the intermittent nature of the water supply was a major source of apparent losses in Miyahuna and in other Jordanian cities. With the only continuous water supply in Jordan, Aqaba's NRW is the lowest at 26 percent.

The solutions to apparent losses in Jordan are replacing existing water meters with smaller meters or meters capable of recording lower flows accurately and developing continuous water supplies. These are clearly capital-intensive, long-range solutions. Miyahuna is currently testing meters that may help to alleviate meter inaccuracy due to intermittent supply. The results may have application throughout Jordan. The Red-Dead Project may offer Jordan the possibility of a continuous water supply in the future.

Real Water Losses in Jordan

Real water losses in Jordan result from leakage from water mains and at service connections to residential and commercial customers. Real losses in water mains occur in older mains and in mains located in aggressive (corrosive) soils and in areas of high pressure. In addition, small leaks are often present at service connections (the point where the service line is connected to the meter).

Older water mains and mains in aggressive soils can leak at joints, in high traffic areas, or at changes in direction. These areas should be mapped and monitored. High-pressure lines are often found where local topography varies significantly such as in Amman. Leaks that do occur in high-pressure lines are more significant than in lower-pressure lines.

Individual service connections typically have low leakage rates, but can be a significant source of real losses because of the number in each city: Amman has an estimated 550,000 service connections. [87]

Older service connections are more likely to leak over time. With 35,000 service connections, Aqaba achieved a significant reduction in real losses by dedicating a maintenance crew to inspecting both older service connections and establishing strict quality control inspections for all new construction.

Even with directed programs to control real losses, not all leakage can be found. Further, even identified sources of leakage may not be cost-effective to address, particularly with low water tariffs. Yet, in water-scarce Jordan, the future must include a series of long-term solutions to real losses. In successful NRW programs, these solutions have included:

- Creating an active leakage control program including mapping of older mains, locations of changes in main direction, and areas of high pressure;
- Instituting leakage studies in areas of suspected high leakage;
- Installing area water meters to establish area demand and to locate suspiciously high demand;
- Instituting an existing service connection inspection program, starting with the largest customers;
- Establishing a policy of correcting identified leaks within a short period of time;
- Educating customers on the need and benefit of reporting and correcting observed leaks;
- Rehabilitating/replace mains where it is cost-effective; and
- Establishing tight material and installation specifications and inspect all new service connections.

Reported NRW by City

The 2013 NRW average value for Jordan was 48 percent. The NRW value reported for each city is shown in Figure 5.9. While the reported average for Jordan is 48 percent, this is merely an average of 12 city NRW values, not a weighted average of water supplied and lost. For example, Amman is clearly the largest supplier of water. Yet, it is lower than most of the other cities in NRW.

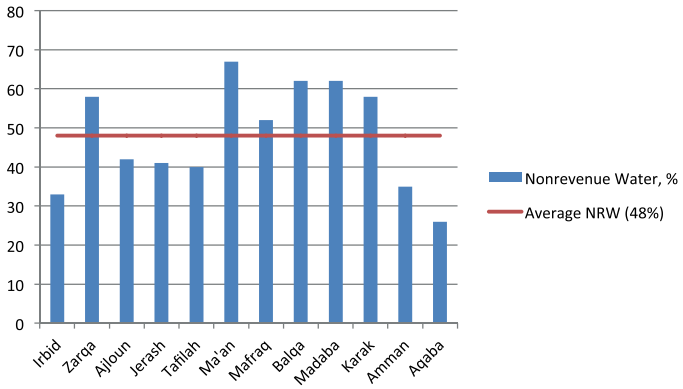


Figure 5.9: Comparison of Nonrevenue Water Performance by City

Adequacy of Water and Wastewater Tariffs

Recognizing the need for better cash flow and more revenue due to higher electrical costs and other rising costs, the Ministry of Water and Irrigation changed the billing frequency for water and wastewater from quarterly to monthly in January 2011. Tariff blocks were also increased.

Tariff History and Structure

In February 2012, the cabinet reversed the decision and directed MWI to return to the quarterly billing cycle. In addition MWI had to return the tariffs in the lower-use blocks to their 2011 levels. Higher-use blocks retained the higher tariff rates.

87 WAJ Retail Services Performance Spreadsheet 2013.

Figure 5.10 shows the tariff differences between the water companies (Aqaba, Miyahuna, and Yarmouk) and the governorates that are the responsibility of WAJ. It is clear that the water tariff differences among the water companies and governorates are particularly pronounced in the higher-usage blocks.

The tariffs in the middle governorates, where Zarqa and Balqa are located, are considerably lower than Amman, for example, and may not provide enough return on investment at those tariff levels, even given the fact that Figure 5.9 showed Zarqa and Balqa to be two of the highest NRW cities.

Another factor is the large increase in demand on Yarmouk Water Company because of the Syrian refugee camps. The need for water in Yarmouk is extreme and a number of new wells have been developed to serve the additional demand. Reportedly, the wells are pumping at an unsustainable rate in the long term.

In addition, the effects of the increasing refugee population have stressed the financial situation of the Yarmouk Water Company. As a result, the higher NRW cities within the Yarmouk Water Company such as Mafraq and Irbid should be considered a priority, both for recovering critical water resources and improving revenue flow to the water company.

Besides water, MWI also imposes a usage tariff on wastewater to at least partially cover the costs of wastewater treatment. The wastewater charge is a separate unit rate (JOD/m3) using a customer's metered water usage as the basis for the charge. Thus for a given quarterly water usage, the customer receives a bill for both water and wastewater service. Figure 5.11 and Figure 5.12 show the combined water and wastewater tariff for the water companies and governorates, respectively.

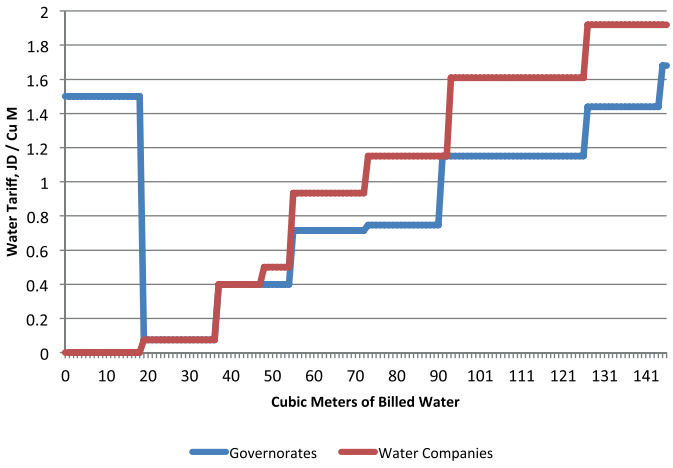


Figure 5.10: Comparison of Tariffs for Water Companies and Governorates

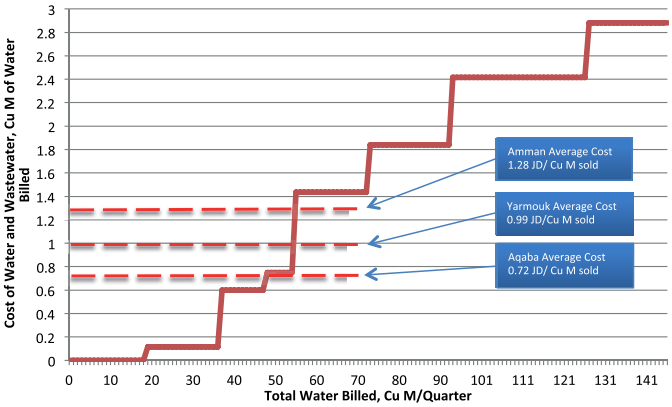


Figure 5.11: Combined Water and Wastewater Tariff Blocks for Jordan Water Companies

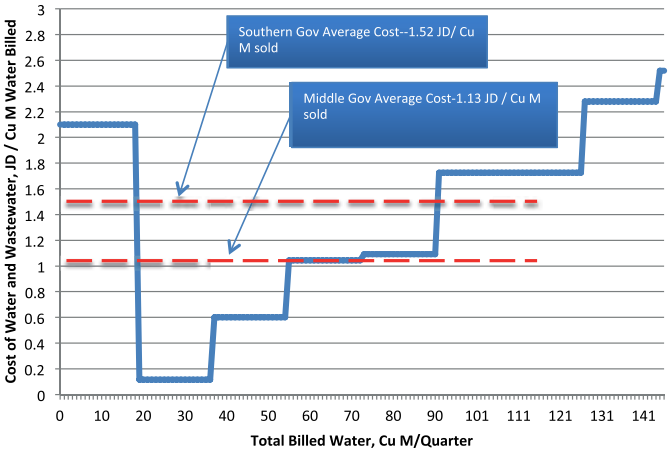


Figure 5.12: Combined Water and Wastewater Tariff Blocks for Governorates

Adequacy of Existing Tariffs to Cover Operating Costs

Figure 5.11 shows the average cost of supplied water and wastewater for each water company and identifies a "break even" usage point on the tariff blocks. Figure 5.12 shows the same data for the governorates. Both water and wastewater revenues are derived from metered water usage. The figures show the quarterly water usage required, on average, to break even on water and wastewater operations for each utility.

The calculated quarterly customer usage for each of the water companies is shown in Figure 5.13, along with the break-even water usage rate. The conclusion to be drawn from the following analysis is that, with the exception of Aqaba, revenues from water and wastewater tariffs are not sufficient to cover the costs of providing water and wastewater services at current water usage and tariff levels. This is particularly true in the governorates.

This is likely a direct result of the cabinet decision to reduce the lower usage tariffs. The lower-usage tariff blocks for both the water companies and governorates need to be increased to provide for full operating cost recovery.

WAJ and JVA Revenues and Expenditures

The Ministry of Finance (MOF) publishes the approved budget for each ministry and department in April of each year. Included are the prior two years' actual performance, the approved current fiscal-year budget, and two indicative years.

WAJ Revenues and Expenditures

Figure 5.14 shows the past 3 years of audited data of the WAJ operations results. A key conclusion drawn from Figure 5.14 is that the trend of operating cost recovery is decreasing. Despite this trend, MWI and MOF are projecting positive net revenue in 2015-2017, possibly due to an increase in water sales as a result of the Disi project. Total costs are projected to decrease from 2015-2017.

The revenues shown in Figure 5.14 reflect only revenues from operations. Government subsidies are not included in the revenues shown, although they have been a significant source of funds in the past. No government subsidy is budgeted for WAJ in 2015-2017. The projected 2015-2017 increases in revenue are mostly attributable to additional water sales from the Disi project coming on line, rather than from any tariff adjustments. Continued attention to NRW will also help to increase revenues.

However, accompanying the revenue increase is a disproportionate increase of expenditures in 2014, reflecting both additional costs of pumping more water and increasing electricity tariffs. The result was a significant reversal of a general trend in the cost coverage of operating costs.

Figure 5.15 shows the trend, measured by revenue as a percentage of operating costs, from 2000 through 2014, with projections for 2015-2017. Values above 100 percent signify revenues collected in excess of operating costs, leaving revenue available for system repairs and expansion.

From Figure 5.15 it is clear that there is a downward trend in revenue as a percentage of operating expenses from 2006 to 2014. Yet the approved 2015 budget shows immediate, significant improvements that appear unrealistic, given that no tariff increases appear imminent and the certainty of continuing electricity rate increases.

Normal utility practice in developed countries is to maintain a revenue cushion of roughly 120 percent of operating expenses to allow for unexpected fluctuations in revenue and costs and to ensure that the utility's current liabilities (salary costs and benefits, electricity, chemicals, and maintenance costs) are always covered. Actual experience in developing countries and MENA countries is covered in the benchmarking section.

Utility	Minimum Break-Even Quarterly Usage, Cu M	Average Actual Quarterly Usage, Cu M
Water Companies		
Amman	55	41
Aqaba	48	120
Yarmouk	55	37
Governorates		
Middle	91	38
Southern	91	39

Figure 5.13: Average Customer Usage Compared to Break Even Rate for Water and Wastewater Operations

	2012	2013	2014
Revenues	177,754	196,617	218,510
Costs			
Operating Costs (Less Electricity)	105,332	132,866	209,823
Electrical Costs	81,800	91,864	103,203
Total Costs	187,132	224,730	313,026
Net Revenue	-9,378	-28,113	-94,516
Revenue, % of Operating Cost	95%	87%	70%

Figure 5.14: WAJ Actual and Budget Revenues and Expense Forecast (Amounts in Thousands of JOD)

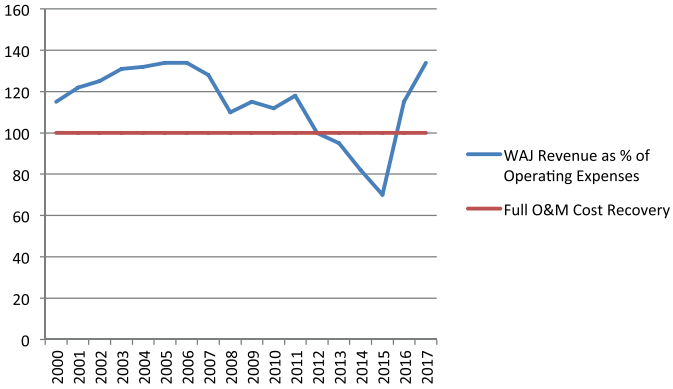


Figure 5.15: WAJ Revenue as % of Operating Expenses

JVA Expenditures

JVA's approved budget expenses for 2015 with projected costs are shown in Figure 5.16.

In preparing the budget, the Ministry of Water and Irrigation and JVA do not include projected revenues. However, for the year 2012, unit operations and maintenance costs were JOD 66/1,000 m3. Average revenues were reported to be 10 JOD/1,000 m3, indicating that there is a significant gap between revenues and budgeted and actual expenses.[88]

	2013	2014	2015	2016	2017
Total Operating Costs	9,119	10,914	11,945	12,376	12,654
% Increase	--	20%	9%	4%	2%

Figure 5.16: JVA Budget Operating Expenses (Amounts in Thousands of JOD)

	MWI Performance Indicator	Base Year	Value	2014 Target	2014 Actual	Notes
Water Resources	Increase quantity of available water for supply, MCM	2009	883	1,100	1,100	Long term trend positive and meets 2014 benchmark
	Decrease gap between available water and water demand	2009	62%	30%	30%	Long term trend positive and meets 2014 benchmark
	Increase % of protected water resources	2009	45%	52%	52%	Long term trend positive and meets 2014 benchmark

Figure 5.17: Performance of MWI against Base Year and 2014 KPIs

	WAJ Performance Indicator	Base Year	Value	2014 Target	2014 Actual	Notes
Water Service	% population served by water	2007	97%	99%	98%	Long term trend positive but does not meet 2014 benchmark
	Quantity of water supplied, MCM	2009	62	75	124	Long term trend positive and meets 2014 benchmark
	Water supplied, l/capita/day	2009	45%	52%	52%	Long term trend positive and meets 2014 benchmark
Sewerage Service	% population served by sewerage	2007	61%	65%	68%	Long term trend positive and meets 2014 benchmark
Customer Satisfaction	Degree of customer satisfaction	2005	51%	77%	75%	Long term trend positive but does not meet 2014 benchmark
	# complaints/1,000 customers	2009	7.3	5	9	Long term trend negative but meets 2014 benchmark
Efficiency	# employees/1,000 customers	2009	7.3	5	9	Long term trend negative and does not meet 2014 benchmark
	Non-revenue water	2009	41%	35%	61%	Long term trend negative and does not meet 2014 benchmark

Figure 5.18: Performance of WAJ against Base Year and 2014 KPIs

88 JVA fax of internal data 2015.

5.6 PERFORMANCE OF SECTOR AGAINST KEY PERFORMANCE INDICATORS

Each year the Ministry of Water and Irrigation, WAJ, and JVA establish key performance indicators (KPIs), based upon the strategic goals of the organization. The KPIs are established using SMART principles (Specific Measurable Achievable Realistic Time Based). Figure 5.17, Figure 5.18, and Figure 5.19 show the applicable base year KPIs for MWI, WAJ, and JVA, respectively.

MWI

Beginning with more strategic performance indicators of the ministry, Figure 5.17 shows the performance of MWI in increasing available water resources, decreasing the gap between available water and demand, and increasing the percentage of water supplies that are protected from contamination. All KPIs are positive, both in their trend (2009-2014), and in achieving their 2014 targets.

The large increase in available water supply is largely due to the Disi project. While greatly improving upon the 2009 baseline value and achieving the 2014 goal, continuing an increase in available water is both necessary and a challenge. Continuing to increase wastewater reuse while reducing real losses (leakage) will be critical to continued success, as most of the near-term water sources have been developed.

As a result of the increase in water supply available, the gap between water demand and available water was cut in half in 5 years, a remarkable achievement though not sustainable in the long-term.

WAJ

As shown in Figure 5.18, the KPIs for WAJ were understandably focused on operations: service coverage for water and wastewater, customer satisfaction, employee efficiency, and NRW. In the case of service coverage, WAJ has made good progress in providing more water to its customers and in increasing wastewater service to more customers, both against the base year of 2007 and against its 2014 KPI.

Customer satisfaction performance is mixed, as the degree of customer satisfaction has greatly increased since 2005, but is slightly short of meeting WAJ's 2014 KPI. Complaints also increased against the base year and exceeded the 2014 KPI.

The number of employees per 1,000 customers is often used as a measure of the efficiency of operations, especially when compared to other similar, well-run utilities. Higher staff numbers per 1,000 customers can suggest too many employees and higher-than-necessary costs. It appears that the number of staff have grown faster than the number of customers since 2009.

Nonrevenue water apparently increased in 2014 after declining for a number of years. The NRW figure of 61 percent was found in the 2015 budget tables, but appears suspiciously high. A recommended approach to NRW is found later in this chapter.

JVA

As with WAJ, the JVA KPIs were focused on operations. Figure 5.19 shows the performance of JVA against KPIs for increasing the quantity and value of water supplied, increasing customer satisfaction, and the efficiency of distributing irrigation water to farmers.

Given the lack of tariff adjustments since the base years, JVA has performed well, meeting increased irrigation targets and providing increased value to farmers. The efficiency of irrigation also improved slightly against

	WAJ Performance Indicator	Base Year	Value	2014 Target	2014 Actual	Notes
Irrigation Water Service	Quantity of water supplied, MCM	2009	65	110	110	Long term trend positive and meets 2014 benchmark
	Value of water supplied for agricultural purposes (million JOD)	2007	5.1	86	85	Long term trend positive and meets 2014 benchmark
Customer Satisfaction	Degree of customer satisfaction	2009	71%	82%	68%	Long term trend negative and does not meet 2014 benchmark
Efficiency	Efficiency of irrigation distribution	2009	85%	86%	86%	Long term trend positive and meets 2014 benchmark

Figure 5.19: Performance of JVA against Base Year and 2014 KPIs

the base year and met the 2014 KPI. At the same time customer satisfaction decreased over time and against the 2014 KPI and should be addressed as a priority.

5.7 BENCHMARKING ANALYSIS

Benchmarking is a technique often used by utilities in evaluating performance objectively, whether compared to internal goals, compared to other utilities in similar circumstances and geographical area, or against a global standard.

Benchmarking can be used to analyze performance and to provide information about how performance can be improved. Further, it can provide decision-makers with information to promote strategic objectives.

In the case of the water sector in Jordan, all three areas of comparison have been made:

- Comparison against its own internal performance indicators;
- Comparison against other water utilities in the Middle East and North Africa (MENA) region with desert climates and limited water resources; and
- Comparison against U.S. and Western European standards.

This section will consider key performance indicators in the Jordan water sector against similar utilities in the MENA region and against utilities throughout the world.

Benchmarks in the following areas were evaluated:

Water and Sewerage Coverage

In most utilities, a piped water connection is the most cost-effective method for providing potable water to the population. The typical performance indicator is percentage of population served, with a target of 100 percent of the population, particularly in cities and towns.

Evaluating sewerage coverage (sewer lines and treatment) is more difficult, as on-site septic systems may be adequate and environmentally sustainable. However, many cities and towns have found that sewer connections and wastewater treatment centers are preferable to more informal solutions and therefore percentage of population served with sanitation can also be a useful metric and will be evaluated in this section.

Price and Cost Recovery

Water tariffs, and their affordability, are important considerations in a well-run utility. The Western European standard water and wastewater tariff is typically set to achieve complete cost recovery, including all operating costs, depreciation, and debt service.

In the developing world, sovereign governments often fund capital projects, because the municipalities or their utilities do not have a credit rating and therefore have no access to capital markets. Funding for capital projects comes from the central budget, through grants from international donors, or through development bank loans to sovereign governments. In these cases, a measure of water and wastewater tariffs is their ability to cover a percentage of operating costs with a desirable measure of recovering 100 percent of operating costs.

Quality of Service

The quality of water service may be measured in a number of ways:

- Water availability (days/week);
- Water quality (percentage of samples meeting quality standards); and
- Customer satisfaction (number of complaints/1,000 customers).

The quality of wastewater service can also be measured in a number of ways, such as by quality of wastewater treatment provided, the amount of wastewater reused, and the number of pipeline breaks per 100 kilometers.

Operational Efficiency

Operational efficiency refers to the lowest cost use of labor, energy, water, and materials in the day-to-day operation of a utility, with the most efficient combination partly dependent on local input prices and prior capital investment decisions. In Jordan, the biggest impact on operational efficiency is the cost of electricity that represents a significant component of operating cost.

One key ratio that is often used as a measure of operational efficiency is the number of utility staff per 1,000 customers. A high number may indicate inefficient use of staff.

Nonrevenue Water

Another measure of efficiency is the percentage of nonrevenue water (NRW), or the difference between water supplied and water sold as a percentage of water supplied.

Figure 5.20 shows a typical water distribution system, beginning with a well or water treatment plant (WTP). Normally, finished or treated water is measured through a "master" meter before it is distributed to customers. Each customer also has an individual meter

where the customer's usage is measured.

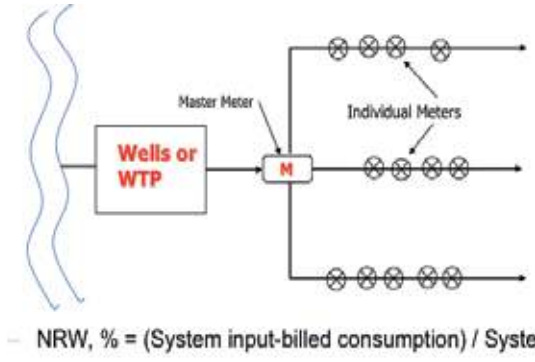


Figure 5.20: Typical Water Distribution System

The difference in measured water usage between the master meter reading and the sum of all customer meters is called nonrevenue water. This is shown visually in Figure 5.21.

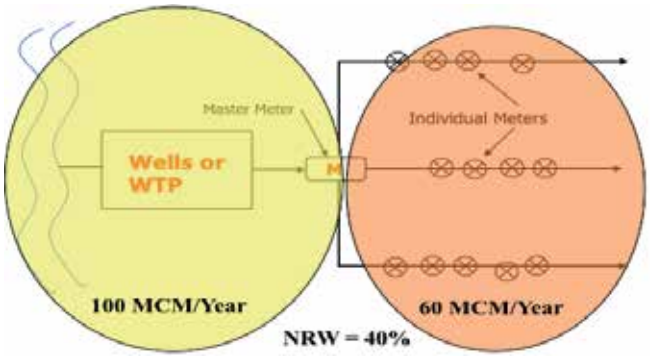


Figure 5.21: Typical Nonrevenue Water Calculation

In the figure, wells are producing 100 MCM/year. Yet, only 60 MCM/year of water is measured through consumers' meters, leaving 40 MCM/year of water, for which the utility receives no revenue.

The formula for nonrevenue water, as a percentage is:

$$NRW\% = \frac{\text{System Input-Billed Consumption}}{\text{System Input}}$$

or

$$NRW\% = \frac{100\ MCM - 60\ MCM}{100\ MCM} \times 100\% = 40\%$$

NRW captures not only physical losses such as leakage, but also "apparent" losses due to inaccurate metering, inefficient billing, or illegal connections. High levels of NRW can be an indication of poor system management, poor commercial practices, or inadequate pipeline maintenance.

In Jordan, all of the above factors are likely present. However, the NRW problem is compounded by the lack of a continuous water supply in all cities but Aqaba. When water distribution systems empty and fill several times per week, flow rates can drop to a level below the ability of the water meters to read accurately or at all. This water is not metered and adds to the NRW percentage.

Thus, while the NRW benchmark can be useful in comparing performance of water utilities, it is not a completely objective measure and should be approached with caution when attempting to draw conclusions as to a course of corrective action.

WAJ Benchmarking Results

Key WAJ performance indicators for 2014 have been assembled in Figure 5.22 and compared to other countries within MENA who reported data for their water systems to the World Bank's International Benchmarking Network for Water and Sanitation

	WAJ 2014	Algeria	Bahrain	Egypt	Kuait	Tunisia	West Bank & Gaza	IBNET Avergae
Water coverage, % of popultation	98%	77%	100%	99%	100%	83%	97%	80%
Electricty, % of operating cost	25%	18%	--	18%	92%	12%	20%	21%
Operating revenue, $\Cu M Sold	$1.40	$0.32	$0.29	$0.19	$0.03	$0.40	$1.31	$1.00
Operating cost, $\Cu M Sold	$2.14	$0.49	$1.62	$0.18	$0.03	$0.50	$1.51	$0.88
Operating cost recovery, %	76%	--	18%	113%	11%	81%	151%	115%
Availability of service, days\wk	1-3	7	7	7	7	7	4	--
Residential usage, l\capita\day	86	54	257	126	502	90	69	180
# of staff\1,000 people	1.0	1.1	0.8	0.9	1.3	0-8	0.8	1.29
Nonrevenue water, %	53%	54%	40%	28%	--	26%	44%	31%
Wastewater covergae, % of population	68%	--	--	50%	100%	--	58%	68%

Figure 5.22: Comparison of WAJ Key Performance Indicators against MENA and International Benchmarks

Utilities.[89] The 2013 WAJ value for operating revenue and operating cost per m3 has been used in the figure.

The data shown for the MENA countries are taken from 2010, the most recent published data. The IBNET averages shown in the figure represent the data from 1,861 utilities in 135 countries and represent 14 percent of the world's population with piped water.

Service Coverage

Figure 5.22 presents a mixed picture. Beginning with service coverage, WAJ has clearly been successful in extending water service throughout the Kingdom far in excess of the world average and certainly comparable or better than other MENA countries. While showing average wastewater coverage against the IBNET world average, WAJ has been steadily increasing its wastewater coverage over the past 5 years and will likely exceed the world average by the end of the 2017 budget cycle.

Financial Benchmarks

The data for operating revenue and operating expenses per cubic meter sold are harder to interpret. First, unlike the other indicators, the 3-year difference between the WAJ data and the survey data may be affected somewhat by inflation. WAJ's operating revenue per m3 is much higher than MENA utilities and also higher than the world average.

However, operating cost is also higher than all benchmarks. Because electricity is shown as a higher percentage of operating costs than others (excluding Kuwait's value which appears inaccurate), this may explain the higher operating unit cost. Also, WAJ's operating revenue does not cover its operating costs. Further, Syrian refugees adversely affect the financial performance of WAJ.

Operational Efficiency

While the IBNET database did not indicate an average number of availability of water, it is clear that most MENA countries have continuous supply, while Jordan has intermittent supply except in Aqaba. This is clearly a key goal of the recently signed Red-Dead agreement that will provide another 50-100 MCM/year by 2021-22.

Jordan falls in the middle of the MENA countries in per-capita water consumption. The Kuwait and Bahrain values are skewed much higher than the other values and likely include significant residential irrigation. Staffing efficiency (number of staff/1,000 people) appears to be average for MENA countries, but better than the world average.

Non-Revenue Water Levels

The Jordan Non-Revenue Water figure is higher than MENA countries and the world average, although those data appear suspiciously low. As mentioned, while the NRW benchmark can be a general indicator of the extent of the problem, its usefulness as a benchmark is limited. This results from a lack of uniformity in calculating NRW across all utilities, a lack of accuracy in reporting actual flows and revenues, and the variable nature of the sources and solutions.

The nature of the NRW problem varies by:

- Water system characteristics (age and pipe materials);
- System pressure characteristics (leakage increases in higher pressure systems);
- Soil type (aggressive soils can cause pipe corrosion and leaks);
- The size of the system (more service connections generally means more leakage);
- The accuracy of the influent metering (often inaccurately estimated by pumping curves in the absence of a influent meter); and
- The continuity of supply (already mentioned as a potential major factor in Jordan due to unmeasured low flows).

While these characteristics are not known for the other utilities surveyed, it is clear that some of Jordan's water systems suffer from high pressure, particularly in Amman; inaccurate influent metering in some cases; and, with the exception of Aqaba, intermittent supply.

Adequacy of Tariffs

Recognizing the need for better cash flow and more revenue due to higher electrical costs and other rising costs, the Ministry of Water and Irrigation changed the billing frequency for water and wastewater from quarterly to monthly in January 2011. Tariff blocks were also increased.

In February 2012, however, the cabinet reversed the decision and directed MWI to return to the quarterly billing cycle. In addition MWI had to return the tariffs in the lower-use blocks to their 2011 levels. Higher-use blocks retained the higher tariff rates.

Figure 5.10 showed the tariff differences between the water companies (Aqaba, Miyahuna, and Yarmouk) and the governorates that are the responsibility of WAJ. It is clear from Figure 5.10 that the water tariff difference between the water companies and governorates is particularly pronounced in the higher-usage blocks.

89 IBNET 2014.

Besides water, MWI also imposes a usage tariff on wastewater to at least partially cover the costs of wastewater treatment. The wastewater charge is a separate unit rate (JOD/m^3) using a customer's metered water usage as the basis for the charge. This tariff was increased by 15 percent in 2014.

The precise cost basis for the wastewater charge is not known, but ranges from about 40-60 percent in the higher water usage blocks. Thus for a given quarterly water usage, the customer receives a bill for both water and wastewater service. Figure 5.23 and Figure 5.24 show the combined water and wastewater tariff for the water companies and governorates, respectively.

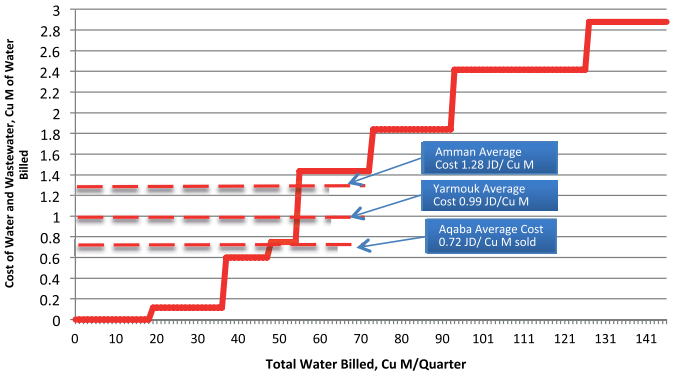


Figure 5.23: Combined Water and Wastewater Tariff Blocks for Jordan Water Companies

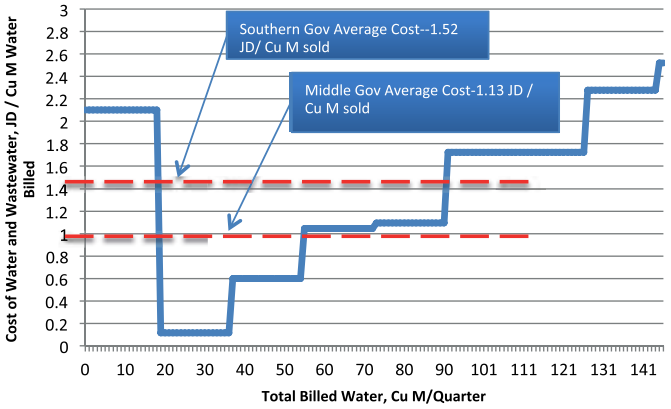


Figure 5.24: Combined Water and Wastewater Tariff Blocks by Governorate

Figure 5.23 shows the average cost of supplied water and wastewater for the three water companies, and a "break even" usage point on the tariff blocks. Figure 5.24 shows the same data for the governorates. Both water and wastewater revenues are derived from metered water usage. The figures show the quarterly water usage required on average to break even on water and wastewater operations for each utility.

The calculated quarterly customer usage for each of the water companies is shown in Figure 5.25, along with the break-even water usage rate. The conclusion to be drawn from the following analysis is that, with the exception of Aqaba, revenues from water and wastewater tariffs are not sufficient to cover the costs of providing water and wastewater services, at current water usage and tariff levels. This is particularly true in the governorates.

This is likely a direct result of the cabinet's decision to reduce the lower-usage tariffs. Rather than encouraging more usage, the lower-usage tariff blocks for both the water companies and governorates need to be increased to provide for full operating cost recovery.

5.8 OPPORTUNITIES AND CHALLENGES

Improvements since 2011 PEP Report

Since the publication of the 2011 PEP Report, the Jordanian water sector has taken great steps toward improving the water sector for Jordanian citizens and Syrian refugees. Comparisons to strategic plans have shown the water sector making significant progress against the 2022 goals set out in the 2007 Water Strategy. Similarly, the Millennium Development Goals established for 2015 are virtually accomplished for the water sector.

Comparisons of water sector benchmarks against prior performance, against the World Bank database in general, and MENA countries in particular show the

Utility	Minimum Break-Even Quarterly Usage,	High Efficiency Motor
Water Companies		
Amman	55	41
Aqaba	48	120
Yarmouk	55	37
Governorates		
Middle	91	38
Southern	91	39

Figure 5.25: Average Customer Usage Compared to Break-Even Rate for Water and Wastewater Operations

City	NRW, %	Amount of NRW, MCM\Year	% of Total	Rank	Total Amount NRW	
Amman	35%	61.45	34.9%	1	63.2 %	80.6. %
Zarqa	58%	32.51	18.4%	2		
Balqa	62%	17.48	9.9%	3		
Mafraq	52%	15.61	8.9%	4		
Irbid	34%	15.02	8.5%	5		
Karak	58%	8.82	5.0%	6		
Ma'an	67%	7.64	4.3%	7		
Aqaba	26%	6.09	3.5%	8		
Madaba	62%	5.56	3.2%	9		
Jerash	41%	2.56	1.5%	10		
Ajloun	42%	1.95	1.1%	11		
Tafilah	40%	1.58	0.9%	12		
Average\Total	48%	176.17	100.0%			

Figure 5.26: Summary of 2013 NRW Quantities by City and Ranking

Jordanian water sector to be equal to or exceeding many comparative performance indicators in both operational and financial areas.

Particularly noteworthy accomplishments in the sector are:

1. Water service coverage has met all strategic goals and compares favorably with any country in the world;
2. Water quality, as measured by compliance with WHO and Jordanian drinking water standards, is over 98 percent, which is also world-class performance;
3. Expansion of wastewater coverage since 2011, and improvement in wastewater treatment performance have increased significantly, although there is still more to be done in this area; and
4. An increase in the amount of wastewater reuse practiced throughout Jordan, reducing the amount of potable water used for irrigation and industry and allowing more water to be used for citizens.

Remaining Challenges to Water Sector

While much has been accomplished since the 2011 PEP Report, major challenges remain. While the primary challenge in Jordan has always been sufficient supply of water, the problem is exacerbated by the unexpected addition of 1.4 million Syrians and accompanying requirements for water and wastewater resources. These and other challenges are summarized below.

Expanding and Improving Water Resources

Jordan's increasing population and demand for water, along with the influx of refugees, have strained already-critical water resources. New water sources are necessary. While the Red-Dead Project has been initiated, the benefits to the country's water supply are a number of years away.

In the absence of other new water resources becoming available before then, increasing the efficiency of usage of the existing resources is the only solution. Increased water usage means an increased need for wastewater treatment and reuse facilities, along with the financial resources to meet these challenges.

Specific steps to improve the efficiency of water resources are outlined in the Recommendations Section.

Providing for Syrian Refugee Water and Sanitation Needs

The demand for water and sanitation services in the Yarmouk Water Company is extreme due to the Syrian refugee camps. A number of new wells have been developed through UNICEF to serve the additional demand. Reportedly, the wells are pumping at an unsustainable rate in the long term.

UNICEF is also extending piped water systems in Za'atari Camp and Azraq Camp, reducing trucked water and associated costs. However, nonrevenue water is likely to increase with higher usage and with water meters.

In addition, the effects of the increasing refugee population have stressed the financial situation of the Yarmouk Water Company. As a result, the higher NRW cities within the Yarmouk Water Company such as Mafraq and Irbid should be considered a priority, both for recovering critical water resources and improving revenue flow to the water company.

Increasing Energy Efficiency

As part of Jordan's agreement with the IMF, the Jordan electricity regulator has implemented a program to eliminate subsidies to the electricity sector. This program has resulted in annual 15 percent compounded electricity rate increases to the water sector through 2014 and 7.5 percent since then.

Clearly, improving energy efficiency is a critical, ongoing need for the water sector. Donor-funded programs are ongoing to address energy efficiency for pumping in selected projects. WAJ and JVA have a continuing need to draw upon the positive experiences of these programs and expand these programs throughout the country to mitigate the impacts of higher electrical tariffs by increasing energy efficiency.

To this end the MWI has implemented its 2015 Action Plan for the implementation of "Energy Efficiency and Renewable Energy Policy for the Jordanian Water Sector." The 10-year plan has specific goals of reducing overall energy consumption for water facilities by 15 percent and increasing the share of renewable energy to 10 percent of overall energy usage.

The plan employs two policy pillars to achieve its objectives beginning as soon as 2017:

1. Optimization and rehabilitation of water infrastructure, including replacement/repair of equipment and piping and development of hydraulic models to increase gravity distribution of potable water.
2. Direct investment in renewable energy technologies, including hydropower, photovoltaic technology (solar), wind energy, and biomass energy from wastewater treatment residuals.

Besides a 15 percent reduction in energy consumption per cubic meter and a 10 percent renewable energy share, other key performance indicators include: a reduction of carbon dioxide emissions by 0.71 kilograms per cubic meter billed, due to energy reduction and use of renewable sources; and a total savings in carbon dioxide of almost 280,000 tons per year by 2025.

Reducing Non Revenue Water

Nonrevenue water is a critical focus area for any utility, but especially for WAJ, its water companies, and governorates. At a countrywide average NRW of 48 percent, almost half of all water produced generates no financial benefit for the utilities. The NRW problem is made up of apparent losses, largely due to inaccurate metering, and real losses, due to leakage in pipes and at service connections. These components will vary in their impacts in each utility.

To the extent that the apparent losses are significant, correcting NRW will generate needed revenue. To the extent that real losses (leakage) are the major cause of NRW, correcting the problems will both recover lost water to service more people and will increase revenue to the utilities.

From a strategic budget standpoint, NRW may be better viewed in terms of actual nonrevenue water lost in a year, rather than as a citywide percentage. Figure 5.26 ranks the 2013 data for NRW by the quantity of water lost in each city, from largest losses in water to smallest, rather than on a percentage NRW basis.

The twelve cities were then ranked based upon the total water actually lost. Amman, Zarqa, and Balqa represent over 63 percent of all water lost in 2013. If the NRW analysis was strictly based upon actual water losses, rather than percentage of NRW, future NRW reduction efforts would focus on these three cities. Similarly, over 80 percent of reported NRW in Jordan is addressed by the addition of Mafraq and Irbid.

Figure 5.26 further shows that no revenue was received across Jordan for over 176 MCM per year in 2013. At the 2013 average cost of 1.16 JOD/m3, the NRW problem in 2013 totaled over JOD 203 million. While complete elimination of NRW is not possible (even the accuracy of new water meters is ± 2 percent), the scope of the problem is at least defined.

There are other considerations, however. Each city's NRW problem likely has different causes and therefore different costs. For example, replacing a large number of water meters may be considerably more expensive than correcting a couple of large leaks in a water main.

Adjusting Tariffs on Cost Basis

The 2012 cabinet decision to reverse the tariffs to previous levels-except at the very high usage blocks-impacted the financial position of WAJ. Currently, all utilities but Aqaba are operating below the break-even cost of operations. The Jordan Valley Authority has not had a tariff adjustment in at least 20 years, despite large increases in costs, particularly electricity, during that time.

Adjustments are made by the Ministry of Finance to cover operating costs and capital expenditures. However, this source of funds is derived from taxes and fees that are unrelated to the water sector. International best practices in tariff adjustments for measured services such as water advocate for the establishment of a national regulatory body to

review requests for tariff adjustments on the basis of demonstrated financial need after satisfying the regulator that the utility is operating at an acceptable efficiency level.

This approach, which has been used in Jordan's electricity sector, has proven most effective in providing for current and future capital utility needs in a transparent and sustainable way. Besides increased revenues, an accompanying benefit of increasing water and irrigation tariffs will be to reduce water and irrigation demands, thereby reducing pressure on the country's water resources.

Besides increased revenues, a key benefit factor is in approaching the NRW issue. When tariffs are low, the value of the recovered water is also low. Increased tariffs create additional incentive to reduce NRW. Along with the cost of repairs, the level of tariffs is a principal factor in making the cost-benefit analysis, to decide where to search for NRW, and when to stop searching.

5.9 SPECIFIC RECOMMENDATIONS

The following recommendations flow directly from the previous analysis of the water sector and the identified challenges facing the sector. These recommendations are summarized in Figure 5.27, along with a suggested time frame and are described in more detail below. These recommendations are:

1. Address short- and medium-term water resource needs by focusing on the northern cities:
    a. Establish an NRW action plan that focuses on the major losses by quantity not strictly by percentage of NRW;
    b. Focus NRW resources on select northern utilities to service both Syrian refugee needs and because most NRW (in water and revenue lost) is located there; and
    c. Given the impact of the Syrian refugees on water resources in the northern governorates, the Yarmouk Water Company appears to be a good starting point as it contains two of the five utilities with the largest NRW problems (Mafraq and Irbid).
2. Continue long-term program water resource development by expediting the Red-Dead project.
3. Address electrical cost issues in WAJ and JVA, now representing 33 percent of total operating costs, and:
    a. Establish an energy task force within MWI to review all system-pumping operations within WAJ and JVA facilities;
    b. Consider variable-speed drives on certain pumps to reduce peak demand charges;
    c. Eliminate improper pairing of pumps from various donors;
    d. Identify the age of all pumping assets to estimate likely need for replacement;
    e. Continue electrical and hydraulic efficiency tests on older equipment most likely to be replaced. Establish whether high-efficiency motors can generate a payback of less than 3 years at current and projected electrical rates. If the payback is less than 3 years, consider installing high-efficiency motors.
4. Focus on NRW reduction in Amman, which is the largest single source of NRW in Jordan:
    a. Consider operating at lower nighttime pressures to reduce pumping rates and reduce real losses;
    b. Expand ongoing program of installing low-flow meters to be able to measure flows during flow startup and shutoff; and
    c. Establish a special leaks task force to find real NRW losses. This could take the form of a performance-based, private-sector contract. A 20 percent reduction in NRW in Amman would represent a gain of 12 MCM per year in water billings.
5. Establish an independent regulatory agency for the water sector, with the power to establish and modify tariffs for WAJ and JVA, in a similar way to the electricity sector:
    a. Apply cost-based tariffs on wastewater, in addition to water, rather than a sliding flat rate. This will allow for expansion and upgrading of wastewater treatment recommended below;
    b. Establish wastewater collection and treatment as a separate cost center to allow establishment of cost-based tariff(s) for wastewater, rather than collecting the current flat fee;
    c. Consider a separate wastewater reuse cost center to allow for cost basis for a reuse tariff designed for full-cost recovery;
    d. In the absence of specific cost-based wastewater tariffs, dedicate funds to further expand and upgrade wastewater treatment plants around Jordan. This will provide for the increasing wastewater quantities generated by additional water demand, but also will increase the amount of properly-treated wastewater for reuse. This has the added benefit of further reducing the need for potable water use for irrigation and industrial applications.

Issue	Recommendation	Time Frame	Goal
Short - and medium-term lack of water resources, particularly in the North	Focus immediate NRW resources in Balqa, Irbid, Mafraq, and Zarqa	Funding - 2017 Program - 2018-20	Reduce NRW by 20 percent in each city. Total = 18 MCM/year
Long-term lack of water resources	Expedite Red - Dead Project	Funding - 2018 Implementation - 2019-2020	Increase overall water resources by greater than 100 MCM/year
Large WAJ/JVA electricity costs and increasing each year	• Implement KfW recommendations • Institute further efficiency measures throughout Jordan	• Implement KfW program - 2016-17 • Implement other energy-efficiency measures throughout Jordan--2020	Reduce energy usage 20 percent: • High-efficiency motors & pumps, • Renewable energy (solar/ wind)
NRW in Amman at 35 percent and increasing - 61 MCM/year lost	• Evaluate meters better able to read low flows • Pursue leaks with special task force	Funding 2018 Program 2019-2022	• Reduction of NRW by 20 percent; • Gain of 12 MCM / year in billings
Increasing revenue gap at both WAJ and JVA	Establish Economic Sector Regulator for tariff decisions and to oversee performance	Law - 2017 Establish-2018-19	Tariffs meet operating cost goals for both WAJ and JVA

Figure 5.27: Comprehensive Recommendations for the Water Sector

REFERENCES

1. Engineering News-Record (2015), Israel and Jordan Sign Pact to Build $1B Pilot 'Red-Dead' Canal, New York
2. International Monetary Fund (2013), First Review Under the Stand-by Arrangement, Request for Waivers of Nonobservance of performance Criteria, Modification of Performance Criteria, and Rephasing of Access, Washington.
3. Jordan Valley Authority Fax of Internal Data (2015), Current Water Tariffs, Jordan
4. KfW (2013), Energy Assessments in the Jordanian Water Supply System-Final Project Report, Jordan
5. Ministry of Finance (2015), Approved Budget -Chapter 2301 MWI, Chapter 2302 JVA, Chapter 8102 WAJ, Jordan
6. Ministry of Water and Irrigation (2013), Draft Structural Benchmark Action Plan to Reduce Water Sector Losses, Jordan
7. Ministry of Water and Irrigation (2014), Jordan Water Sector Facts and Figures 2013, Jordan
8. Ministry of Water and Irrigation (2015), Draft Jordan Response Plan for Water Sanitation and Hygiene-Operational Plan 2015-2017, Jordan
9. Ministry of Water and Irrigation / Ministry of Planning and International Cooperation High Level Conference on Jordan's Water Crisis (2013), Quantification of the Impact of Syrian Refugees on the Water Sector in Jordan, Jordan
10. Ministry of Water and Irrigation (2015), Energy Efficiency and Renewable Energy Policy for the Jordanian Water Sector, Jordan
11. NEPCO Electrical Tariff Schedule (2014)
12. Royal Commission for Water / Ministry of Water and Irrigation (2009), Water for Life: Jordan's Water Strategy 2008—2022, Jordan
13. Today's Zaman (2013), Disi Water Conveyance Project, Jordan
14. UN High Commission for Refugees (2015), UNHCR Operational Update, Jordan
15. United Nations / Ministry of Planning and International Cooperation (2010), Keeping the Promise and Achieving Aspirations—Second Millennium Development Goals Report, Jordan
16. United States Agency for International Development (2011), Public Expenditure Perspectives, Jordan
17. Water Authority of Jordan (2014), Water Retail Services Performance Spreadsheet (internal), Jordan
18. World Bank (2014), Red Sea—Dead Sea Water Conveyance Study Program—Final Feasibility Study Report, Washington
19. World Bank (2014), The IBNET Water Supply and Sanitation Performance Blue Book, The International Benchmarking Network for Water and Sanitation Utilities Databook, Washington.

USAID-funded Fiscal Reform Project
www.frp2.org