Analysis of the Pharmaceutical Supply Chain in Jordan

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Secretary General, The Jordanian Association of Pharmaceutical Manufacturers & Medical appliances
## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>EDL</td>
<td>Essential Drugs List</td>
</tr>
<tr>
<td>EMA</td>
<td>European Medicines Agency</td>
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<tr>
<td>FDA</td>
<td>US Food and Drugs Agency</td>
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<tr>
<td>GMP</td>
<td>Good Manufacturing Practices</td>
</tr>
<tr>
<td>GCC</td>
<td>Gulf Cooperation Council</td>
</tr>
<tr>
<td>JD</td>
<td>Jordan Dinar (approximately 1.41 USD)</td>
</tr>
<tr>
<td>JAPM</td>
<td>Jordanian Association of Pharmaceutical Manufacturers &amp; Medical Appliances</td>
</tr>
<tr>
<td>JFDA</td>
<td>Jordanian Food &amp; Drugs Administration</td>
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<td>JPD</td>
<td>Joint Procurement Department</td>
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<tr>
<td>KAUH</td>
<td>King Abdullah University Hospital</td>
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<tr>
<td>KHCC</td>
<td>King Hussein Cancer Center</td>
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<tr>
<td>MeTA</td>
<td>Medicines Transparency Alliance</td>
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<tr>
<td>MoH</td>
<td>Ministry of Health</td>
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<tr>
<td>NCD</td>
<td>Non-communicable Disease</td>
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<tr>
<td>OTC</td>
<td>Over-the-Counter (medicine)</td>
</tr>
<tr>
<td>RDL</td>
<td>Rational Drug List</td>
</tr>
<tr>
<td>RMS</td>
<td>Jordanian Royal Medical Services</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
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<td>WHO</td>
<td>World Health Organization</td>
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</table>
1 Background

Transparent and institutionally strong pharmaceutical supply chains can strongly contribute towards improving access to essential drugs. However, pharmaceutical supply and distribution systems in most countries are often a complex network of heterogeneous stake-holders from the public, private-for-profit and private-non-profit sectors. The purpose of this report is to provide an overview of the different players, their roles and functions within the public and the private sector supply chains for medicines in Jordan.

The methodology used for this study consisted of primarily qualitative and some quantitative analysis. The study traces the flow of essential medicines from the manufacturer to the patient in the sectors outlined above. Primary research was conducted using in-person interviews with various stake-holders in the supply chain in Jordan. A template to assess role and responsibilities and the extent of markups at each stage was used wherever possible. This analysis should be viewed as a preliminary-level study as not all information could be obtained in the short time frame.

2 Overview of Health Sector in Jordan

Jordan is classified as a middle income country and has a population of 5.7 million\(^1\). Around 87% of Jordan population has health insurance\(^2\) and a significant proportion of those have multiple insurance. The largest provider of health care in Jordan is the public sector via the Ministry of Health (MoH), providing insurance to 40% of the population, followed by the Royal Medical Services (RMS), covering 27.5% of the population. The remaining 19.5% are covered by insurance companies associated with banks, professional syndicates, universities or private companies. The total population includes 1.8 million refugees mainly from Palestine and Iraq\(^3\).

Finally, Jordan is geographically a small country with functional infrastructure allowing for efficient transportation, and with approximately 78% of the population living in urban areas\(^3\).

Consequentially with its economic status, the burden of disease in Jordan has shifted toward non-communicable diseases (NCD). This is reflected in the Jordan national health priorities list\(^4\):

- Cardiovascular diseases.
- Cancer.
- Injuries.
- Endocrine disorders (diabetes).
- Osteoporosis.
- Neuropsychiatric disorders.
Table 1: Health and demographic indicators (Source: WHO World health statistics 2006)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population[^1]</td>
<td>5.7 Million</td>
</tr>
<tr>
<td>Per Capita government Health Expenditure (Intl $ rate[^1])</td>
<td>$611</td>
</tr>
<tr>
<td>Percentage of deaths related to cardiovascular illness[^5]</td>
<td>15%</td>
</tr>
<tr>
<td>Provinces[^3]</td>
<td>12</td>
</tr>
<tr>
<td>Health Districts[^6]</td>
<td>14</td>
</tr>
</tbody>
</table>

The WHO/HAI 2007 report[^2] lists poor availability of drugs in the public sector as one of the main problems in Jordan’s health sector. However, prices in the public sector were reported to be good in comparison to international standards. Conversely, availability in the private sector was more satisfactory, but at higher prices limiting affordability for the low income segments of the population.

Total healthcare expenditure accounts to 9.4% of GDP, from which, public funds provide around 45% of national health financing, the private sector contributes 47% of funds, and other donors provide 8% for medicines procurement[^7].

**Public Sector**

Healthcare delivery in the public sector is mainly provided by two players in Jordan. One is the Ministry of Health (MoH), responsible of health matters ranging from preventive health to the organization and general supervision of healthcare. It also offers health insurance for qualifying citizens within available resources, with a network comprised of 760 healthcare centers, of which 72 are comprehensive and 30 Hospitals with a total of 4250 beds (38.5% of all available beds in Jordan[^8]).

The second important source of health provision is the Jordanian Royal Medical Services (RMS), providing health care services to military, security personnel and their dependents, and other staff related to these institutions. There is an agreement in between these two institutions, so that MoH provides primary healthcare to patients insured by RMS, while patients with MoH insurance are entitled to get specialized care at one of the 14 RMS Hospitals with a total of 2131 beds (19.3%)[^9].

In addition, the Jordan University Hospital (JUH) with 531 beds (4.8%) and the King Abdullah University Hospital (KAUH) with 489 beds (4.4%) provide insurance and services for the University employees and dependents and also serve as referral centers[^8].

Due to its size and geography, the maximum travel time to the nearest health center in Jordan is approximately 30 min[^7]. Geographical reach of the health system is not a key limiting issue in Jordan unlike in many other countries in its income class.
Patients seeking treatment in the public sectors face a small co-payment of the prescribed drugs, which is somehow more expensive if the patient is not directly insured in the center attended. According to a recent study\textsuperscript{[2]}, some drugs are routinely out-of-stock in the public sector with no substitutes available, forcing the patients to pay for the drugs out-of-pocket in retail pharmacies if patients are not insured.

In addition to a state run system, the UNRWA provides primary health care to Palestinian and other refugees on its 23 primary health care facilities. Registered refugee population is 1.8 million patients\textsuperscript{[1]} However, they may be referred to MoH and RMS hospitals when necessary and according to certain agreement with the government\textsuperscript{[7]}.

**Private (for-profit) facilities**

The private sector provides primary, secondary, and tertiary services through a network of private clinics and hospitals, mostly concentrated in the capital and other urban centers. The private sector includes 58 hospitals with a total of 3642 hospital beds (33.0%)\textsuperscript{[8]}.

Patients seeking treatment in the private sector purchase their drugs directly at the private health center, or at a retail pharmacy. There are around 13% of people with private insurance, which also covers drugs expenditures in retail pharmacies\textsuperscript{[9]}.

**Pharmaceutical Market and Manufacturing**

Total value of Jordan Pharmaceutical market (2008) is 350M USD, of which approximately 80% (in value) corresponds to imports. The public sector accounts for 140M USD, whereas the private accounts for 212M USD. This represents a per capita pharmaceutical spend of around 80 USD\textsuperscript{[10]}.

Jordan has a fairly well developed high quality local pharmaceutical manufacturing sector. Currently, there are 16 companies which manufacture mostly generics or branded generics. There is no local manufacturing capacity for certain therapeutic areas such as oncology drugs or vaccines. The local manufacturers engage in contract manufacturing for large global pharmaceutical companies but currently this contributes to less than 5% of the overall pharmaceutical sector revenue. All 16 companies are GMP certified according to WHO GMP standards. Two are also FDA certified, and 7 are EMEA certified. The presence of a strong and vibrant local manufacturing sector results in products entering the market at lower levels in the supply chain (unlike imported products which are typically imported by a single importer/manufacturer’s agent before flowing into the wholesale/distributor channel of the supply chain). This influences the overall supply chain organization and the incentives and behavior of its various constituents as typically there is higher competition and higher responsiveness of the supply chain.
The local manufacturing companies export around 70% of their production to 65 countries, with Saudi Arabia and Iraq as their biggest markets representing around one third of the total exported volume. Jordan is the biggest producer in the Middle East, and has a positive trade balance in pharmaceuticals [11].

In the following sections we provide sector-by-sector maps of the supply chains and analyze the key issues and challenges.

3 Public-Sector Supply Chain for Medicines

The public sector contributes to about 65% of health care obtained in Jordan, when hospital admissions are used as a proxy [8]. In figure 1 we provide an ‘at-a-glance view’ of the public sector supply chain with salient characteristics pertaining to Jordan. Each of the functions is then analyzed in detail.

<table>
<thead>
<tr>
<th>Registration &amp; Regulation</th>
<th>Selection</th>
<th>Procurement</th>
<th>Distribution</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>JFDA is a strong agency, successfully self-funded through registration fees.</td>
<td>Efficiency, safety, and cost benefit analysis is used to guide drug selection.</td>
<td>JPD is responsible for the procurement on behalf of MoH, RMS, official Jordanian Universities Hospitals, and The King Hussein Cancer Center.</td>
<td>The Supply and purchasing Department of the MoH is primarily responsible for distribution.</td>
<td></td>
</tr>
<tr>
<td>Stringent registration requirements are followed for all products</td>
<td>JFDA/ RDU committees develop standard treatment guidelines and protocols.</td>
<td>Yearly local tendering with Jordan-registered entities is used. Reference price is &lt;85% of registered price.</td>
<td>Drugs are usually received in two batches, one it is mentioned 4 months in page 11 3 months after the bid award and the next 4 months later.</td>
<td></td>
</tr>
<tr>
<td>Pre-shipment inspection and QC is often mentioned as a procurement bottleneck.</td>
<td>JFDA and the national Steering committee which consists for all stakeholders is responsible for issuing and updating the RDL, consistent with WHO EDL.</td>
<td>If there are no qualified bidders (e.g. sole registered drugs in their therapeutic category), JPD request a quotation or executes a direct purchase.</td>
<td>There are three main warehouses that distribute to 14 Health Districts, each holding around a month’s worth of supply.</td>
<td></td>
</tr>
<tr>
<td>Inspections (at least two per year) are carried out at manufacturers, wholesalers and retail pharmacies.</td>
<td></td>
<td>The Supply and purchasing Department of the MoH is primarily responsible for distribution.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Characterizing the public sector supply chain for medicines in Jordan

Registration
The Jordanian Food & Drugs Administration (JFDA) has the responsibility to register all drugs before they can be imported or sold in Jordan\(^{[12]}\). Regardless of the relatively modest size of the Jordanian pharmaceutical market, the JFDA is a strong, independent and well functioning agency that is well staffed and adequately funded through registration fees. Its responsibilities include i) product registration; ii) pricing; iii) licensing of pharmaceutical manufacturers, importers, wholesalers and establishments; iv) promoting Rational Drug Use (RDU) and v) post marketing surveillance, including QC and inspections.

According to JFDA by-laws, the registration of a new drug must be completed in less than 180 working days. The average registration time is however around 90 days. There is currently no two-tiered system for product registration to differentiate between products that have received regulatory approvals by other regional or global stringent regulatory authorities and those that have not. The price for registration is 1500JD (slightly above 2000 USD) for a new chemical entity, and 400 JD (a bit over 550 USD) for a generic drug. A total of 35 new chemical entities were registered during the years 2007 and 2008.

JFDA also has a well-equipped Quality Control lab with fifty-six staff members. The by-laws of JFDA state that a drug that has been in the market for more than two years and achieves seven consecutive successful batches does not have to go through quality inspection for each batch and only random batch QC inspections should be carried out. However, for drugs procured by the public sector agencies, the JPD insists that every single batch received undergo quality testing. This, coupled with the timing of the single yearly procurement translates into delays at the QC lab, increases costs to the bid winners both in warehousing (JPD does not own warehouse space and the MoH or procuring entities cannot receive/store products pre-QC inspection clearance). The contractual penalties resulting from the inspection delays are borne by the suppliers. In the long run the suppliers build the cost of such penalties and additional warehousing costs into the quoted prices. This is an area that was consistently mentioned as a weak link in the supply chain by all stakeholders involved.

The surveillance and inspection activities at the JFDA are divided into manufacturing & pharmacies/wholesalers. There are 1829 registered pharmacies, from which 1029 are in Amman. All are inspected at least twice a year, but apart from the pre-scheduled inspections, there are unannounced surprise inspections. The team of inspectors has grown from 8 to 14 inspectors in the last few years, and the inspectorate has its own vehicular fleet to conduct the inspections. This effort has allowed them to diminish the presence of counterfeits down from being available at 61 pharmacies in 2007 to just 15 in 2008\(^{[14]}\).

In addition to drug registration and regulation, the JFDA also plays the role of the price setting body. The pricing setting criteria in Jordan use a range of methods to calculate a price for a drug in the domestic market in Jordan. For originator drugs, the mechanism essentially calls for prices
to be calculated using each of the different methods and the one that provides the lowest price is adopted as the price for Jordan. The following different methods are used:\[13\]:

1) Arithmetical formula based on CIF/FOB prices
2) Selling price at country of origin (adjusted to local margins)
3) Median price based in a country basket
4) Export price to Saudi Arabia market
5) Product reference pricing at country of origin

In practice, however, the most frequently used are based on prices in Saudi Arabia, adjusted every year but only to decrease prices.

When it comes to generics, the price ceiling is set at 80% of the originator brand. Thus prices of generics in Jordan are high as compared to free market prices for generics in other countries, but this serves as an incentive for achieving higher revenue in exports markets, as most countries consider the price in the country of origin price as a reference.

**Selection**

The JFDA has a Rational Drug List Efficiency which has been established with the objective to ensure that the patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community\[15\]. Safety, and cost benefit analysis are used to update the Rational Drug List periodically.

The RDU Department at the JFDA engages in the following activities:
1. Issuing and updating the Jordan Rational Drug List (RDL).
2. Issuing and updating the Jordan National Drug Formulary (NDF).
3. Developing standard treatment guidelines and protocols.
4. Establish, support and monitor Pharmacy and Therapeutic committees in hospitals national wide.
5. Conduct studies and researches to increase the awareness and the importance of implementing RDU concept.
6. Promote the concept of RDU.
In 2005 The Joint Procurement Department (JPD) was created with the objective of improving the efficiency of the procurement process in the public sector through demand aggregation, process standardization, and duplicity elimination. It serves as the procurement agency for its five partners: MoH, RMS, official Jordanian Universities Hospitals, and The King Hussein Cancer Center (KHCC).

The JPD functions include:

1. Organize procurement procedures, participation terms, bids study method, and awarding decisions.
2. Conclude procurement contracts and effect pursuit implementation.
3. Prepare and verify forms and documents of any bids as well as announce them.
4. Determine necessary securities required for bids.
5. Maintain entries and records.
6. Maintain and store supplies in the central warehouses to distribute them to concerned parties.
7. Develop procurement operations.
8. Conduct training courses for working staff.
9. Set out principles and terms pertaining to the participation of companies and suppliers

The procurement is organized yearly, with the following timeline: by Nov/Dec JPD receives orders for the more than 500 line items from its five partners, of which MoH represents around 60% in value (about 62 JD millions, or around 87 USD millions). For approximately 6-8 weeks, JPD consolidates the orders and ensures the partners have sufficient funds available for their submitted orders. During this period procurement plan volumes are adjusted frequently in consultation with the procuring agencies. Then, in March/April a tender is floated with a bidding window of 4 weeks. It is only opened for companies registered by the JFDA, and a 3% Bid Bond is required. Bids are then examined by the tender committee, composed of experienced pharmacists and procurement specialists. The selected companies are published on JPD’s web page, and firm contracts are signed within four days of the award announcement. At the time of contract signing the 3% Bid Bond is released and is substituted by a 10% Performance Bond.

During contract negotiations quantities can be changed by JPD +- 30% without change in price. The standard contract also establishes that after the procurement order is firm an additional 30% can be ordered at the same price. Thus JPD retains an upside flexibility in the contracted quantity.

Delivery of the first (of two) batches happens three months after the bid award in Jun/Jul. The second is expected 7 months after the bid award, regardless of the possible delays suffered by the first one. As previously mentioned, there are delay penalties clauses in the contracts.

Ideally three bids are required. If there are no bidders, an additional request of quotation or direct purchasing is executed. This is often the case for those drugs that are the sole approved treatment in their therapeutic category, which may account for as much as 65% of all registered drugs[11].

Figure 3: Procurement timing at Jordan
The approximate split for the drugs procured by JPD is around 60% of purchases originator drugs; 30% local generics; 10% imported generics[^17].

In the event of a stock-out, there is a small budget of 20.000 JD (below 30.000 USD) for urgent procurement of out-of-stock drugs directly by the purchasing committee at the MoH procurement group directly. Additionally, the districts and provincial hospitals are permitted to spend a tiny amount of 200 JD (below 300 USD) for emergency drug purchases when the usual supply channel does run dry.

![Figure 4: Public Sector Procurement Process in Jordan](source: Parkes & Bader 2008)

**Distribution**

Each of the five JPD partners is responsible for the storage (including during the quality control step) and distribution of their procured drugs. In the following paragraphs we will be describing how these functions are taken care of at the Ministry of Health, which is the biggest player in the public sector.

The Supply & Procurement Department manages the storage and distribution of drugs for the MoH. They have three main warehouses: one in Amman with capacity for more than 6 months worth of stock, and two smaller ones with capacities for 3-6 months worth of stock. The supplies, mainly procured annually by the JPD tenders, are first received in the main warehouse in Amman. These warehouses are capable to maintain the necessary cold chain for vaccines and
other pharmaceuticals, but the warehouses lack the appropriate equipment in terms of racks, tools, shelving, MIS systems etc. First-In First-Out (FIFO) stock issue principle is used for inventory rotation at the warehouses, in order to minimize drugs expiration, the overall layout of the warehouse and storage allocation is not designed to facilitate that.

Upon receipt, supplies are proportionally allocated to the secondary warehouses in the North and South, by using the fleet of eight trucks owned by the MoH supplies department, supplemented by sub-contracted transport capacity when needed. Jordan is divided in 14 Health Districts, with each district being supplied by either Amman's main warehouse or one of the secondary warehouses. Each district is served once a month (some may require additional deliveries) in compliance with a preset schedule. All districts are required to place their orders (hand-delivered or by phone/fax) before a preset date each month. Upon receiving the order from the districts, each warehouse prepares and ships the orders usually within a working week if in stock. The health districts should hold around 45 days worth of inventory (and about 70% of them do\textsuperscript{[18]} and in turn distribute to their corresponding hospitals and health clinics. The bigger health centers do have a small vehicle used to pick-up the supplies on their scheduled day, while the smaller ones rely on the health district delivery vehicle to get their supplies. Even if it is not formally organized or supported by the Supply & Procurement Department, informal transshipments takes place in-between nearby health centers.

The distribution system follows a pull-logic wherein shipments are based on actual demand (based in orders) off-take (or stock levels) at the districts and not a centrally developed forecast for each district. Some drugs such as those used to treat cardiovascular diseases are consistently in short supply and are often out-of-stock within 10 days after replenishment at the health centers. Availability in the remaining part of the month is poor and patients often have to purchase prescribed drugs in the private market. Patients have developed some understanding of the monthly pattern in drug availability and have started to schedule their visits to the health center to coincide with this 10 days time-window during which availability is good. This does not only affect the workload distribution at the health centers, but also distorts true demand. The authors found that at a tertiary center about 1200 out of 20,000 prescriptions (6%) within the MoH RDL, were out-of-stock, could not be substituted and patients were given a government stamped prescription to receive them at a private pharmacy, and the MOH through the HI Directorate would repay them back. Based on informal interviews and random visits at several private pharmacies in Amman, it was found that due to the very slow repayment system by the Ministry of Health many pharmacies ask these drugs to be purchased out-of-pocket by the patient.
Figure 5: Distribution by Jordanian MoH

Operationally, after a patient receives a prescription from the health care providers in a public health center, there is a system of triage where he/she first goes to a triage station where availability (by phone) and price of drugs in the prescription are checked. If a drug is not in stock, the patient has to go back to the prescriber to see if an alternative drug can be prescribed from those that are available. The patient then goes to the finance department/cash counter for co-payment, which amounts for 10% of the prescription cost with a minimum of 0.25 JD (around 0.35 USD). Upon receiving the payment receipt, the pharmacist in the health center fills the patient’s prescription. Prescriptions of more than 100JD (a bit below 150 USD) must be broken down in several prescriptions. Pharmacists keep a paper record of drugs dispensed (for inventory reconciliation), an activity that takes around two man hours per day for the team of 2 pharmacists and 8 pharmacy assistants at the tertiary center visited by the authors.

Every quarter the Supply & Procurement Department calculates the stock levels including their supply pipeline, average consumption and uses this analysis to decide stock positioning in the supply chain and re-ordering if needed.

Finally, it is worth mentioning the Ministry of Health Supply & Procurement Department share their inventory stocks with RMS. This system is also used to avoid expiration issues with drugs, moving those with short shelf life left to the centers with higher consumption of those drugs.
Figure 6: Ministry of Health Distribution Process in Jordan
4 Key Problems Diagnosed in the Public-Sector

The biggest challenge in the public sector supply chain is poor availability as certain drugs are consistently out-of-stock in the public sector health centers. Affordability and geographical access are not access-limiting factors because a large fraction of the population is under some form of insurance coverage, the prices of drugs procured in the public sector are competitive and the geographical reach of public health facilities is high.

The poor availability problem starts in the:

- Forecasting period, when demand is calculated by using estimates of drug dispensed instead of drugs prescribed, so that figures are distorted by what was available, instead of what was needed. Forecast (at least for the MoH) is based on the average of the past three years consumption, to which an annual growth factor is added or a fixed 10% is added to the total amount to be purchased. This has proved to be inadequate for some therapeutic classes where the demand has been growing steadily over the years. Procurement planning and budgeting done based on past year's consumption and procurement quantities does not capture the effects of under-stocking and true need. Stock outs and poor availability are remedied through patients purchasing medicines in the private sector. The accuracy of demand forecasts also get impacted by non-adherence to the standard treatment protocols. Hence many such factors need to be considered when procurement planning is done and should be reflected in forecasted demand. Adjustments on past procurement data should be made for full-filing the effect of stock-outs, by adding those extra quantities which would have been dispenses if the product was in stock. Historical demand, disease incidence, prescription patterns and other related information should be collected from various reliable sources before generating a forecast for each product. Detailed recommendation on this is in included in the recommendations section of this report.

- Another problem that creates logistics inefficiency is the insufficient space in the Amman warehouse, used as a logistic hub for all MoH drug shipments. The problem is compounded by the fact that JPD orders are not spaced in time, so that twice a year the quantity of goods received often exceeds the capacity of the main warehouse. This forces the Supply Department to organize ad hoc shipments to the secondary warehouses in the North & South of the country, to use them as temporary warehousing creating logistics inefficiencies. It also leads to work load imbalance for the warehouse personnel. Manage these temporary peaks in inbound shipment receipt and storage leads to laxities in the processes for optimal warehouse management. This in turn deteriorates the outbound logistical efficiencies as order picking and packing then requires longer duration and more effort.
• Closely related to the above diagnosed problem, the warehouse equipment is not adequate in terms of racks design, labor security, tooling, etc. Moreover, the organization of goods and the overall warehouse layout was inherited from legacy, and it has been optimized nor for their current assortment of medicines, neither for the volumes currently being warehoused.

• Finally, there is poor visibility (ability to track and trace shipments) in the supply chain after the product is delivered to the districts, interfering with the ability to create optimal stock positioning.
5 Private-Sector Supply Chain for Medicines

Around 33%[8] of the health care provided in Jordan is obtained in the private sector, which provides primary, secondary, and tertiary services through a network of private clinics and hospitals, mostly concentrated in the capital and other urban centers. This includes 58 hospitals with a total of 3642 hospital beds (33%).

Patients seeking treatment in the private sector purchase their drugs directly at the health center, or in a retail pharmacy. There are around 13% of people with private insurance, which also covers drugs expenditures in retail pharmacies[9]. In addition those patients who are unable to fill their prescription drugs in the public sector due to stock outs also obtain medicines in the private sector.

The structure of the private sector supply chain is shaped by a few large importers and wholesalers bringing in drugs from international manufacturers or suppliers and selling them to private hospitals, retail pharmacies or drug outlets. In addition, Jordan has solid local manufacturing sector which manufacture most generic drugs, even if they are mostly export oriented. In Jordan all manufacturers, wholesalers, importers and retail pharmacies must be registered with the JFDA.

![Diagram of Private-Sector Distribution in Jordan](image-url)
Local manufacturing

There are 16 Jordanian manufacturers producing mostly generic and branded generic drugs. They devote around 5% of their installed capacity to contract manufacturing for global pharmaceutical companies. All registered manufacturing companies are GMP certified according to WHO regulations. Seven of them do also hold EMA certifications, while two others are FDA certified sites. The presence of local manufacturing leads to products entering the market at lower levels in the supply chain and eliminates competition limiting layers in the supply chain such as exclusive importers/distributors. It thus influences the incentives and stocking patterns of various constituents in the distribution chain, notably with significantly reduced lead times, higher responsiveness and lower inventory needs.\(^\text{[18]}\)

Given the relatively small size of the Jordanian market as compared to minimum efficient plant size in pharmaceutical production, most of these companies are export oriented, with around 70% of their production sold in 65 countries: Saudi Arabia (which accounts for a large share of the Gulf Cooperation Council procurement); Algeria (where Jordan is the second largest drug exporter), etc.

Hikma Pharmaceuticals PLC is the largest local player, with around 15% of Jordanian market share, and has a product portfolio covering a range of therapeutic categories, including anti-infectives, Central Nervous System drugs, cardiovascular and alimentary tract & metabolism. Dar Al Dawa Pharmaceuticals makes a distant second with less than 7% of the market, and manufactures a wide range of pharmaceutical products including antibiotics, antihyperglycemics, chemotherapeutics, cardiovascular products, dermatological products, ophthalmology/otology products, respiratory products, mouth washes, vitamin preparations and many others.

Even though Jordan is the sole country in the Middle East which has a positive trade balance in pharmaceuticals, it mostly depends on Europe for patented drugs. Furthermore, some giant Asian generics exporters are entering the Jordanian market. For instance, one of Bangladesh’s top five export players, Beximco Pharmaceuticals began shipments to Jordan in October 2007, while Pakistan’s Indus Parma is set to follow suit after recently being granted a license.\(^\text{[19]}\)

Importers/Wholesalers

There are 84 medicine agents & around 160 subagents & herbal/ food supplement products' importers.

All companies that register themselves at the JFDA as wholesalers and importers of pharmaceutical products are required to have suitable storage facilities in which the pharmaceutical products can be stored before distribution. JFDA requirements also stipulate that
all registered pharmaceutical establishments should have a professionally qualified pharmacist. All pharmaceutical products imported into Jordan should be declared to the JFDA and an approval of the pro-forma invoice is required.

Most importers have relationships with specific manufacturers for high volume products. For low volume therapeutic categories, some importers do not source from a manufacturer but instead buy from another importer within Jordan who may specialize in importing that product category. This leads to purchasing and in-bound logistical efficiencies for low volume therapeutic categories. Hence, sometimes there is no clear differentiation between wholesalers and importers as these roles are product category dependent. Sole distributorship does not work for many products because each distributor may have strong unclear relationships with one type of buyer.

Most of the large importers receive around 120 day (formerly 180 days) credit from their suppliers, but the longer the credit, the higher the stock levels the agent is required to hold. One importer/wholesaler (who also owns some retail pharmacies) discussed that there are strong incentives for them to start a new manufacturing company, with basic formulation and packaging capabilities which would allow them to be able to sell a generic drug that with the current pricing regulations was below profitability. This is due to the usually very low prices in their original local markets (typically India or China) that are taken as a reference for pricing them in Jordan. After importing the API and formulating and packaging, it is possible to sell it at a much higher price (with a ceiling of 80% the originator price).

Due to the relatively small size of Jordan and its good infrastructure, the importers/wholesalers make deliveries to retail pharmacies and private hospitals all over the country, even if the greater Amman area accounts for around 65% of all transactions. For such deliveries they bear the transportation costs and some of them have their own vehicular fleets (some others use third-party delivery companies).

One agent mentioned the small size of Jordanian market as a problem for reaching the minimum orders quantities form the manufacturers; sometimes merging the volumes from the public and private sector this is reached, but other times it is not. For the private market, importers order and stock based in their own forecast, and hold inventory to either create in-bound logistics efficiency or to have a competitive edge in quoting lead times to fulfill orders from their clients. Typical markup in the wholesale/import business is 15% of landed cost, plus 4% expenses. One respondent mentioned the existence of cross-subsidies across clients wherein a wholesaler has to supply cheap to maintain its relationship commitments with the tender (public) sector and compensates it by higher markups with the private sector.

The importers/wholesalers provide 180 days credit and aggressive bonus to their large private clients to compete in a market with regulated prices and fixed margins (which puts lower priced
generics to a disadvantage). This leaves importers with a financial cost of 6-8 months worth of stock at 5.5%, plus a financial cost of 60 days of credit at 2.0%.

Wholesaler/Importers can strongly influence prescribing behavior of the pharmacists. One agent cited how their company engaged in sending sales representatives to key retail buyers in addition to the sales representatives of the pharmaceutical company.

**Pharmacists and Retail Chemists**

There are 1829 registered pharmacies, out of which 1029 are located in Amman. Some of these pharmacies are owned by wholesalers/importers but some continue to be independent pharmacies that purchase from the wholesaler/distributors. More recently a chain pharmacy has also started operating in Jordan (Pharmacy-1). Having started in 2005 it now consists of 42 retail pharmacies and employs 350 people. This chain has a 13-17% market share, with a split volume in sales of 70% drugs (40% of them generics) and 30% Over The Counter (OTC) products. It is not clear if this split is typical of other single owner retail pharmacies or is only for the pharmacy chain. The “pure-play retail” pharmacies are at a natural disadvantage (vertical integration advantages of their competitors) and try to counter the competition by greater involvement in the community and by offering value-added services to their customers. Apart from retail pharmacists there are 317 registered drug stores that are allowed to dispense OTC drugs, from which around 100 dispense drugs. In addition, private hospitals and clinics also dispense medicines.

There is price control on drugs and prices at the retail level are regulated by the JFDA. The markup for retail pharmacies is 20% over wholesale price. Typical pharmacies employ or are owned by one pharmacist and one or two pharmacy technicians who are salaried employees.

There is some presence of sales reps from pharmaceutical companies to do product marketing and training. Sales reps from the distributors visit the pharmacies when they calculate the pharmacy would be close to stocking-out on their products. They concentrate only in the bigger pharmacies, and none of the three establishments informally visited by the author in Amman had received any of them. Nevertheless, one mentioned receiving a visit for monitoring prescription substitution.

There is lack of clarity amongst stakeholders regarding pharmacy level substitution whether for generics or other drugs. According to our current understanding the pharmacist should seek explicit permission from the prescriber before substituting but the patient may be able to ask for substitution to the pharmacist. During the informal interviews carried out in the small retail pharmacies one out of three mentioned that they offered generic or branded generic substitution to their clients, but mentioned that only approximately 30% of them were happy to accept it.
Pharmacies place their orders usually over the phone, and the lead time for retail pharmacies to receive shipment form the wholesalers is less than two days. Due to the wide range of products in pharmacies, it was not possible to ask the wholesale source of individual products and create a structural relationship map.

<table>
<thead>
<tr>
<th>Player</th>
<th>Activities carried out</th>
<th>Average markup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importer/Wholesaler</td>
<td>Forecasting/Order consolidation from multiple pharmacies</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>Price negotiation with suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facilitate product clearance at point of entry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warehousing at primary location</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distribution to secondary locations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stock management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-financing (pays suppliers prior to receiving payments from buyers)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assume partial risk of overstock and expired products</td>
<td></td>
</tr>
<tr>
<td>Pharmacies</td>
<td>Wholesaler Selection (where no fixed contracts or backward integration exists)</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>Develop marketing materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advise/Prescribe/Dispense appropriateness of drugs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inventory levels, stock control (e.g. losses)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assume partial risk of overstock and expired products</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provide credit for the time between dispensing drugs and receiving payments from</td>
<td></td>
</tr>
<tr>
<td></td>
<td>insurance companies (or MoH in some cases)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Roles and mark-up assessment for the private sector supply chain

Figure 8: Supply Chain Margins in EU member states (for use as a reference benchmark).
Source: Alliance Unichem
6 Incentive Analysis of the pharmaceutical supply chain

A pharmaceutical supply chain with many independent stakeholders works well in achieving its objectives only if the incentives of all parties are well aligned towards the common goal of improved access to medicines. We analyze the incentives for different stakeholders for key access related activities. In analyzing incentives, we focus only on explicit incentives, i.e. those in which a stakeholder clearly achieves better results on its mandated purpose/mission and we only focus on the incentives for those stakeholders who can influence or carry out the activity in question. The incentive for other stakeholders who have no influence or role to play in an activity is listed as being indifferent. Table 1 shows a grid of the incentives of different players. Any incentive conflicts are shaded in tan and the reasons for the weak/medium/strong incentives for some of the key activities are discussed as footnotes. A weak or medium incentive is not necessarily a reflection of the weakness of any player in contributing to the objectives of improved access. In many instances, the relative priority to one activity over the other may create weaker incentives for some activities if the activities are not mutually attainable.

<table>
<thead>
<tr>
<th>Activity</th>
<th>JPD</th>
<th>JFDA</th>
<th>MoH</th>
<th>Retail Pharmacists</th>
<th>Wholesalers</th>
<th>Prescribers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease Price (Retail Price and Procurement Price)</td>
<td>Strong</td>
<td>Medium</td>
<td>Strong</td>
<td>Weak^2</td>
<td>Weak^2</td>
<td>Indifferent</td>
</tr>
<tr>
<td>Increase Timely Availability of stock at National MoH Warehouse</td>
<td>Medium^3</td>
<td>Indifferent</td>
<td>Medium^4</td>
<td>Weak^3</td>
<td>Weak^5</td>
<td>Indifferent</td>
</tr>
<tr>
<td>Increase Availability at point of dispensing in Public Sector</td>
<td>Indifferent</td>
<td>Indifferent</td>
<td>Strong</td>
<td>Weak^5</td>
<td>Weak^5</td>
<td>??</td>
</tr>
<tr>
<td>Increase Availability at point of dispensing in Private Sector</td>
<td>Indifferent</td>
<td>Indifferent</td>
<td>Medium</td>
<td>Strong</td>
<td>Strong</td>
<td>??</td>
</tr>
<tr>
<td>Ensure Quality of Medicines</td>
<td>Strong</td>
<td>Strong</td>
<td>Strong</td>
<td>Medium</td>
<td>Medium</td>
<td>Strong</td>
</tr>
<tr>
<td>Ensure Rational Drug Use and Adherence to Standard Treatment Protocols</td>
<td>Indifferent</td>
<td>Medium^6</td>
<td>Strong</td>
<td>Weak^2</td>
<td>Weak^7</td>
<td>Indifferent^6</td>
</tr>
</tbody>
</table>

1 JFDA has the dual objective of ensuring prices reflect good business opportunities for Jordanian pharmaceutical manufactures while keeping domestic prices low.

2 Margins of retail pharmacists and wholesalers are a fixed percentage of the end price hence they have no incentive to push for reduced prices from the manufacturers they represent.
3 JPD’s key performance measures are procurement price, transparency and competitiveness in the procurement process, on-time delivery from the suppliers and the overall volume procured. Reducing the total time from start of the budget planning process to the actual receipt of shipments at the national warehouse is not a key measure of performance for the JPD. Also see 4 below

4 The MoH (and thus the procuring organizations on its behalf) has a higher incentive to ensure quality of drugs as compared to the incentive to increase timely availability. The QC testing of each batch exemplifies that. Also, the MoH is currently not engaging in any activities to reduce the time in the planning and budgeting cycle before the start of procurement.

5 Failures in timing of national procurement or poor availability at public sector clinics create additional business opportunities for wholesalers and retail pharmacists.

6 There are no clear monetary or non-monetary incentive programs instituted by the JFDA or the insurance companies in order to incentivize prescribers for rational use/prescribing.

7 Fixed margins on sales leave no incentives for wholesalers or retail pharmacists to recommend generics, or engage in other rational use practices.
7 Recommendations for Intervention

In this section we present our recommendations to remedy the problems that are highlighted in the diagnosis of the public and private sector supply chains. Most of these are strategic recommendations, and would require further analysis to be translated into implementable actions.

1. Improving Procurement Efficiency through a Decision Support Tool

The JPD is a well staffed organization with proven results on improving procurement. However, an important part of achieving long term efficiency in procurement is to implement strategies that could increase competition in supply sources. Currently, many of the drugs procured have single or limited sources of supply. Firstly, strategies should be formulated to incentivize more players to participate and to actively support additional suppliers to be registered in Jordan in order to be eligible to supply these products. A better understanding of supply market dynamics leads to higher agility in future procurements and increasing competition in supply sources (if managed well) would increase availability, reduce lead time and lower prices.

Currently such analysis is carried out by JPD staff using home-grown spreadsheet tools and the data utilized for this process comes from multiple disparate sources. Some of these factors obscure the ability to analyze procurement spending and may lead to under-informed sourcing, poor budgeting and wrong timing of order placement. Overall, it leads to loss of efficiency and in some instances does not provide all the information necessary to make optimal procurement decisions.

A simple decision support tool that can capture historical orders, actual delivery times, prices, comparisons against international published price lists, will benefit the efficiency of the procurement process for both single-sourced and generic pharmaceuticals. It will also serve as a supplier rating database on delivery terms and other parameters which are used as key attributes in supplier selection at JPD (This function is already in the tool used by JPD). This tool should also be able to interface with registration data at JFDA and thus create quick at-a-glance views of the supply market dynamics (average price, number of suppliers, installed capacity, typical lead time) for each product and therapeutic category. Speeding up the ability to conduct this analysis will shorten the lead time of budgeting, planning and the overall procurement process.

2. Improving Information Availability for Forecasting and Quantification

Lack of accurate data and information about the true demand for pharmaceuticals results in stock-outs both at the national and the health center level. Designing a process that captures prescriptions and consumption at the health center can help in more accurate forecasting. The
Triage system observed by the authors at a health center they visited appears to be an ideal point for capturing true demand. If such triage is done in all health centers, a basic Personal Digital Assistant (PDA) device using very simple touch-screen menus can be used to capture the prescriptions, drug dispensed and its quantities. The data can be automatically downloaded at the end of every working day at a (cradle) station, and sent over the internet (or a mobile network) to the MoH supply department. This will result not just in an improved forecasting process but also enhance the ability to track rational drug use and adherence to standard treatment protocols. This simple system will also significantly reduce the workload for the pharmacists at the health centers on record keeping, inventory counting and replenishment quantity calculations. Once data capture rates from the health centers become high in this system, the data can be used for multiple other planning purposes such as better inventory planning, stock allocation etc.

Conducting a small pilot in select health centers to test the techno-economic feasibility of this recommendation and evaluate its impact could be an immediate step.

3. Incentive for Adherence to Standard Treatment Protocols

Poor adherence to standard treatment protocols and irrational drug use makes supply planning very difficult at the health center and at national level. Demand for particular drugs becomes much more variable and more difficult to predict. This leads to stock-outs, supply imbalances, and ultimately, to lower availability and higher total cost. In countries such as Jordan which have a high incidence of non-communicable diseases like diabetes, hypertension, and cancer that require expensive continuous treatment, this becomes even more important in ensuring continuous supply. As is seen in the incentive analysis there are weak incentives across all players to ensure higher adherence to this. JFDA has organized seminars and workshops to promote rational use and adherence to standard treatment protocols but the use of specially designed incentives for this purpose needs to be explored. A pilot study should be conducted to determine whether a small financial incentive for prescriber and/or dispenses would lead to better adherence, such as the MeTA NICE on-going project supported by the World Bank. Other studies could be carried out in a small sample of health centers, hospitals and tertiary facilities and would help inform the effectiveness of such an incentive both on standard treatment protocol adherence and rational use and the resulting impact on quantification and stock planning.

4. Better Warehouse Layout Planning and Stocking

Poor adherence to good warehousing practices at the MoH warehouse in Amman (and potentially the other two secondary ones) increases the man-hours spent in order picking as well increases the possibility of not being able to fill order lines even when there is stock available at the central warehouse. The current methods of stocking make it difficult to have an organized picking
schedule and lead to a longer order-preparation time. An integrated warehouse management system (that includes an IT solution and formalized processes) will allow a more visible stock management with clear standard processes, optimal warehouse layout planning and minimize picking time. A small study to quantify the costs and benefits from such an exercise needs to be conducted.

5. Re-examine the Feasibility of Minor Changes to Pricing Regulation

Pegging the prices of generic medicines to 80% of the price of the innovator drug helps achieve the objectives of export price competitiveness for Jordanian manufacturers but leads to higher prices in the private sector. Step wise declines such as the 70/90 regulations in Canada, where the first generic entrant's price cannot exceed 70% of the incumbent's branded price and subsequent entrants' prices cannot exceed 90% of the first generic entrant's price could be considered. Such stepwise pricing strategies will ensure that the prices are in domestic market are in tune with the level of generic competition in each category while ensuring export competitiveness for the first generic entrant in each category. It would thus promote specialization in generic exports and also create competition for being the first generic entrant in new oncology and cardiovascular drugs which are currently patent protected.

In a similar vein, changes to fixed wholesaler and retailer markups to consider regressive markups could lead to higher generic use and the more effective segmentation of products for domestic and export markets by manufacturers.
Appendix

Figure 9: Supply Chain for Medicines in Spain (for use as reference benchmark). Source: Alliance Unichem, farmaindustria 2004 report and author’s work.
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[14] Private communication of Dr. Tahseen Abbadi, Head of Inspection & Monitoring Department, Jordanian Food & Drug Administration.


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