Analysis of the Public, Private and Mission Sector Supply Chains for Essential Drugs in Zambia

Prashant Yadav

MIT-Zaragoza International Logistics Program

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Michael Borowitz	DFID, London
Bonface Fundafunda	Drug Budget Supply Line, MoH, GRZ
Dyness Kasungami	DFID, Lusaka
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Tom Brown	Medical Stores Ltd.
Caesar Cheelo	University Of Zambia, Lusaka**.**
Nicholas Chikwenya	MoH,GRZ
Oliver Hazemba	MSH, Zambia
Mr. K (?)	Jubilee Pharmacy, Lusaka**.**
Goodwell Lungu	Transparency International, Zambia
Henry Malikyama	MoH,GRZ
Clement Mandala	Ngansa Pharmaceuticals, Ltd.
Esnart Mwape	Pharmaceutical Regulatory Agency, Lusaka**.**
Alison Nabugwere	Canadian International Dev. Agency., Lusaka
Harold Rugara	Circlepharma, Zambia
Christoper Salaka	Northmead Pharmacy, Lusaka
David Thompson	Medical Stores Ltd.
Ngoza Phiri Yezi	Transparency International, Zambia

Acronyms

ARV	Antiretroviral
CHAZ	Church Health Association of Zambia
CIDA	Canadian International Development Agency
CP	Cooperating Partner
DFID	Department for International Development
DRC	Democratic Republic of Congo
DSBL	Drug Supply Budget Line
EDL	Essential Drugs List
GFATM	Global Fund to fight AIDS, Tuberculosis and Malaria
GMP	Good Manufacturing Practices
GRN	Good Received Note
GRZ	Government of the Republic of Zambia
GWP	Good Wholesaling Practices
HAI	Health Action International
IDA	International Dispensary Association (procurement agent)
LIC	Low Income Country
MeTA	Medicines Transparency Alliance
MoF	Ministry of Finance
MoH	Ministry of Health
MSL	Medical Stores Limited
MSH	Management Sciences for Health
MSF	Medicines Sans Frontiers
OTC	Over-the-Counter (medicine)
PEPFAR	President's Emergency Plan for AIDS Relief
PRA	Pharmaceutical Regulatory Authority
SWAP	Sector Wide APproach
WB	World Bank
WHO	World Health Organization
ZNAN	Zambia National Aids Network
ZK	Zambian Kwacha (1 US$ = 4050 ZK)

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 sector, the private sector and the mission sector supply chain for medicines in Zambia. We present these supply chain maps with additional considerations on possible entry points for the MeTA initiative within the various functions outlined in this report.

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 three sectors outlined above. Primary research was conducted using in-person interviews with various stake-holders in the supply chain in Zambia. A template to assess role and responsibilities and the extent of markups at each stage was used wherever possible. This initial study was used to assess the feasibility and value of a detailed supply chain mapping exercise for the MeTA initiative. This should be viewed as a preliminary-level study as all information could not be obtained in the short time frame.

2 Overview of Health Sector in Zambia

Zambia is classified as a low income country and has a population of 11.6 million. The public sector is the largest provider of health care in Zambia followed by the Churches Health Association of Zambia (CHAZ) member institutions and the mine hospitals. The for-profit private sector is relatively small in Zambia as compared other countries in the region such as South Africa. Interestingly, Zambia is also one of the most urbanized countries in sub-Saharan Africa, with approximately 38% of the population living in urban areas.

Malaria is the primary public health problem in Zambia with an estimated 3.5 million cases in 2004-05. HIV/AIDS also is another key public health problem with approximately 1.1M people living with HIV/AIDS of which only 75,000 are on antiretroviral therapy.

Table 1 : Health and demographic indicators (Source: UNAIDS, MoH GRZ Annual Report 2005)

Population	11.6 Million
Per Capita Government Health Expenditure (Intl dollar rate)	$ 26
Percentage of people living with less than US$2 a day	87.4%
Number of people living with HIV	1.1 Million
Provinces	9
Districts	72

The MoH annual report released in September 2006 lists erratic supply of drugs and inadequate logistics for health services delivery as two of the six main challenges facing the health system. The report also states that the need for pharmaceuticals in Zambia is roughly $21 million.

Health care in Zambia is provided through a network of public sector facilities, complemented by mission facilities in the rural areas, mine hospitals in the Copperbelt province and a small but growing private sector largely in Lusaka and other urban areas.

Public Sector

Primary health care in the public sector is provided by primary health centers that service a catchment population of between 30,000 and 50,000 (urban areas) or a designated catchment area of 29km (rural)[1].

The public sector system consists of one general hospital in each provincial center and a district hospital in each district. There are many primary health centers (typically 20+) under each of the district hospitals but their number varies from region to region. Some areas also have health posts that offer a very limited range of health care.

In urban areas there is a small user fee to access the public health system but access is free in rural areas. Drugs are dispensed free of charge in both rural and urban centers in the public sector.

Mission and mine hospitals

Mission and church hospitals are usually located in the rural areas of the country. According to estimates, between 20-30% of health care in Zambia is obtained through the mission hospitals and clinics (this fraction is much higher in the rural areas). The Churches Health Association of Zambia (CHAZ) is an organization which collectively represents these hospitals and health centers (approximately 97 member institutions + 28 non member institutions) and does procurement and storage for them. CHAZ works in close partnership with the MoH and with Zambia National Aids Network (ZNAN) to procure, store and distribute drugs to certain public facilities.

In the Copper-belt province there is also a strong presence of mine hospitals. These health facilities are for the mine employees and were largely funded by the mining companies. These hospitals now have a quasi public status and many of them are supplied drugs by the public system.

In addition, organizations such as MSF operate their health facilities in the border areas with Congo (DRC) to cater to the health needs of refugees from DRC. Similar clinics exist around other orders of Zambia and are operated by different NGOs.

Private (for-profit) facilities

Private-for-profit health facilities are limited to the urban areas either around Lusaka or in the Copperbelt province and occasionally in Livingston. Some private clinics also dispense drugs. There is no clear distinction between a private clinic and a private hospital. Patients seeking treatment in the private sector purchase drugs primarily from retail pharmacies which are again concentrated in Lusaka and the Copperbelt and very few (most respondents said none) in the rural areas. In addition to registered pharmacies, drugs are also sold in drug stores as over-the-counter (OTC) medicines. There is also a small market for drugs that are sold in non-fixed structure stores that are located either in far flung rural areas or in the shanty compounds neighboring Lusaka.

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

[1] Source: Global Fund background paper on Zambia

3 Public-Sector Supply Chain for Medicines

The public sector contributes to over 60% of health care obtained in Zambia. In figure 1 we provide an 'at-a-glance view' of the public sector supply chain with salient characteristics pertaining to Zambia. Each of the functions is then analyzed in detail.

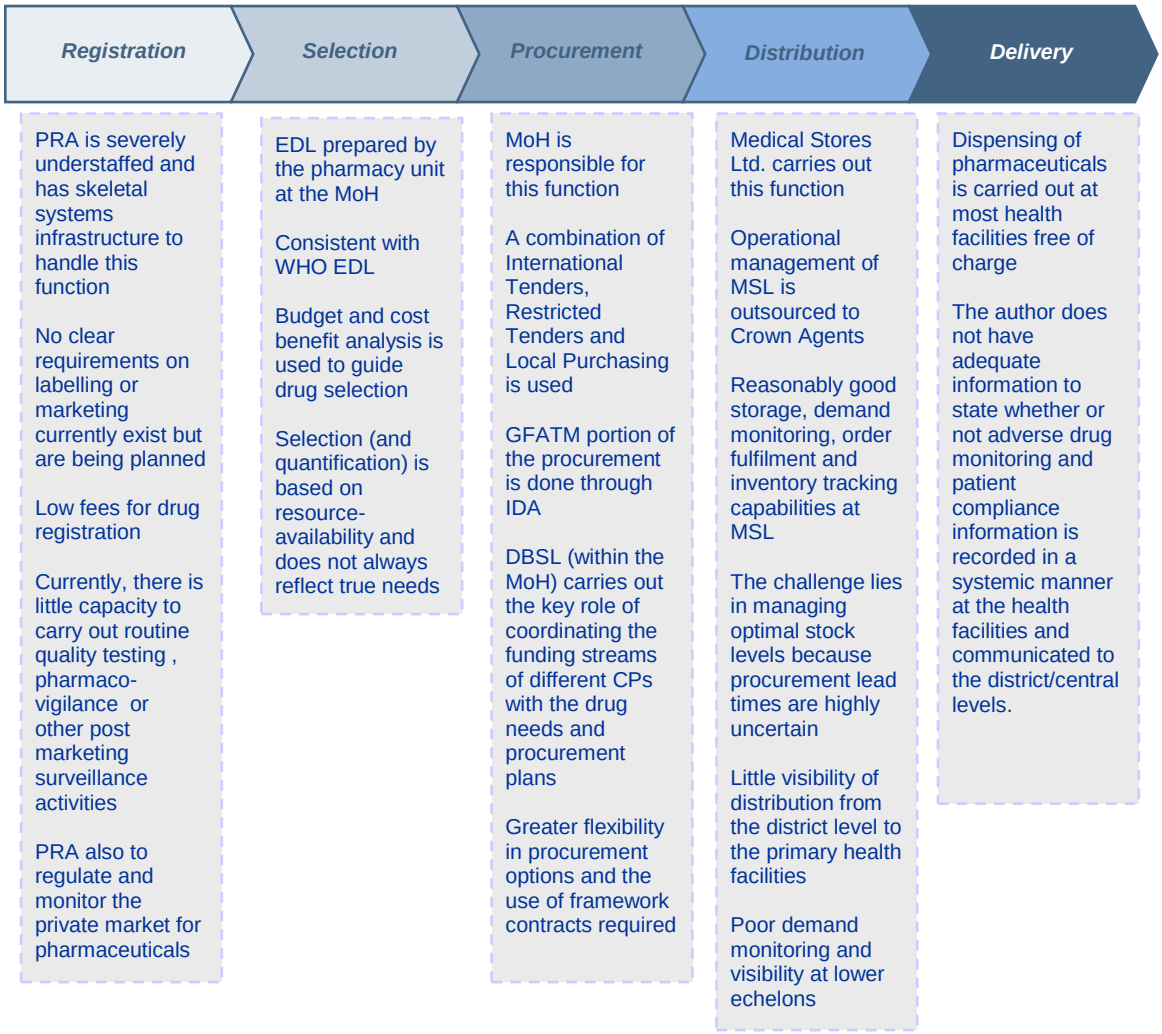

Figure 1 : Characterizing the public sector supply chain for medicines in Zambia

Registration

The Pharmaceutical Regulatory Authority of Zambia (PRA) has the responsibility to register all drugs before they can be imported or sold in Zambia. The PRA is still in a state of transition as it was formed in 2004 from the former Pharmacy and Poisons Board (PPB). Its responsibilities include i) product registration, ii) licensing of pharmaceutical establishments and iii) post marketing surveillance.

Approximately 500 new drug applications are received every year in Zambia. The fee for registering a new drug is only $150 as compared to $1000 in some other countries in the region. Despite that, many unregistered drugs can be found on the market. These include drugs whose registrations have expired or drugs that were never registered. In addition, herbal medicines are also found on the market. The PRA wants to include these herbal and traditional medicines under its purview but currently has very little capacity to do that.

The time required to register a new drug can vary significantly although prioritized registration is carried out in special circumstances. There is no two-tiered system for product registration to differentiate between products that have received regulatory approvals by other regional or global regulatory authorities and those that have not. The variability in the approval time is attributed to the lack of people and skills to evaluate the dossiers. The PRA relies on quality and safety data provided by the manufacturers and has virtually no capacity to do its own tests and quality checks. It has 3 quality mini-labs that were provided by the WHO and MSH and plans to have a medium sized quality control lab by 2010.

The PRA currently has very little capacity to carry out its other two roles of licensing pharmaceutical establishments and post-marketing surveillance. There is lack of a fleet for the inspectorate and a lack of trained GMP/GWP inspectors to successfully monitor the private pharmaceutical market in Zambia. Also, it is not clear if policy decisions will mandate the PRA to be actively involved in regulating or monitoring wholesaler and retailer markups

Selection

Cost benefit analysis and other efficacy data are used to update the Essential Drug List periodically. This activity is carried out primarily by the pharmacy unit within the MoH. WHO recommendations on Essential Drugs List (EDL) in resource constrained setting are used to update the list. The author did not have enough time to ascertain other details of the selection process during the visit.

Procurement

Before delving into the procurement function in detail it is important to understand the financial flows for procurement in Zambia (many of which are typical for low income countries). The MoH relies extensively on external donors (Cooperating Partners or CPs) for the national drug needs. The CPs can be categorized into three types

i) those who buy drugs and provide in-kind assistance with drugs (e.g. CIDA, PEPFAR)

ii) those who bring money in-country to purchase drugs (e.g. GFATM)

iii) those who provide budgetary support to the MoH (e.g. DFID)

In the past this led to a coordination problem across programs that were buying drugs. It led to flooding of some drug and shortages of other drugs as CPs would not purchase a certain drug assuming others were buying it. The shortages led to emergency procurement by both the MoH and at times by the CPs. Also, this had on various occasions resulted in CPs bringing in drugs into the country that were not even on the essential drug list. Those who procured from the country are now asked to contribute to the drug-basket (SWAp) and others who provide drugs in-kind now play the role of filling in any gaps or short-tem shortages. The drug supply budget line (DBSL) within the MoH plays the role of coordination across multiple CPs and the MoH budget and procurement plans.

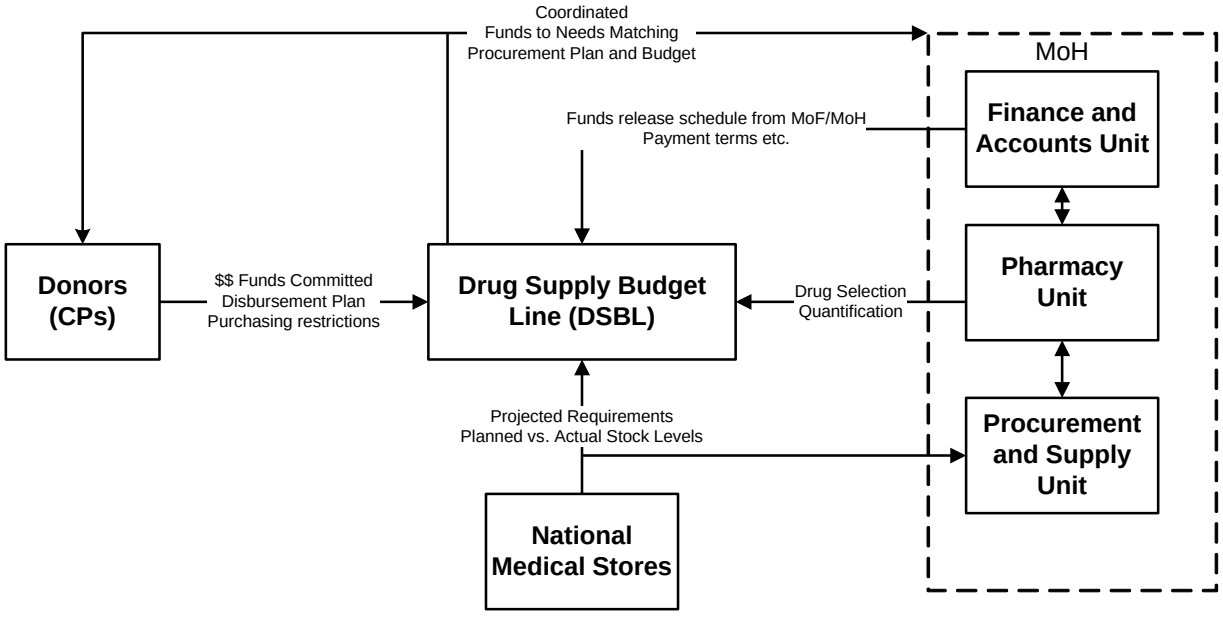

Figure 2 : Coordination role of the DSBL in Zambia public sector supply chain (adapted from a slide by Bonface Fundafunda, head DSBL)

The drug procurement function in Zambia requires many institutions to be involved and can often be a coordination challenge. The MoH receives funds for health financing from both the Ministry of Finance (MoF) and the bilateral and multilateral Cooperating Partners. Some CPs channel their funds directly to the MoH and others channel it through the MoF. *The MoF makes the funds available to the MoH for drug purchasing based on a quarterly/monthly disbursal schedule. This often leads to purchasing in fragmented quantities some of which are too small to even float an international tender. Thus the MoH pays a higher price for drugs that could have been procured cheaper if international bulk procurement was carried out. The MoF often cites poor accountability as the reason for controlled and staggered disbursal of the budgeted funds to the MoH*.

The pharmacy unit at the MoH carries out the quantification and forecasting and this in conjunction with the needs communicated by the national medical stores and availability of resources is used to create a procurement plan. The required quantities are then converted into a

$ value based on international reference prices available from the MSH price survey. If the value of the bid is higher than ZK 2.5 Billion, the tender is floated by the Zambia National Tender Board (ZNTB). For smaller value bids the MoH is authorized to float the tender. In practice however most tenders go through the ZNTB as the MoH threshold is very small.

In the event of a stock-out, emergency purchases in smaller quantities are made by the MoH which do not follow the above outlined process. Private in-country importers are awarded the contracts for such emergency procurement. Additionally, the districts and provincial hospitals are permitted to spend a tiny fraction of their total budget (between 4%-10%) for emergency drug purchases when the national medical stores cannot supply them.

In the event of a severe shortage of essential drugs (crisis) some CPs tend to support the MoH by expedited purchasing of the required drugs. This however leads to the consequences of a stock-out not being perceived as severe by the MoH procurement staff because over a period of time they may have become conditioned to the fact that if the delivery or procurement drastically fails, they can always depend on the CPs as a 'measure of last resort'.

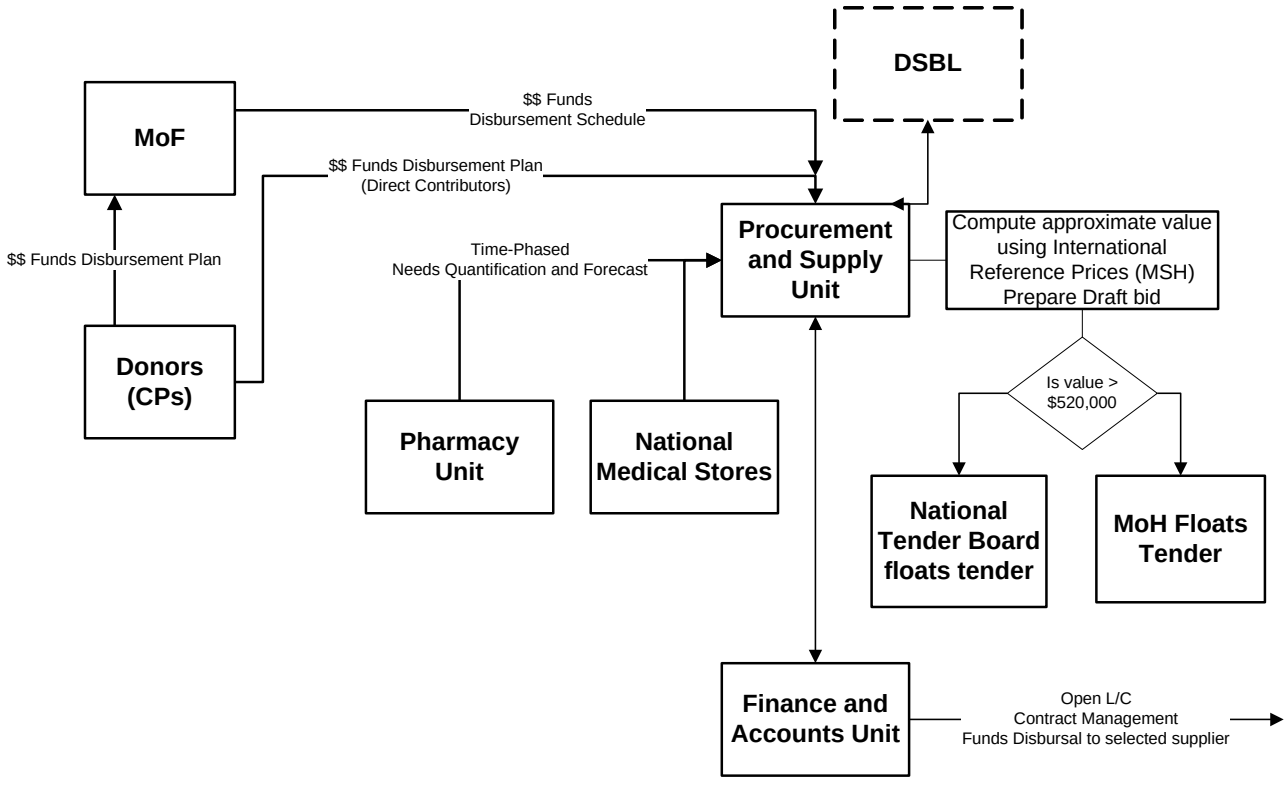

Figure 3: Public Sector Procurement Process in Zambia

The MoH procurement unit has started to utilize framework contracts with a few local suppliers to avoid the long lead-times (2 months to 8 months) associated with procuring through the regular international open-tender process. Such framework contracts also need to be setup with a few large international suppliers where the price and lead-time terms are set per a long-term contract and quantities to be shipped are communicated periodically. However, currently large donors do not permit such arrangements or it is viewed as a competition limiting measure by various others.[2]

Distribution

Medical Stores Limited (MSL) is the national medical store and it manages the storage and distribution of drugs for the MoH. The government has contracted out the management of MSL to Crown Agents. The MoH pays Crown agents a management fee to run the efficient working of MSL. Operating expenses are paid directly into the MSL account. Capital investments that were recommended by Crown Agents have been implemented and better physical infrastructure for storage and distribution now exists at the MSL. MSL currently has a staff of 85 including Crown Agents management personnel.

Each district is served once a month by MSL (some may require additional deliveries) in compliance with a preset schedule. All districts are required to place their orders before a preset date each month (hand-delivered or faxed) and then MSL prepares and ships the orders usually within a week if in stock. MSL has a fleet of 14 ten-ton trucks for delivery and fixed route plans for the deliveries are made every year and updated based on any new demand/ route information

The distribution system follows a pull-logic wherein shipments are based on actual demand off-take (or stock levels) at the districts and not a centrally developed forecast for each district. However medicine kits are supplied in a push manner and each district receives a certain number of kits every month.

Over 50% of the essential drug lines are usually in-stock at MSL. Every month MSL sends a stock-status report to all the districts. Also, many districts call MSL to confirm availability before placing an order. *If an item has been out-of-stock for a long period of time, panic over-ordering occurs whenever stock becomes available*. In such instances, the MSL planners often choose to deflate the order based on their discretion and estimates of more realistic demand levels. Specifying a budget for how much each district can order in a given month can help partially resolve the problem associated with panic over-ordering. On the other hand as the districts have access to the stock availability report, they choose not to order those items which they know are out-of-stock. This leads to censored demand information at the MSL and very gross estimates are then required to quantify the monthly need for those drugs.

[2] Purchases made through the GFTAM funding stream have to use a procurement agent (IDA).

Tom Brown at the MSL remarked “Orders are based on what people think they can get and not what they think they need. If they don’t have a chance of getting it, they don’t include it in their order”.

Upon receipt of drugs and medical supplies each district or hospital is supposed to send a Goods Received Note (GRN). However, this notification is not always received in time and systems to track this are weak. The districts are required to update their stock-control cards upon receipt. For ARVs many facilities are running JSI’s inventory and stock tracking system but its design features are suited only for ARVs.

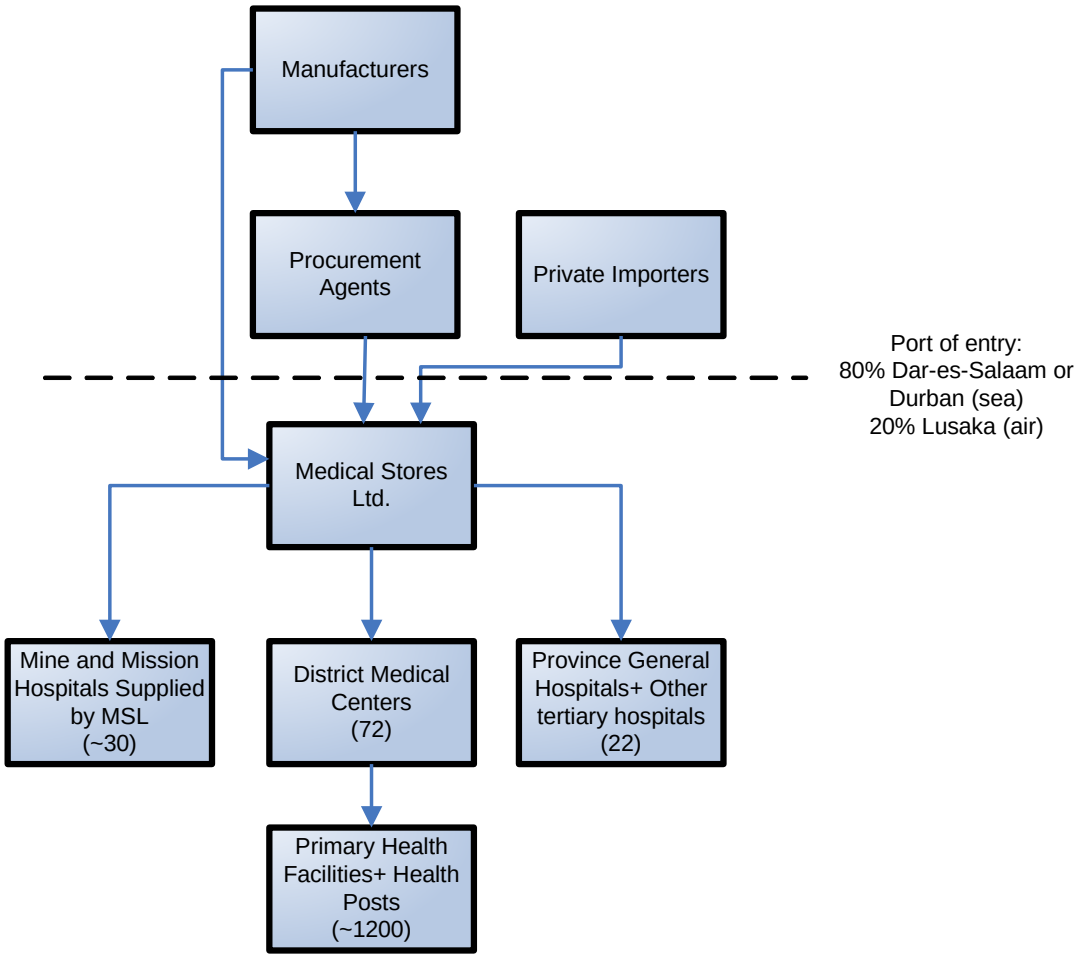

Figure 4: Public-Sector Distribution Chain in Zambia

There is poor visibility of the supply chain after the product is delivered to the districts. Periodic visits to the districts are made by the customer service teams of MSL. However, field audits on stock availability and product storage etc. are not in the mandate of MSL. Pilferage and wastage is reported to have occurred on many occasions at the district or primary health centers. Expired product does not return back to MSL and there is very little traceability to ensure that it is destroyed.

However, the biggest challenge in managing the distribution chain is that lead-times are highly unpredictable and long. The overall lead time to MSL includes the procurement lead time of MoH and the delivery lead time of supplier. High variability in lead time can be buffered only by holding higher safety stock at MSL. However budgetary constraints and the mandate for MSL to reduce operating costs prevent them from holding higher buffer stocks. The result is a higher frequency of stock-outs of essential drugs at the MSL.

4 Mission-Sector Supply Chain for Medicines

The Churches Health Association of Zambia (CHAZ) represents over 125 health facilities (97 member + 28 non-member) accounting for between 20-30 %[3] of health care in Zambia with this fraction being significantly higher in the remote rural areas of Zambia.

CHAZ carries out its own procurement, has its own central warehouse and arranges the distribution of its products for its member institutions. Many hospitals and clinics that purchase from CHAZ arrange to transport the drugs themselves from the central CHAZ warehouse in Lusaka.

CHAZ procures its drugs mainly from international non-profit procurement agencies. It floats restricted tenders to its pre-qualified suppliers for procuring drugs and medical supplies. Most of the purchases are obtained from either Mission Pharma or International Dispensary Association (IDA)[4]. CHAZ does not offer quantity discounts or credits to its buyers. It usually receives a 30 day credit from IDA or Mission Pharma on its purchases.

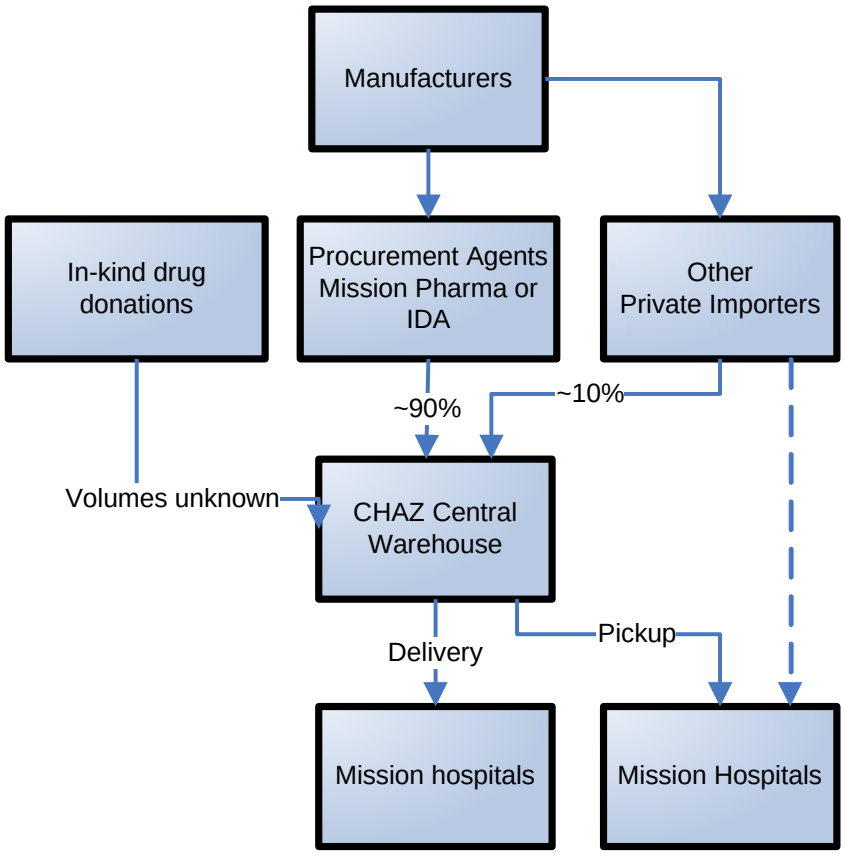

Figure 5: Mission-Sector Distribution Chain in Zambia

[3] WHO report puts this number at 33%.
[4] WHO report states 98% international and 2% local purchasing for CHAZ

Table 2 : CHAZ supply chain figures (Source Farmasøyter 2006, Wehrens 2007, CHAZ Report 2005)

Number of member tertiary hospitals served	34
Number of member primary health centers served	58
Number of member health posts	5
Non member health facilities	25
Total health facilities served	125
Number of warehouses	1 (in Lusaka)
Number of staff	34
Number of staff in warehousing and distribution	6
Vehicle Fleet	4+1 trucks
Variable costs	75%
Staff costs	8%

Table 2 : Cost structure of drugs in the mission sector (CHAZ)

Cost element	Drugs purchased	Drugs donated
Landed Cost (including handling+ freight)	100	0
Service Fee (15-30% depending on product)	15-30	30
Transport (borne by buyer) 3-10%[5] of original	3-10	3-10
Landed cost	125-140	40
Price relative to MSH median price	75%	-

Table 3 : CHAZ roles and functions

Activity	**Remarks**
Supplier selection and price negotiation	CHAZ selects from the two or three different procurement agents. It procures using a restricted tender from its pre-qualified suppliers.
Credit terms from suppliers	Receives 30 days credit from its suppliers
Credit terms to buyers	No credit provided
Inventory risk	Borne by CHAZ
Exchange rate risk	Passed on to customers
Transportation	Transportation is carried out by buyer
Quality Inspection	Carries out quality inspection

[5] Based on author's earlier estimates

5 Private-Sector Supply Chain for Medicines

Between 10-30% of the health care provided in Zambia is obtained in the private sector. Estimates varied considerably from respondent to respondent. The structure of the private sector supply chain is similar to that observed in most Low Income countries (LIC) with a few large importers and wholesalers bringing in drugs from international manufacturers or suppliers and selling them to retail pharmacies or drug outlets. In Zambia all wholesalers, importers and retail pharmacies must be registered with the PRA. The author does not have sufficient evidence to comment on whether or not this is strictly adhered to.

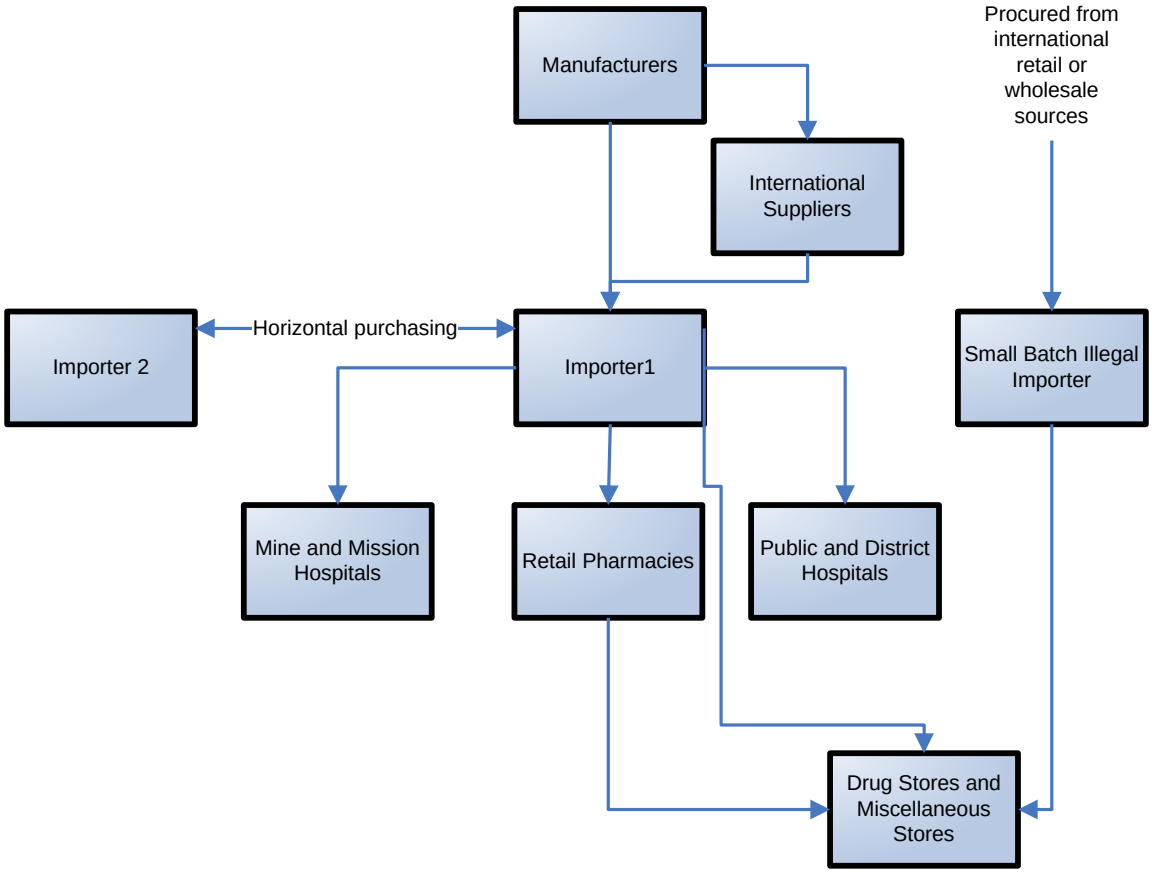

Figure 6: Private-Sector Distribution Chain in Zambia

Local manufacturing

There are 6 bonafide manufacturers with one or two that claim to have basic GMP compliance. Many of them have encapsulation and tableting capabilities. *Finished pharmaceutical products, Active Pharmaceutical Ingredients (API) and Intermediates can be imported into the country duty free; whereas excipients, inactive materials and packaging materials such as bottles, containers, ampoules etc. may carry an import duty up to 50%.*

There is also an import duty on machinery and capital equipment. *All of these factors lead to the cost of locally manufactured (or locally encapsulated or tableted) product much higher than imported finished product. The rationale behind the government's import duty policy is that some of the inactive ingredients are also utilized in the manufacture of non-pharmaceutical products (e.g. Lactose is a common inactive ingredient that finds uses in many consumer items) and there is little ability to trace and ensure the flow of a material once it has entered the country*. The local manufacturers are under-capitalized and have poor access to working capital to be able to execute large orders. They engage mostly in make-to-order production and work on a cash-to-cash cycle that minimizes working capital needs.

There are no multinational pharmaceutical companies that have any manufacturing operations in Zambia, and some of them are represented by local agents who register and distribute their products. Mission Pharma is known to have contracted out some of its manufacturing to a local company before.

Importers/Wholesalers

There are about 50 companies[6] that engage in the business of importing drugs into the country. Around 80-90% of these are wholesalers based in Lusaka who also import pharmaceutical products into Zambia. The remaining 10-20% are based in the urban centers of the Copperbelt province and some also have operations in Livingston. Many of the large importers are former manufacturers that have turned into importers due to poor profitability of local manufacturing in Zambia. *Although the number of players is large, almost 80% of the volume moves through 6 main importers/wholesalers*.

All companies that register themselves at the PRA as wholesalers and importers of pharmaceutical products are required to have suitable storage facilities in which the pharmaceutical products can be stored before distribution. PRA requirements also stipulate that all registered pharmaceutical establishments should have a professionally qualified pharmacist. *All pharmaceutical products imported into Zambia should be declared to the PRA and an approval of the proforma-invoice is required*. Again, the author does not have adequate information to validate if this is adhered to in entirety or the lack of policing and inspection staff at the PRA leads to importers with inadequate facilities/ staff; unregistered importers; or product being imported without proforma-invoice approval from the PRA.

The majority of the pharmaceuticals imported by the private sector come from India, followed by UK[7], Germany, South Africa, Holland and Belgium.

[6] Some respondents put this number at 60.
[7] Suppliers from UK consist of international distributors of multinational pharma companies

Often times, the importers trade among each other leading to large horizontal flows within the supply chain. For example a particular importer/wholesaler may have good relationships with one private hospital or a mine hospital. All product enquiries originating from this hospital naturally are routed to the importer/wholesaler with which they have an existing relationship. If this particular importer/wholesaler does not have the product in stock or does not have a relationship with the manufacturer of that product, he in turn procures it from his competition and fulfills the order. Similarly, since many importers/wholesalers are also owners of more than one retail pharmacy, they end up buying from each other for different product needs. Most importers have relationships with specific manufacturers for high volume products (e.g. one importer stocks anti-malarials from Aurobindo Pharma, another from Ajanta Pharma or Novartis etc.). *For low volume therapeutic categories, some importers do not source from a manufacturer but instead buy from another importer within Zambia who may specialize in importing that product category. This leads to purchasing and in-bound logistical efficiencies for low volume therapeutic categories. Hence, 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 atleast 30 day (sometimes 45 days) credit from their suppliers. 20% upfront payment + 30 days credit for the remaining portion were stated as the credit terms obtained from their suppliers by some importers. One importer/wholesaler (who also owns over 3 retail pharmacies) described having a sourcing company established in Mumbai, India to buy on his behalf at local prices and then import the product to Lusaka, Zambia.

The importers/wholesalers make deliveries to retail pharmacies and private hospitals (also dispensaries?) in Lusaka and in the urban centers of the Copperbelt province. For such deliveries they bear the transportation costs and some of them have their own vehicular fleets (some others use third-party delivery companies). Private hospitals and drug stores from smaller towns come to Lusaka to buy drugs from the private importers/wholesalers. Missionary hospitals come to Lusaka to buy from the CHAZ facility and many end up buying those products that are not in stock at CHAZ (or are not on their supply list) from the private importers/wholesalers. Some mine hospitals that buy from the importers/wholesalers require delivery which is often outsourced to a third party transport company.

Most importers hold some inventory to either create in-bound logistics efficiency or to have a competitive edge in quoting lead times to fulfill orders from their clients. Large volume orders however require them to purchase from their supplier as their in-stock inventory is usually very low.

15-20% of the input cost is freight and handing charges. Typical markup in the wholesale/import business varies between 10-40%[8]. It is highly dependent on the product category (insulin vials vs. antibiotic capsules) as the range or services and transport options depend on that. One respondent[9] mentioned the existence of cross-subsidies across clients wherein a wholesaler has to supply cheap to maintain its relationship commitments with a client and compensates it by higher markups with another.

The importers/wholesalers provide 30 days credit to their large clients. This is often done using the system of post-dated checks. For smaller customers they do not offer credit terms and require upfront payments.

The importers/wholesalers do not provide any structured or formally stated quantity discount to the retail chemists or hospitals that purchase from them. They claim that the payment records of the retail chemists and hospitals are very bad to offer them any form of quantity discount. However, product pricing negotiation does get influenced to some extent with the quantity purchased.

Wholesaler//Importers can strongly influence prescribing behavior of the retail chemists. One importer cited the example of how their company engaged in educating the doctors about use of new forms of Insulin. "*Supply capacity is in our hands so we can undoubtedly influence the retailers" remarked a large importer.*

In addition to the registered importers and wholesalers, drugs are also brought into the country in small batches by some who travel frequently to South Asia. *These drugs make their way quickly to the retail outlets in the outlying rural areas or peripheral areas of Lusaka*. There are also some drugs that enter Zambia from South Africa, Tanzania and Zimbabwe through one of its many borders. This parallel market is however mostly restricted to cheap over-the-counter (OTC) drugs and anti-malarials[10].

Pharmacists and Retail Chemists

There are around 40 retail pharmacies in Zambia. Out of which 25 are in Lusaka. Many of these pharmacies are owned by wholesalers/importers but some continue to be independent pharmacies that purchase from the wholesaler/distributors. These "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.

[8] See Figure 8 later in this document
[9] Not directly from the import/wholesale industry
[10] ACTs are technically still prescription only drugs in Zambia.

Apart from retail pharmacists there are drug stores that are allowed to dispense OTC drugs but in reality they also dispense various prescription drugs. In addition some private hospitals and clinics also dispense medicines.

There is no pricing control on drugs and prices at the retail level are determined by the market forces. A markup of 30% is minimal at the retail level. Bulk-breaking (for example tablets in jar) leads to extremely high markups as high as 300%. A few examples of markups are provided in Tables 4 and 5. *The key determining factors for retail markups are the intensity of competition in the region* (e.g. Cairo Road Lusaka has higher intensity vs. peripheral Lusaka) and *origin/quality perception of the drug* (Asian drugs fetch a lower retail price than European manufactured drugs).

Pharmacies employ one or two pharmacy technicians who are salaried employees. This along with real-estate cost forms the largest portion of the overhead cost for the pharmacy. Except for the price paid to the wholesaler, *variable costs are very small fraction of the cost structure at the pharmacies*. A typical pharmacy technician makes anywhere between 1.2M to 5M ZK a month.

There is some presence of sales reps from either the pharmaceutical company (Novartis, Ajanta Pharma, CIPLA were mentioned more than once) 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.

Due to the wide range of products in pharmacies, it was not possible to ask the wholesale source of individual products.

Table 4: Examples of high markups observed in the supply chain

	Product type (anti-biotic vial)	Product type (anti-rabies vaccine)
Input price	1200 ZK	100,000 ZK
Wholesaler price	3000 ZK	150,000 ZK
Retail price	7000-9000 ZK	600,000-800,00 ZK

Table 5: Retail prices of anti-malarials purchased/observed by author

Product	Manufacturer	Retail Price1	Retail Price2	Retail Price3
Coartem® 20/120 AL	Novartis (Beijing, China)	37,000 ZK	50,000 ZK	40,000 ZK
Co-Arinate® (3 day dosage) AS+ SP	Dafra Pharma(Belgium)	43,000 ZK	-	
Novidar Plus® (3 day dosage) AS+ SP	Pharmanova Ltd, (Lusaka, Zambia)	-		
Pharmadar® SP	Glumex Pharma (India) (marketed by Pharma Plus , Lusaka)	1,000 ZK		
Artefan® AL	Ajanta Pharma (Mumbai, India)	18,000 ZK	25,000 ZK	
Artesunate	Denk Pharma, Germany	35,000 ZK		

If the price (of Coartem®) falls too much, after a certain point they(customers) will stop buying it thinking it is fake. – Pharmacist in Lusaka

Volume Dependent vs. Volume Independent Costs In the Private Sctor Suppy Chain						
Player	Cost Element	Fixed → Variable				Remarks
Importer/Wholesaler	Unit FOB Price				■	Manufacturer's FOB price is usually quantity dependent bt higher volumes allow better price negotation
	Sea/Air Freight		■			For medium to small volume shipments freight costs are not strongly dependent upon volume
	Insurance				■	Insurance is on value of shipment
	Duties/VAT				■	Duties and VAT is on value of shipment
	Clearance Fees			■		Fee paid to agent for Port Clearance.
	Administrative Cost	■				Staff involved in negotiation and processing of paperwork
	Transport			■		Transport Costs for Port to Primary Warehouse transport
	Warehousing Costs	■				Rent (including utilities),maintennace, salaries, pilfrage
Pharmacies						
	Taxes and Misc.overheads			■		Activities and cost directly attributable to filling a prescription
	Warehousing Costs	■				Rent (including utilities),maintennace, salaries, pilfrage
	Administrative Costs	■				Costs for staff involved in Negotiation,Ordering, Pricing, Marketing & Stock Mgt

Figure 7: Volume dependence of costs in the private sector supply chain

Table 6: Roles and mark-up assessment for the private sector supply chain

Player	**Activities Carried Out**	Average markup
Importer/Wholesaler		25%
	Forecasting/Order Consolidation Supplier identification based on lead time, price, brand Price negotiation with suppliers Facilitate product clearance at point of entry Warehousing at primary location Distribution to secondary locations Stock management Pre-financing (pays supplier but does not recieve advance from buyer) Quality control Assume risk of overstock and expired product	
Pharmacies		120%
	Wholesaler Selection (where no fixed contracts or backward integration exists) Develop marketing materials Advise/Prescribe/Dispense appropriate of drugs Inventory levels, stock control (e.g losses) Assumes risk of overstock and expired product	
General Stores		?
	Identify supply source Process order with supply source Transport ACTs to store Credit Terms to Customer Assumes risk of overstock and expired product	

Appendix

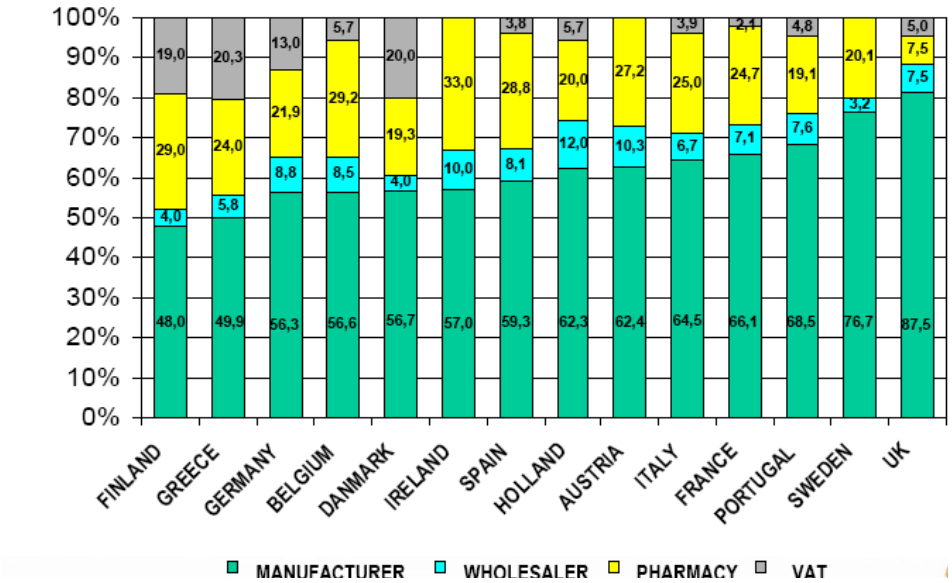

Figure 8: Supply Chain Margins in EU member states (for use as a reference benchmark). Source: Alliance Unichem

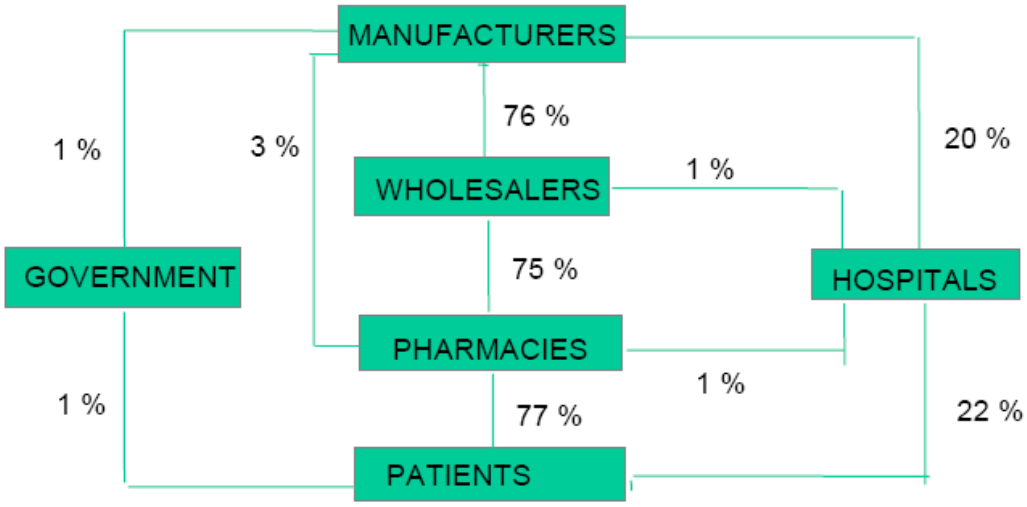

Figure 9: Supply Chain for Medicines in Spain (for use as reference benchmark). Source: Alliance Unichem, farmaindustria 2004 report and author's work.

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