CHAPTER 6

UTILIZATION, AVAILABILITY AND STOCK-OUTS OF MEDICINES IN RAJASTHAN FACILITIES

6.1. INTRODUCTION

Ensuring availability of essential medicines has been a major challenge for developing countries.[21] Several studies have revealed the glaring gaps between the need and availability of basic medicines at public facilities, especially at the primary level. A few studies from India also tend to support this evidence.[7, 21 & 22] Several studies in the past have pointed out that inadequate funding, inefficient financing mechanisms and unreliable drug procurement and distribution mechanisms lead to unavailability of medicines at public facilities. Recent evidence from Tamil Nadu suggests that a centralized procurement and decentralized distribution system can ensure availability of medicines in public facilities even with moderate levels of spending.[23] A comparison of availability of medicines at CHCs of Tamil Nadu and Bihar shows that mean availability of medicines in Tamil Nadu is double (88%) compared to Bihar (43%). The study also shows that an efficient procurement and distribution system reduces the average number of days of stock-out and also ensures improved availability of important categories of medicines such as antibiotics and antipyretics.

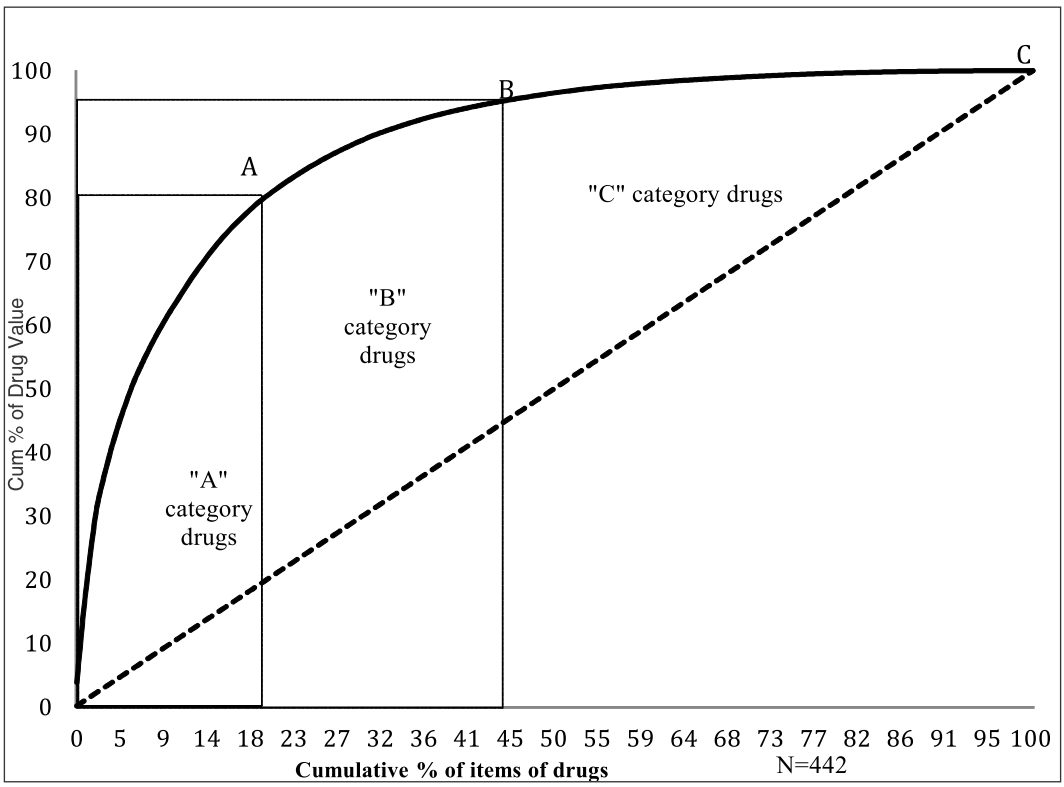
Some of the key elements of an efficient procurement and distribution system include: (a) selection of essential medicines that reflect policy priorities and community needs in accordance with the respective disease burdens; (b) transparent bidding process that ensures competition, quality and value for money; (c) timely release of payments to suppliers to ensure continuous supply of medicines; (d) incorporating checks and balances with the suppliers; and (e) adequately stocked warehouses and clear rules and guidelines enabling the medicines to be supplied to facilities where medicines are most needed.[23] In this chapter, we analyse the pattern of utilization and distribution of medicines as well as measuring availability.

6.2. ABC ANALYSIS OF DISBURSEMENT OF MEDICINES

It is often found that a small number of items account for a large proportion of the total value of annual consumption. The analysis of this phenomenon is called "Pareto analysis" or more commonly "ABC analysis", where "A" items account for large proportion of the value of the annual consumption (say 80%), and "B" and "C" items account for a moderate (15%) and small (5%) proportion of value of the annual consumption, respectively. ABC analysis can be a useful tool to analyse data on selection, procurement and disbursement of medicines. For example, ABC analysis on procurement data may have the objective of justifying or improving the inventory management system. Similarly, ABC analysis of drug disbursement data can be used to get an idea of the annual consumption pattern of medicines in a particular health system. In most health systems of developing countries, actual medicine consumption data are not available. Hence, a majority of the studies on health systems of developing countries are found to have used ABC analysis using procurement data (where weighted average of tender prices and quantity have been used) to calculate the estimated value of the procured medicines. Unlike other health systems in developing countries, however, Rajasthan does have annual medicine disbursement data. RMSC has been doing centralized medicine procurement and localized (through public health facilities) distribution since October 2011. In the process, RMSC maintains the data on value of annual disbursement (consumption) of medicines in its *e-Aushadi* database. In the next section we will use disbursement data for our ABC analysis to identify those medicines that account for a major share of the value of annual disbursement (or consumption) of medicines in Rajasthan. We will also identify category "A" medicines disbursed in 2012–13 to identify their therapeutic category to gather a better idea about drug consumption patterns in Rajasthan.

During the year 2012–13, 442 medicines were disbursed by RMSC via 34 district drug warehouses (DDWs) located in 33 districts of Rajasthan (Jaipur district has two warehouses). Of the total value of medicines disbursed by RMSC, 51% are distributed in seven districts (Jaipur Urban, Jodhpur, Bikaner, Udaipur, Kota, Ajmer and Alwar). ABC analysis on medicine disbursement data reveals that of the medicines disbursed through the Rajasthan public health system during 2012–13, 20% of medicines disbursed (89 medicines) accounted for 80% of the value, 26% of medicines disbursed (113 medicines) accounted for 15% and 54% of medicines disbursed (240 medicines) accounted for 5% of value of medicines, totalling 442 medicines in all. We can thus say that 89 medicines are in category "A", 113 are in category "B" and 240 are in category "C" (Fig. 6.1 and Table 6.1).

Fig. 6.1. ABC analysis of expenditure on medicines



Source: Author's calculation based on e-Aushadi database – consolidated issue details (2012–13), RMSC, Rajasthan

Table 6.1. ABC analysis of RMSC drug issue (2012–13)

	Category			Total
	A	B	C	
Number of items	89	113	240	442
Percentage of all items	20	26	54	100
Value of annual distribution (10 million ₹)	150	28	8	187
Percentage of total annual distribution	80	15	5	100

Source: Extracted from e-Aushadi database – consolidated issue details (2012–13), RMSC, Rajasthan

Of the 442 medicines used during 2012–13, 384, 437 and 403of the types of medicines have been used in the primary, secondary and tertiary levels of care, respectively (Table 6.2). For each level of care, roughly 20% of medicines account for 80% of the total value of medicines distributed through that particular level of care, validating the Pareto principle of distribution.

Table 6.2. Distribution of medicines by ABC categories and levels of care

ABC Category	Items/value of medicines	Unit	Level of Care		
			Primary	Secondary	Tertiary
Category A	Items of Medicines	Number	77	88	88
		Percentage	20.1	20.1	21.8
	Value	10 million `	31	110	11
		Percentage	80.3	80.9	80.9
Category B	Items of Medicines	Number	104	113	108
		Percentage	27.1	25.9	26.8
	Value	10 million`	6	20	2
		Percentage	15.3	14.7	14.7
Category C	Items of Medicines	Number	203	236	207
		Percentage	52.9	54	51.4
	Value	10 million INR	2	6	1
		Percentage	4.4	4.4	4.4
Total	Items of Medicines	Number	384	437	403
		Percentage	100	100	100
	Value	10 million INR	38	136	14
		Percentage	100.0	100.0	100.0

Source: Extracted from *e-Aushadi* database – consolidated issue details (2012–13), RMSC, Rajasthan

From Table 6.2, we can also observe that at the primary health-care settings, 20.1% of drug items are in category "A", whereas at the secondary and tertiary levels, 20% and 22% of medicines are in category "A". Often, a sub-set of these "A" category medicines are prescribed and dispensed due to its essential nature.

We next extend this analysis to examine the therapeutic composition of category "A" medicines at different levels of care.

6.2.1 ANALYSIS OF CATEGORY "A" MEDICINES BY THERAPEUTIC CLASSIFICATIONS

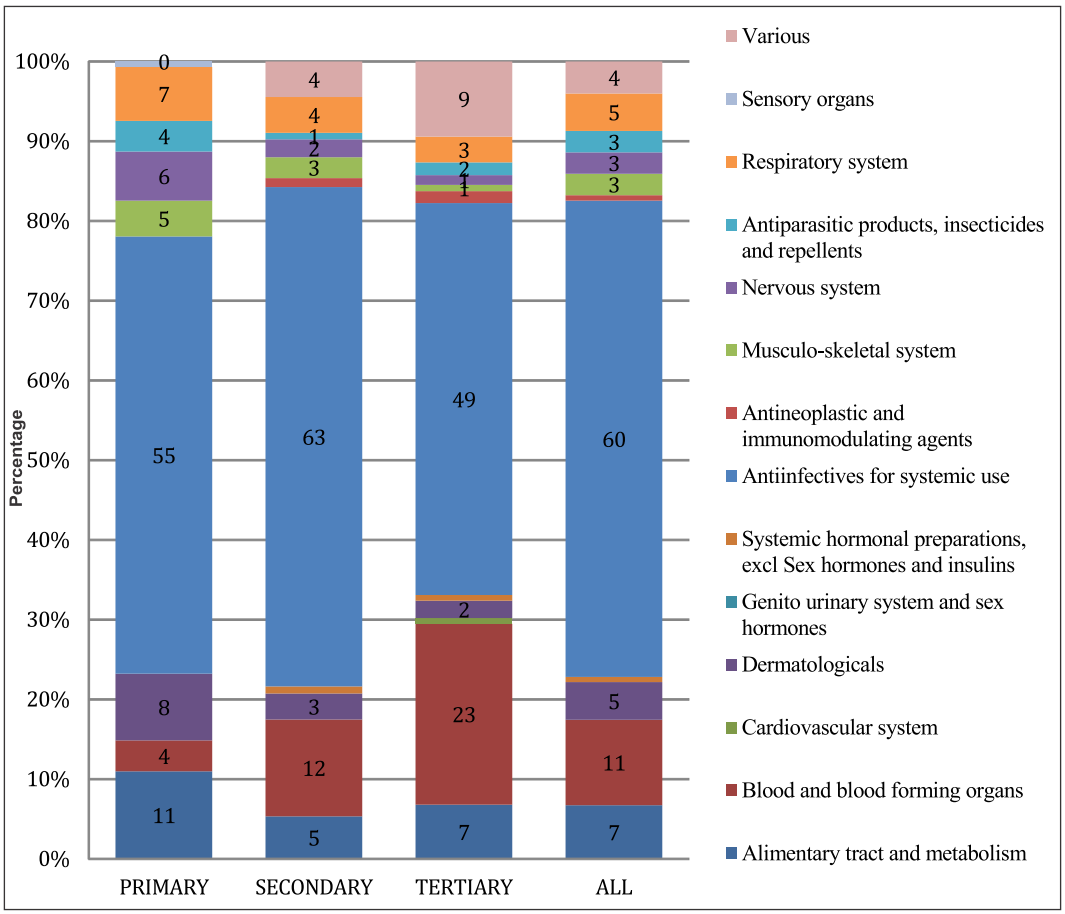
An examination of "A" category medicines reveals that 89 medicines which fall into this category are anti-infective for systemic use (super group J of ATC). From this category, 55%, 63%and 49% of "A" category medicines are disbursed at the primary, secondary and tertiary health-care level, respectively (Table 6.3, Fig 6.2). In a drug disbursement mechanism where the procurement is on an annual basis and based on the lowest bid tender system, the value of disbursement can be taken as the volume of demand (or expected consumption demand in the inter-procurement period).

Table 6.3. Distribution of "A" category medicines across therapeutic super group categories

ATC super group	Therapeutic category	Value of "A" category medicines (%)			
		Primary	Secondary	Tertiary	All
A	Alimentary tract and metabolism	11	5	7	7
B	Blood and blood forming organs	4	12	23	11
C	Cardiovascular system	0	0	1	0
D	Dermatological	8	3	2	5
G	Genito-urinary system and sex hormones	0	0	0	0
H	Systemic hormonal preparations, excluding sex hormones and insulin	0	1	1	1
J	Anti-infective for systemic use	55	63	49	60
L	Antineoplastic and immune modulating agents	0	1	2	1
M	Musculo-skeletal system	5	3	1	3
N	Nervous system	6	2	1	3
P	Ant-parasitic products, insecticides and repellents	4	1	2	3
R	Respiratory system	7	4	3	5
S	Sensory organs	1	0	0	0
V	Various	0	4	9	4
	Total value (10 million Indian rupees)	**31**	**107**	**11**	**149**

Source: Extracted from *e-Aushadi* database – facility-wise issue details (2012–13), RMSC, Rajasthan

Fig. 6.2. Therapeutic super group distribution of "A" category medicines



Source: Extracted from *e-Aushadi* database – facility-wise issue details (2012–13), RMSC, Rajasthan

We see that among the "A" category medicines, the highest demand is for medicines falling in the therapeutic category "anti-infective for systemic use" across all levels of care. We also see that at the primary health-care level, therapeutic category "A" (alimentary tract and metabolism) comprises 11% of value of "A" category medicines. At the secondary and tertiary levels, therapeutic category "B" (i.e. blood and blood forming organs) forms the second-largest share in total value of category "A" medicines. These are the second most distributed medicines across various levels of facilities.

6.2.2 DECOMPOSITION OF THERAPEUTIC CATEGORY J (ANTI-INFECTIVE FOR SYSTEMIC USE)

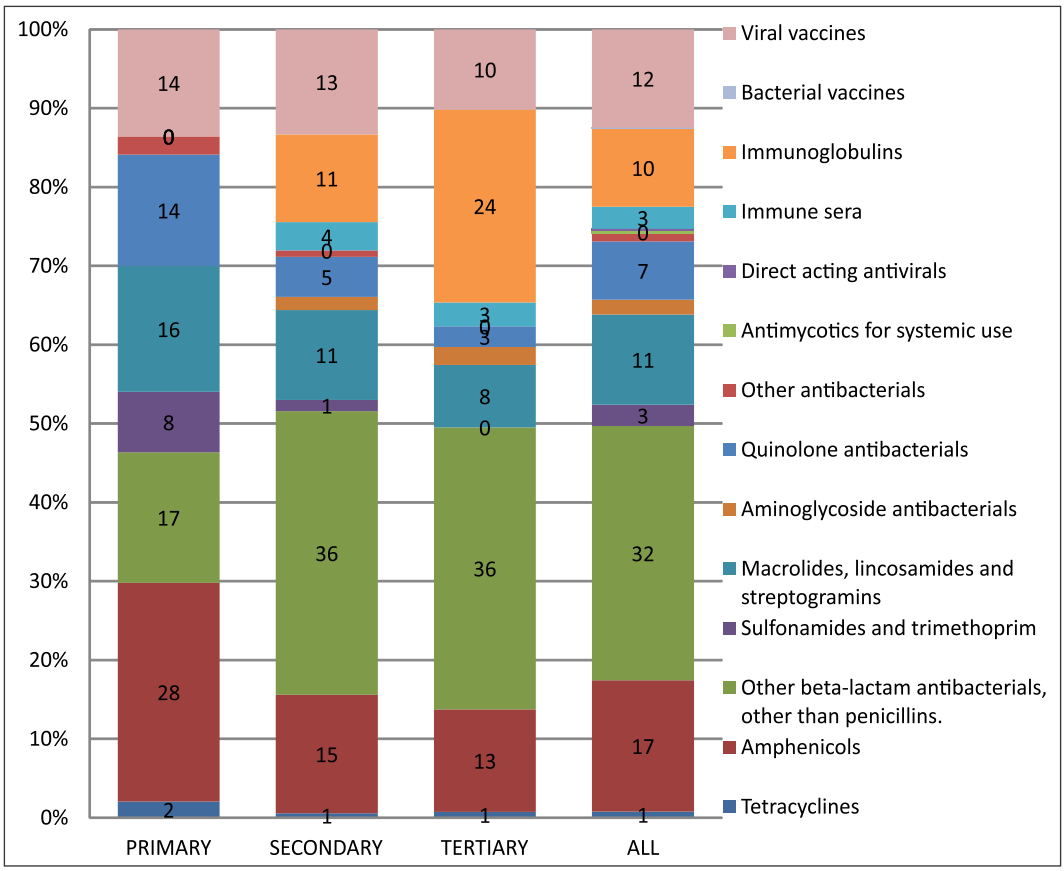
We next see the decomposition of this category at different health-care levels at the therapeutic/pharmacological subgroup level (third level ATC – called "J" category of medicines) (Table 6.4 and Fig. 6.3).

Table 6.4. Decomposition of therapeutic category "J" across different health-care levels

ATC	Therapeutic category	Value of medicines (%)			
		Primary	Secondary	Tertiary	All
J01A	Tetracyclines	2	1	1	1
J01C	Amphenicols	28	15	13	17
J01D	Other beta-lactam antibacterials (other than penicillin)	17	36	36	32
J01E	Sulfonamides and trimethoprim	8	1	0	3
J01F	Macrolides, lincosamides and streptogramins	16	11	8	11
J01G	Aminoglycoside antibacterials	0	2	2	2
J01M	Quinolone antibacterials	14	5	3	7
J01X	Other antibacterials	2	1	0	1
J02A	Antimycotics for systemic use	0	0	0	0
J05A	Direct acting antivirals	0	0	0	0
J06A	Immune sera	0	4	3	3
J06B	Immunoglobulins	0	11	24	10
J07A	Bacterial vaccines	0	0	0	0
J07B	Viral vaccines	14	13	10	12
	Total value (10 million Indian rupees)	**17**	**67**	**5**	**89**

Source: Extracted from e-Aushadi database – facility-wise issue details (2012–13), RMSC, Rajasthan

Fig. 6.3. Decomposition of therapeutic category "J" (anti-infective for systemic use)



Source: Extracted from *e-Aushadi* database – facility-wise issue details (2012-13), RMSC, Rajasthan

Further, the evidence from the table and figure above reveals that other beta-lactam anti-bacterial medicines (J01D) accounts for 32% of the value of all category “A” medicines that fall under super group “J”. In primary health-care settings, such medicines constitute 17% of the total value of medicines. At the secondary and tertiary health-care levels, such medicines account for 36% each. The analysis further shows that amphenicols (J01C) accounts for the second largest share in the total value of the “J” super group category. Viral vaccines (J07B) take the third largest share. While the vaccine is largely in use at the secondary health-care level, it is also being used in primary and tertiary health-care levels. At the tertiary health care level, immunoglobulins (J06B) account for a relatively larger share in the total value of category “A” anti-infective for systemic use (J super group) medicines.

The success of any medicine procurement and distribution system partly depends on inventory management and supply chain management. The ABC analysis of disbursement of drug value shows that the value of medicines disbursed in 2012–13 is inclined to a particular therapeutic category (ATC "J"), i.e. anti-infective for systemic use at all levels (primary, secondary and tertiary) of care. On an average, at all levels of care, such medicines comprise 50% of the value of all medicines disbursed. Further disaggregation of this particular therapeutic category shows that amphenicols (J01C) and other ß-lactam antibacterials (other than penicillin) accounted for 50% of value of therapeutic category "J" medicines disbursed at all levels of care. The rationale behind such a high use of antibacterials can be a further research question, especially at lower levels of care.

6.3 AVAILABILITY AND STOCKOUT

In this section we analyse the availability and stock-out of medicines from the survey data. The current study was aimed at generating evidence on availability and stock-outs across various levels of government facilities and districts in Rajasthan. For this purpose, 112 government facilities spread across 10 districts were surveyed. The surveyed facilities included one medical college, 10 district hospitals, 34 CHCs and 67 PHCs. Data on availability of medicines on the day of survey and medicine stock-out position for the last six months were collected from each of the facilities by administering a structured questionnaire.

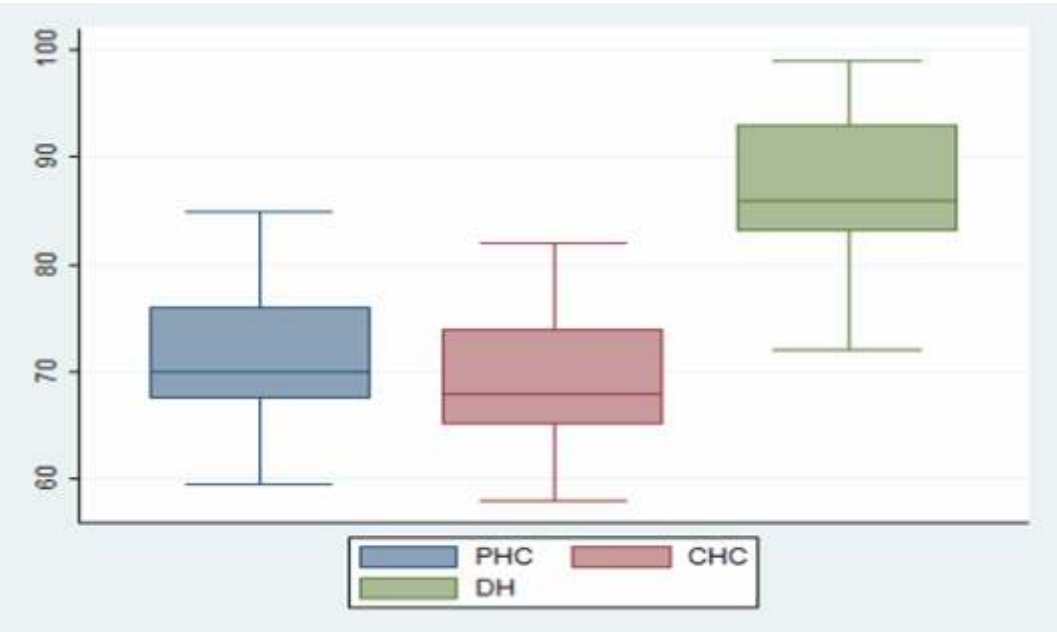
For the purpose of this study, the basket of medicines has been identified from the NLEM and the State EML. Around 160 medicines under different therapeutic categories were identified and segregated based on availability of such medicines at different levels of care as suggested by national public health guidelines. We identified 92 medicines at the primary level, 132 medicines at the secondary level and 160 medicines at the tertiary-care level, i.e. super specialty hospital attached with a medical college. However, not all of these medicines were procured by RMSC. RMSC allows local purchase of 10% of the allocated budget. In order to capture availability of medicines that have been procured by RMSC, we have excluded those medicines from the list which were not procured by RSMC. As a result, there were 55 medicines which were relevant for the PHCs, 99 medicines relevant for CHCs and 123 medicines for district hospitals. We have used generic names of medicines to maintain uniformity in information. The medicines were also further segregated based on dosage and types (injectable, tablets/capsules, suspension). For the purpose of our analysis we have also segregated medicines based on the ATC Classification System as per WHO guidelines.

6.3.1 AVAILABILITY AND STOCK-OUT ACROSS DISTRICTS

Through the survey, we have tried to capture the district level variations in the availability of medicines. We have also captured the number of medicines available on the day of survey. We studied the average number of medicines available on the day of survey across PHCs, CHCs and district hospitals. This also includes medicines which are not part of our survey tool. It is quite encouraging to see that on an average more than 100 medicines are available at PHCs across districts. Similarly, at CHC level, 180 medicines are available on an average. The average number of medicines available at district hospitals is more than 300. However, in order to standardize results we have also measured availability using our survey tool.

As per our survey tool average, availability of medicines at a PHC is around 70% (Fig. 6.4). Availability at the CHC level is slightly less than 70%, whereas at the district hospital level the availability increases to 88%. There is significant variation across districts, especially in the case of PHCs. For instance, in Bikaner 85% of the required medicines are available at the PHC level (Table 6.5), whereas in Udaipur the availability is less than 60%.

Fig. 6.4. Average percentage of medicines available by levels of care



DH – district hospital
Source: Authors' calculation based on primary survey data

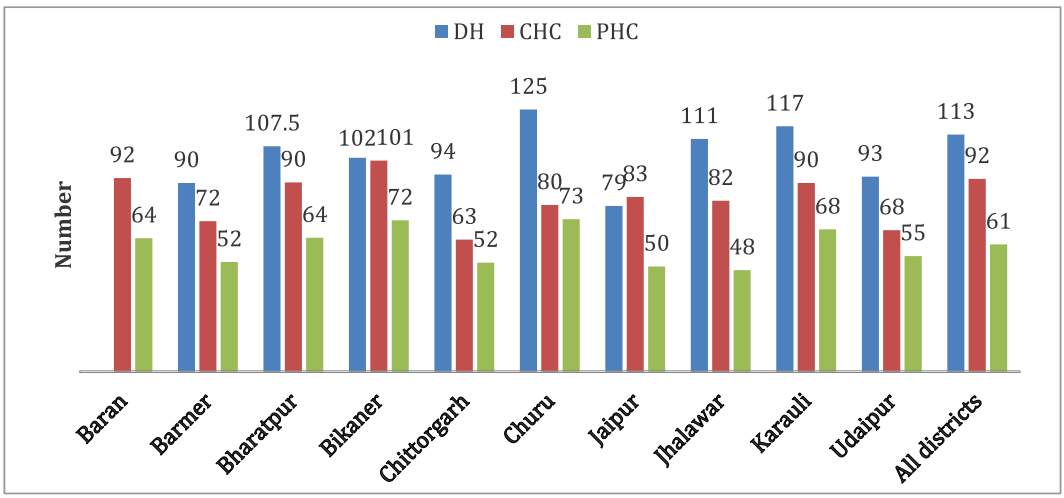
Table 6.5. Percentage of EML medicines available on the day of survey by districts and levels of care

	PHC(%)	CHC(%)	DH(%)
Baran	74.8	72	82
Barmer	64.9	63	72
Bharatpur	77.8	75	83
Bikaner	85	82	85
Chittorgarh	67.4	65	87
Churu	67.8	66	93
Jaipur	69	67	85
Jhalawar	71.2	69	99
Karauli	76.1	74	99
Udaipur	59.5	58	91
All Districts	71	69	88

Source: Authors' calculation based on primary survey data

For the medicines which were not available on the day of survey but had been supplied over the past six months, we have tried to capture the average duration of stock-out (86 days). Bikaner, which had high availability, also had least days of stock-out (44 days on an average). However, Karauli which had 57% of EML medicines available (87 medicines), also had the highest number of days of stock-out (117) (Fig. 6.5). The other district with more than 100 days of stock-out on an average is Barmer, which also has the least availability.

Fig. 6.5. No. of EML medicines available (on the day of survey) across facilities in ten survey districts



Source: Author's calculations based on primary survey data

6.3.2 AVAILABILITY AND STOCK-OUT OF MEDICINES BY THERAPEUTIC CATEGORIES

We classified medicines as per their therapeutic categories to examine the aspects of availability and stock-outs in a more systematic manner. We then coded the 160 medicines in the survey tool using the ATC Classification System. ATC is an internationally recognized scientific coding system of medicines which allows us to compare availability across various settings. Of the various levels of coding, we have used the super group here, which is at the first digit (Table 6.6). The highest number of medicines in the survey tool belongs to "nervous system" (N) related medicines (24) and "alimentary tract and metabolism" (A). Both of these are largely part of the medicines required to be available at the primary level. The other important category of medicines is "anti-infective for systemic use" (J) which is meant for tertiary and secondary levels. Of the 92 medicines required for the primary level, 44 belong to three super groups namely, "alimentary tract and metabolism" (19), "nervous system" (15) and "respiratory system" (R) (10).

Table 6.6. Categorization of medicines into super groups of ATC: survey tool medicines

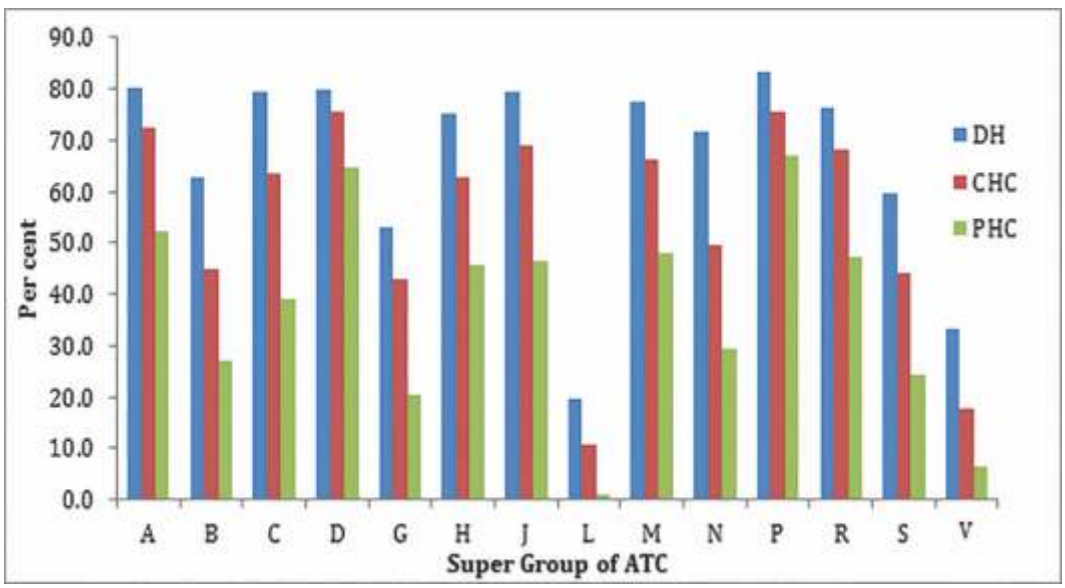
Code	Super group	No of medicines in the survey tool	Primary	Secondary	Tertiary
A	Alimentary tract and metabolism	24	19	4	1
B	Blood and blood forming organs	14	6	5	3
C	Cardiovascular system	14	8	6	0
D	Dermatological	6	6	0	0
G	Genito-urinary system and sex hormones	9	4	0	5
H	Systemic hormonal preparations, excluding sex hormones and insulins	8	5	2	1
J	Anti-infectives for systemic use	23	7	11	5
L	Antineoplastic and immune-modulating agents	7	0	1	6
M	Musculo-skeletal system	4	2	1	1

N	Nervous system	24	15	6	3
P	Antiparasitic products, insecticides and repellents	6	5	1	0
R	Respiratory system	12	10	2	0
S	Sensory organs	6	3	1	2
V	Various	3	2	1	0
	Total	**160**	**92**	**41**	**27**

Source: Authors' calculations based on primary survey data

In Fig. 6.6, we outline the availability of medicines across different super groups and at various survey facilities. For all the categories, the percentage of medicines available at district hospitals is higher compared to CHCs and PHCs. Availability is particularly low for "antineoplastic and immune-modulating agents" (L) and "genito-urinary system and sex hormones" (G) medicines. At the primary level, "antiparasitic products, insecticides and repellents" (P) and "dermatological" (D) are the ones with the highest levels of availability. Though "alimentary tract and metabolism" (A) and "nervous system" (N) constitute the largest part of the drug basket at PHCs, their availability is low in comparison to that in CHCs and DHs.

Fig. 6.6. Availability of medicines according to ATC classification by levels of care (%)

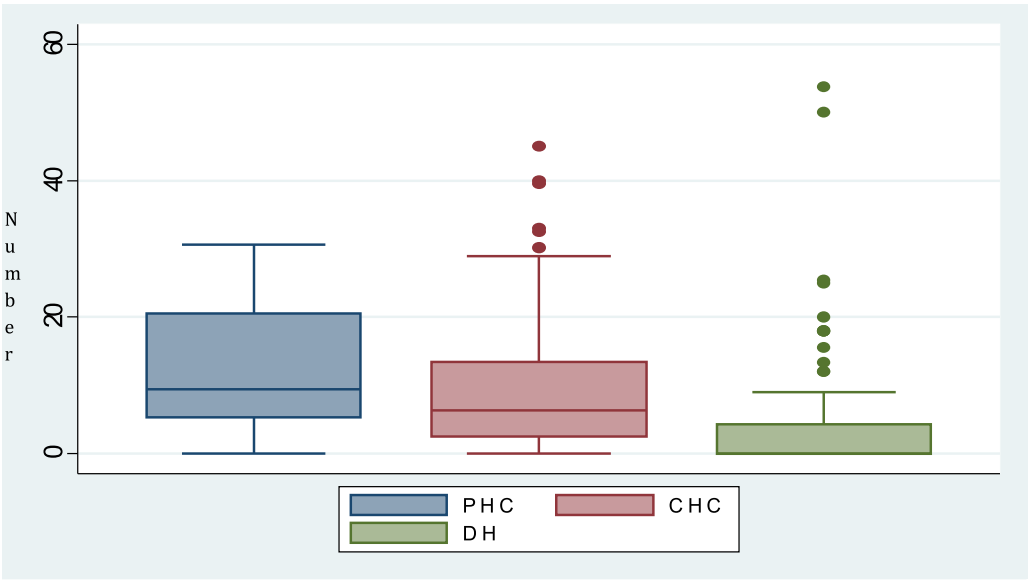


Source: Authors' calculation based on the primary survey data

6.3.3. STOCK-OUTS BY FACILITIES AND THERAPEUTIC CATEGORIES

Analysis of the survey on stock-outs shows low levels of stock-outs for most medicines. In order to calculate the stock-out of medicines at various levels of care, we included some questions in the questionnaire. If a particular drug was not available on the day of survey, we checked the drug register to find out if the drug was ever supplied in the past six months, and if so, for how many days was there a stock-out. As was done for the availability analysis, here too we have considered medicines which are part of the RMSC EML and are also appropriate for a particular level. Fig. 6.7 shows the average number of days of stock-outs at PHCs, CHCs and district hospitals. Clearly,the average stock-outs are quite low at every level. For instance, the average stock-out among 55 medicines for PHCs that were part of the survey tool as well as procured by RMSC for the primary level was 12 days. The highest stock-out was 31 days for a particular drug. Similarly, for CHCs and DHs the average stock-out was 10 days and four days, respectively. The maximum stock-out in the CHCs and district hospitals was 45 and 58 days, respectively. We have further categorized medicines into various therapeutic super-groups to understand if certain therapeutic groups have stock-outs. The results (Table 6.7) show that none of the super-groups have stock-outs of more than 23 days across various levels of care. At the PHCs, the highest stock-outs were found in the case of musculo-skeletal medicines (18 days) and cardiovascular medicines (17days). At the CHC level, sensory organ related medicines have the highest stock-out of 23 days and at district hospital level the highest stock-out was in the case of antineoplastic and immune-modulating agents (12 days).

Fig. 6.7. Average number of days of stock-outs at PHCs, CHCs and district hospitals



Source: Authors' calculation based on primary survey data
Note: dots indicate outliers

Table 6.7. Average number of days of stock-out across therapeutic categories and facilities

ATC level 01	Super group	PHC	CHC	DH
A	Alimentary tract and metabolism	10	8	3
B	Blood and blood forming organs	13	14	6
C	Cardiovascular system	17	10	5
D	Dermatologicals	6	3	0
G	Genito urinary system antd sex hormones	11	6	7
H	Systemic hormonal preparations, excluding sex hormones and insulins	15	17	4
J	Anti-infectives for systemic use	12	7	5
L	Antineoplastic and immune-modulating agents			12
M	Musculo-skeletal system	18	9	2
N	Nervous system	8	9	2
P	Antiparasitic products, insecticides and repellents	9	9	0
R	Respiratory system	12	7	5
S	Sensory organs	4	23	6
V	Various	23	0	1

Source: Authors' calculation based on the primary survey

6.4 KEY OBSERVATIONS

The foregoing analysis throws up several interesting findings. It is positive and encouraging to note that a PHC in Rajasthan had on an average 100 medicines available at the time of survey. This is much more than the number of medicines found at the PHC level in other studies. Similarly, more than 180 medicines were found to be available on average at the CHC level. These are the most critical points of service delivery and having a considerably good supply of medicines would clearly lead to better utilization of services. The considerable increase in OPD load at PHC level found in the survey actually corresponds to robust availability of medicines. Very low levels of stock-outs also suggest that most of the systemic deficiencies are being taken care of and efficiencies in the supply chain have been successfully brought in. While analysing the budget data, we found that a progressively higher amount of money is being spent on medicines in the State. However, the increase in spending is absorbed mostly at the tertiary level. This leaves further scope of improvement at the PHC level, where HR shortages are the most crucial. It has to be noted here that RMSC has started procuring as many as 600 plus medicines, a large amount of which go towards tertiary care. Health facilities at district level and below are managing with about a hundred medicines which are considered to be very essential.

CHAPTER 7

RATIONAL USE OF MEDICINES

7.1 INTRODUCTION

“Rational use of medicine” is defined by WHO thus: "rational use of medicines requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, at the lowest cost to them and their community". The concept of rational use of medicines has always taken a backseat despite the availability of state-specific EDLs and standard treatment guidelines.

Drug prescription plays a vital role in health-care delivery and it acts as a cost driver of health care. It also has a major influence on the procurement process and can act as a major financial barrier, since procuring unnecessary medicines will prevent procurement of other essential medicines that are needed for the system.

Rational drug use is dependent on many factors, the most important being the compliance of the prescribing doctor or any health professional to the EDL and adherence to standard treatment guidelines. Doctors who prescribe medicines are generally targeted by drug manufacturers to promote their product irrespective of any evidence on its efficacy and effectiveness. Prescription analysis is one way which can be used as an objective and standard method to examine the drug use and prescription behavior in health facilities. With more focus towards the movement of generic medicines into the existing health system, the analysis will help us in understanding how much of generic medicines are being prescribed as against the existing brand-specific drugs. Apart from these issues, with growing concern over the rising drug resistance to the second and third generation of antibiotics, this analysis will help in studying the prescription pattern of antibiotics across different public health facilities in the State. This can help in deriving protocol or policy for rational usage of antibiotics in health facilities based on the level of care.

7.2 METHOD

This study was conducted across the ten districts of Baran, Barmer, Bharatpur, Bikaner, Jaipur, Chittorgarh, Churu, Jahalawar, Karauli and Udaipur. Prescription slips were collected from users of public health facilities at the PHCs, CHCs, district hospitals and one medical college. Around 20–25 prescriptions were collected from each facility from the users of the facilities. Without a functional management information system, the doctors' handwritten prescriptions were used to collect and analyse the data. A total of 2235 prescriptions from the ten districts were collected and used for the analysis. Analysis was carried out on the following parameters: average number of medicines prescribed in each encounter; percentage encounters when antibiotics were prescribed; percentage of medicines prescribed by generic name; percentage of syrups prescribed; percentage of injectables prescribed; percentage of single dose versus fixed dose drugs; and percentage of vitamins prescribed across facilities and across districts. There are, however, certain limitations of the current analysis and data collection techniques. The indicators analysed do not necessarily measure the appropriateness of the pharmaceutical care. There is no guarantee that the patient gets the prescribed medicines. The collection of prescriptions from each facility was done on a single day – this might show an increased usage of a particular drug type for that day, which cannot be generalized for the whole facility through the year.

7.3 ANALYSIS

Prescriptions were collected from the selected 10 districts. A total of 2235 prescriptions were used for the analysis which included 1343 (60%) from the PHCs, 630 (28.2%) from the CHCs, 231(10.3%) from the district hospitals and 31 (1.4%) from the state medical college. The analysis was done to estimate the average number of medicines prescribed per counter and the proportion of generics, antibiotics, injections, fixed drug combinations and syrups prescribed. All medicines that were prescribed were from the Rajasthan EDL and hence a separate analysis for EDL medicines did not need to be done.

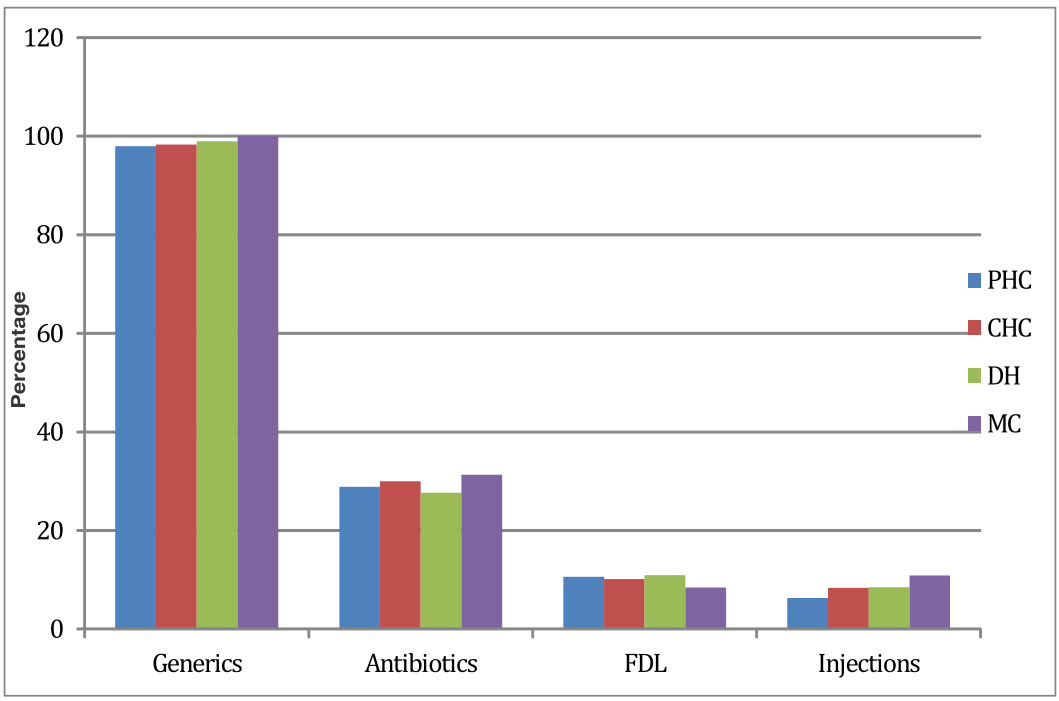
Table 7.1. Prescription indicators across districts

Indicator	Quantity/percentage
Average number of medicines per counter	3.29
Percentage of medicines prescribed by generic name	98.29
Percentage of antibiotics prescribed	28.9
Percentage of injections prescribed	7.1
Percentage of encounters with syrup prescribed	9.3
Percentage of encounters with vitamins prescribed	3
Percentage of single drugs prescribed as against fixed drugs	89.02

Source: Authors' calculation based on primary survey data

On an average 3.3 medicines was prescribed across all facilities (Table 7.1). Of the medicines prescribed, 98% were prescribed using their generic name, 29% were antibiotics (including metronidazole and no other ophthalmic preparations), 9% were syrup preparations and 7% were injectable medicines. Only 3% of the prescribed medicines were vitamins and around 89% of the medicines were of single component as opposed to the fixed dose combination.

Fig.7.1. Prescription of different types of medicines across facilities



DH – district hospital MC – medical college

While more than 98% of the medicines prescribed overall used the generic name of the drug, it was 100% in case of the medical college (Fig.7.1, Table 7.2). The medical college had the highest proportion of antibiotics and injections prescribed in the OPD (31.3% and 10.8%, respectively). All the facilities prescribed around 10% of the medicines as a fixed drug combination as against the single drug.

Table.7.2. Prescription practice across different facilities (%)

	Generics	Antibiotics	Injections	FDC	Syrups	EDL
PHC	98	28.8	6.27	10	12	100
CHC	98.2	29.1	8.3	10.1	7.5	100
District Hospital	99	27.6	9	11	6.4	100
MC	100	31.3	10.8	8.4	0	100

Source: Authors' calculation based on primary survey data

Analysis carried out based on the number of medicines per prescription showed that the percentage of injectables prescribed was the highest for prescriptions with five medicines and above (Table.7.3, Fig 7.2). The lowest percentage for generic drugs prescribed was in the case of prescriptions with single medicines (93%). Syrups and antibiotics were found to have been prescribed mostly for prescriptions with two medicines (12% and 34%, respectively). The fixed dose combination was the highest for the prescriptions for single medicines (18%). This could be due to the impression that a combination of two medicines will have a synergetic effect on the ailment the patient complains of.

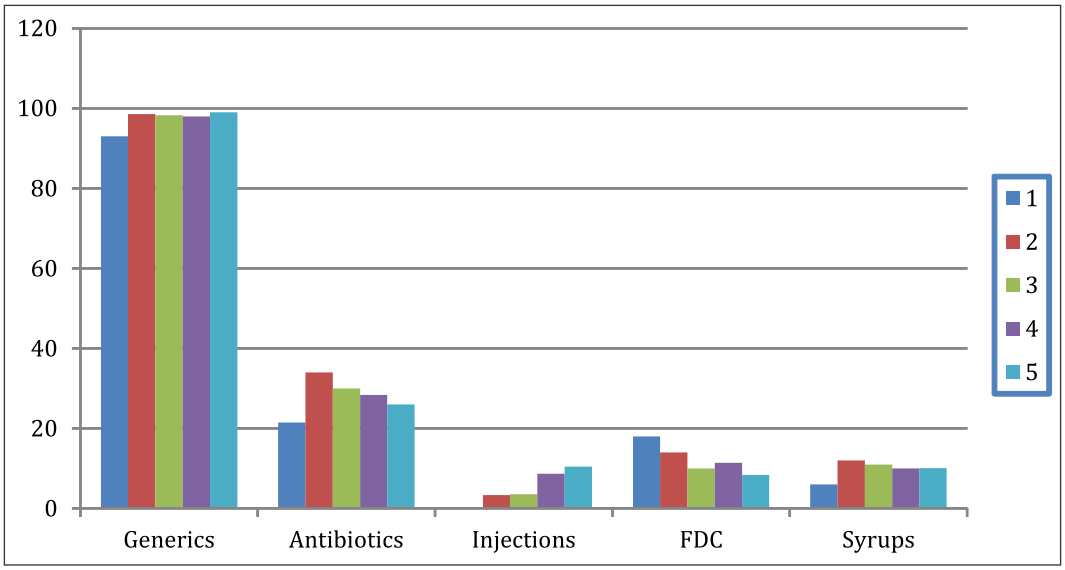
Table 7.3. Percentage of medicines by type of medicine and No. of medicines per prescription

No. of medicines/ prescription	Generics	Antibiotics	Injectables (Percentage)	FDCs	Syrups
1	93	21.5	0	18	6
2	98.6	34	3.4	14.04	12
3	98.3	30.04	3.6	10	11
4	98	28.4	8.7	11.4	10
5 or more	99	26	10.5	8.4	10.14

FDC – fixed drug combination

Source: Authors' calculation based on primary survey data

Fig.7.2. Percentage of different categories of medicines per prescription



When the prescriptions collected from the PHCs were analysed across the districts sampled (Table 7.4), Baran and Chittorgarh districts had the highest proportion of antibiotics prescribed among all the medicines in the State, at 35%. The same two districts had the lowest percentage of generic medicines prescribed. Fixed drug combinations were prescribed the most in Barmer district (17.6%) and syrup preparationswere prescribed the most in Chittogarh district (20%).

Table 7.4. Prescription practise across the PHCs in the districts of Rajasthan (%)

District	Generic medicines	Antibiotics	Injections (Percentage)	FDC	Syrups
Baran	93.5	35	4.7	8.2	11.7
Barmer	98.3	26.8	5.7	17.6	10.38
Bharatpur	100	26.6	5.3	14.02	4.6
Bikaner	94.1	32.3	6	12.3	9.3
Jaipur	100	20.2	6.5	12.7	10.7
Chittorgarh	97.2	35.2	8.5	12.3	20
Churu	100	22	9.3	5.2	9.1
Jahalawar	99.2	26.5	3.6	9.1	11.7
Karuali	99.3	31.1	7	6.5	14.4
Udaipur	98	30.2	6.5	9.5	14.6

Source: Authors' calculation based on primary survey data

Among the CHCs, Baran district had the lowest proportion of medicines prescribed with generic names (89%) as compared to other districts which had more than 99% of the prescriptions in generic names (Table.7.5). Similar to the PHC prescription pattern, CHCs in Chittogarh and Baran had the highest proportion of antibiotics

prescribed among all the medicines (35% and 33%, respectively). CHCs of Barmer and Jaipur had the highest proportion of FDCs prescribed (15%). Injections were also prescribed the most in Chittogarh district at 27%.

Table.7.5. Prescription practice across the CHCs in Rajasthan (%)

District	Generic medicines	Antibiotics	Injections (Percentage)	FDC	Syrups
Baran	89	32.8	1.5	12.8	7.2
Barmer	99.6	26.4	10	15.5	8.1
Bharatpur	100	23	0	14.5	3.2
Bikaner	97.7	42.2	4.4	11.1	16.6
Jaipur	99	28.6	0.7	15.4	(3
Chittorgarh	99	34.7	27.2	2.02	0
Churu	100	17	2.1	7	3.5
Jahalawar	99.02	30	3.8	10.03	10
Karuali	99	29	9	8.4	16.45
Udaipur	99	30	8.7	9.3	9

Source: Authors' calculation based on primary survey data

Among all the nine district hospitals from where prescriptions were collected, more than 94% of the prescriptions had medicines with generic names (Table 7.6)

Hospitals of Barmer and Bharatpur had the highest proportion of antibiotics prescribed among all the district hospitals. Injectables were prescribed at around 50% in the district hospital of Chittorgarh, which was the highest among all the district hospitals in the State. This could probably be due to the over usage of both antibiotics and anti-inflammatory drugs in the injectable form. FDCs were prescribed the most at the district hospital of Bharatpur at 14%. Syrups were prescribed more in the hospital of Jhalawar district (17.3%).

Table 7.6. Prescription practice across district hospitals in Rajasthan (%)

District	Generic medicines	Antibiotics	Injections (Percentage)	FDC	Syrups
Barmer	98.7	41	3.8	13	6.4
Bharatpur	100	40	4	14	2
Bikaner	94	31	0	13	5.1
Jaipur	100	19.4	15	12.3	4.1
Chittorgarh	100	31.3	49.2	3	0
Churu	99	17.7	0	8.3	7.3
Jahalawar	99	27	2.8	10.5	17.3
Karuali	100	28.1	2.7	11	9.1
Udaipur	100	24.3	7.5	13.1	2

Source: Authors' calculation based on primary survey data

7.4 CONCLUSION

Prescription analysis is a robust mechanism for understanding provider prescribing behaviour and reflects on the quality of clinical care delivery at the health facilities. In recent years, Rajasthan has made enormous investments in ensuring access to medicines from the public health system. Apart from improving supply of medicines in the system, the State has introduced supporting policies and strategies to improve the use of rational medicines, such as the establishment of drugs and therapeutic committees (DTCs) at CHC level and above for ensuring safe use of medicines. Standard treatment guidelines have been prepared through a collaborative and inclusive mechanism, with support from the Delhi Society for the Promotion of Rational Use of Drugs (DSPRUD). The State is also in the process of developing a drug formulary.

With more focus towards prescription of generic medicines into the existing health system, the analysis has helped us in understanding the degree of rational use of generic medicines being prescribed in the public health system. Apart from these issues, with growing concern over the rising drug resistance to antibiotics and antimicrobials, this analysis has helped in studying the prescription pattern of antibiotics across different public health facilities in the State, which could be used to frame protocols for rational usage of antibiotics in health facilities based on the level of care. Finally, this data will help us conduct further studies to understand reasons behind differential prescription practices in different facilities and districts in the State, which in turn would help to make informed decisions and devise policies to inform, sensitize and educate health-care providers on the importance of proper use of medicines.

CHAPTER 8

MEDICINE PROCUREMENT PRICE AND UTILIZATION

One of the chief attributes of Rajasthan's centralized procurement system is the potential to achieve efficiency and significant cost savings by procuring medicines at low rates through tendering and purchase directly from the manufacturers. Tendering is recognized as one of the most effective means of getting low prices because of intense competition among bidders.

Autonomous agencies such as Tamil Nadu Medical Services Corporation Ltd. (TNMSC) and Kerala Medical Services Corporation Ltd.(KMSCL) have successfully pioneered a two-bid tendering system wherein only bidders who qualify on technical requirements are advanced to the next stage for consideration of their price bids. Similarly, RMSC makes use of a two-bid tender model as the basis of setting a rate contract with approved suppliers (usually the L1 bidder) that remains valid for a period of one year. Tenders are floated on a rolling basis when rate contracts are approaching expiry. A detailed study of RMSC procurement rates was undertaken to study the efficiency of the procurement system in generating low prices. Prices were compared with TNMSC rates as well as with the private sector.

Another useful tool in monitoring and evaluation of procurement is analysis of utilization patterns. Such analyses can be used to define benchmarks in order to facilitate continuous monitoring of operations and also in improving the accuracy of demand forecasting, identifying irrational trends or anomalies in use, and better aligning procurement to disease burden.

For this report, a preliminary analysis using medicine disbursement data was conducted to compare utilization patterns at public health facilities in Rajasthan to those observed in the private sector. Utilization of high-value medicines has been presented as a metric based on defined daily doses. Using the category of anti-infective medicines as an illustrative example, the annual number of treatment courses that can be made available at current procurement rates was also estimated.

8.1 PUBLIC PROCUREMENT PRICES

The efficiency of RMSC in getting low procurement rates can be appraised through comparisons with other public procurement models. For this purpose, TNMSC is considered an ideal benchmark because it is the system on which RMSC was modelled. Moreover, TNMSC has been engaged in procurement for over a decade with relatively streamlined and mature systems in place.

Approved rates for rate contract issued during 2012–13 for Category "A" medicines (based on value of medicine disbursed to health facilities) were extracted from RMSC published documents. In cases where multiple suppliers were approved for rate contracts for the same medicine, an average rate was calculated for the 2012–13 period. TNMSC rates were obtained for the same list of medicines, where available, from publically available documents containing the finalized procurement rates for 2012–13.

This yielded a basket of 38 medicines for which the ratios of TNMSC rate to RMSC rate were computed (Annex 6). In general, RMSC rates did not differ by large margins from TNMSC rates – the majority of RMSC rates were within a 25% range of TNMSC rates. In fact, TNMSC rates were higher than RMSC rates for 19 medicines. In the case of six medicines – lignocaine 2% gel, povidone iodine 5% solution, neomycin bacitracin and sulphacetamide powder, lysol liquid, sodium lactate injection and snake venom under the therapeutic category– TNMSC rates were lower than RMSC rates by more than 25%. Potential cost savings for RMSC were these medicines procured at the TNMSC rates would be to the tune of 50 million Indian rupees (calculations based on 2012–13 volumes of medicine issued).

While there is potential for further improvement, these findings illustrate the success of RMSC in achieving low prices that are comparable to those of TNMSC, an established procurement model, even within the short period of its operations. As is being done by TNMSC, RMSC may consider running a primary tender cycle to finalize rates for all essential medicines at the start of the year. Bringing the rates into alignment with the period of medicine issue can help improve annual estimation of tender quantities and improve predictability for suppliers, thereby increasing participation and reducing operational costs.

The experience of RMSC in setting up a successful competitive bidding model can provide lessons for other states that are trying to set up centralized procurement of medicines. The utility of interstate comparisons of procurement rates is also highlighted by the analysis.

8.2 PROCUREMENT VERSUS MARKET PRICES

RMSC procurement rates were also compared to the market prices of 2012. Data from IMS Health was used to estimate prices in the private sector. Since data in IMS Health is captured at the level of stockists' sales, prices reflect the "price to retailer". We therefore applied a conservative 15% retail margin to estimate retail prices at the point of sale. Annex 7 provides details of the market prices for 62 Category "A" medicines for which IMS data were available. Since multiple suppliers are engaged in sales for a particular medicine in the private sector, a volume-weighted mean price was computed for each of the medicines. The main outcome indicator was the ratio of the volume-weight mean market price to the RMSC rate.

Not surprisingly, private sector prices were higher than RMSC prices other than a few exceptions. On average, they were 5.5 times higher than RMSC rates. In the majority of cases (50 of a total of 62 medicines under study), the RMSC price was observed to be lower than even the lowest market price.

Market prices as a percentage of RMSC rates are given in Annex 7. Market prices were on average 448% greater than RMSC prices, the highest being >3800% for fusidic acid 2% cream.

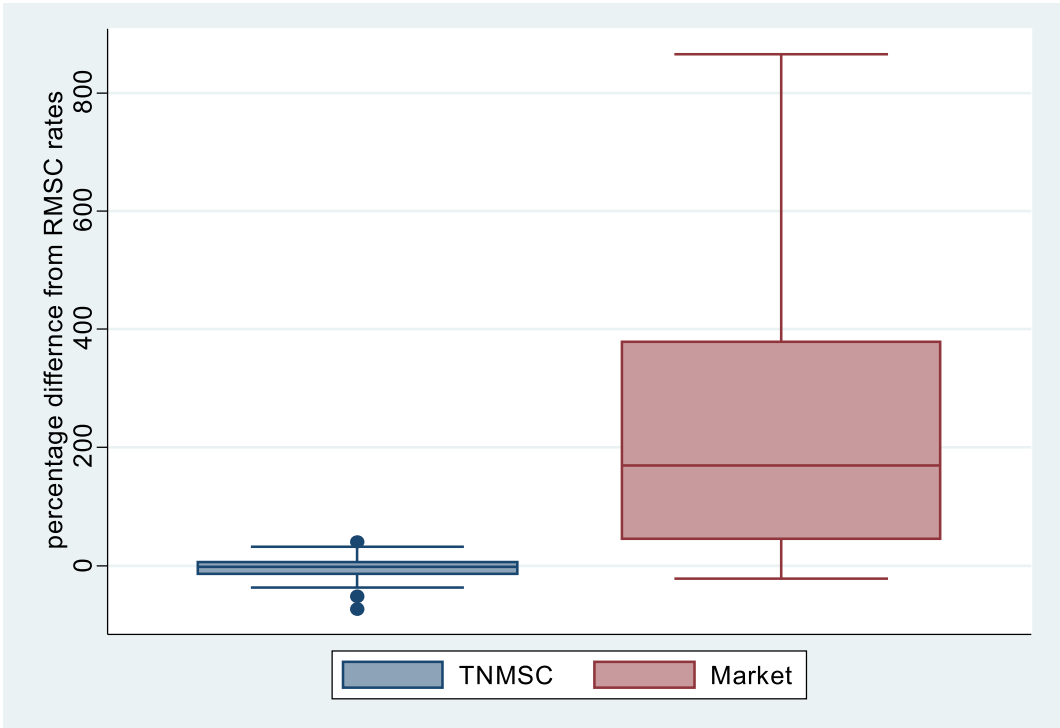
The small number of suppliers for anti-snake venom and factor VII in the open market may be indicative of less competition in this specific medicine market. This is supported by frequency observed shortages for snake venom in government procurement and a somewhat limited scope for improving the public procurement rate. Prices for blood and plasma products vary widely across suppliers as consequence of poor regulation of these products in India and availability of products such as factor VIII is often poor. For the period of analysis, only one supplier was recorded in the dataset of private sector sales whose price was observed to be lower than RMSC. This does not rule of other suppliers who may have been pricing higher but for which sales were not reported in the IMS data. The market price for sodium chloride + dextrose injection was only 3% less than RMSC. Our very conservative estimate for the retail margin (frequently seen to be as high as 20–50% in the Indian market) is likely to be responsible for the higher RMSC rates observed in these cases.

Overall, RMSC rates are observed to be much lower relative to the private sector, where patients are paying several times the cost at which medicines can be procured in the public sector. In cases where RMSC rates are higher than the lowest

market price (e.g. paracetamol tablets, amoxicillin tablets, co-trimoxazole oral solution and tablets, povidone iodine solution, dextrose 5% injection), further reductions of the procurement rates may be explored.

The results of the RMSC price comparisons with TNMSC and the private sector were combined for a basket of 30 medicines that were common across both analyses. Fig. 8.1 summarizes the findings for market prices and TNMSC rates for the outcome indicator percentage increase over RMSC price. For market prices, the median value of the outcome indicator was 175% (lower quartile 57%, upper quartile 416%). In contrast, the median value of the outcome indicator for the comparison with TNMSC prices was -2% (lower quartile -15%, upper quartile 6%). When we adjusted the percentage difference of the market price from the RMSC rate for outliers, i.e. excluded medicines with a percentage difference greater than 1500% (domperidone tab. 10 mg and cetirizine tab. 10 mg), the median value was 170% (lower quartile 45%, upper quartile 379%).

Fig. 8.1. Comparison of RMSC rates with TNMSC rates and market prices for a common basket of medicines



Source: Author's calculations based on RMSC rate contract documents for 2012–13, TNMSC approved rates for 2012–13 and 2012 market data from IMS Health

The stark difference in the two plots is unequivocal evidence that centralized procurement of medicines through a system of tendering has the ability to dramatically bring down prices of medicines from market rates, impact on OOP spending of patients and deliver cost savings to the government sector. Scaling up of similar pooled procurement models in states represents the only viable mechanism for realizing the goal of universal access to essential medicines.

8.3 ANALYSIS OF UTILIZATION PATTERNS

A comparative analysis of utilization patterns in Rajasthan public health facilities vis-à-vis market consumption was undertaken. In an earlier chapter, we observed that Category "A" medicines, identified based on an ABC analysis of passbook data of health facilities in Rajasthan (described earlier in the report), accounted for ~80% of the total value of medicines consumed in 2012–13. Sixty-five category "A" medicines for which market data were available through IMS Health were matched to 32 therapeutic segments as classified by IMS. Separately, the top therapeutic segments in the Indian market based on 2012 sales were also identified in the IMS data. It is interesting to note that of the 32 therapeutic segments containing RMSC high value medicines, 20 were also on the list of top selling segments in the private sector (Annexes 8a and 8b).

To the extent that utilization in the public sector maps onto trends in the private sector, RMSC high-value procurement appears to be in general alignment with the demand in the open market. More significantly, this highlights the relevance of the Rajasthan Chief Minister's free medicines initiative in reducing OOP spending, particularly in areas of high patient spending.

8.4 PRELIMINARY FINDINGS ON PRIVATE SECTOR TRENDS

Private sector sales of medicines in Rajasthan from 2010–2013 were studied using data from IMS Health. The value of annual sales and growth rates were estimated in order to explore if there was any evidence of the impact of the Free Medicines Initiative on sales in the private sector. Market sales were disaggregated into (a) combined sales for therapeutic categories containing high-value (category "A") essential medicines being procured by RMSC, and (b) remaining therapeutic categories. To the extent that utilization of essential medicines in the public sector may displace sales in the private market, we may expect to see a dip in the market value of not just the same medicines but also close substitutes in the same therapeutic category.

Fig. 8.2 shows the market sales in Rajasthan (at 2010 constant prices). Annual growth rates for the total market, high-value essential medicine market and residual market are shown in Table 8.1. The growth of the market stalled (0.9%) in the 2011–12 period from 5.1% in 2010–11 and then picked up to reach 9.8% in 2012–13. The trend in the essential medicines market mirrors the general market trend; however, growth reached a negative value of -1.6% between 2010–11 and 2011–12. Similarly, growth in 2012–13 lagged behind the market at 7.2%. The residual market, mainly comprising medicines absent from the Rajasthan EML, showed the highest growth. It may be too early to attribute the decline in growth in the essential medicines market to the MNDY public sector initiative, but neither can its potential impact be dismissed in this regard.

Fig. 8.2. Trends in private sector sales in Rajasthan

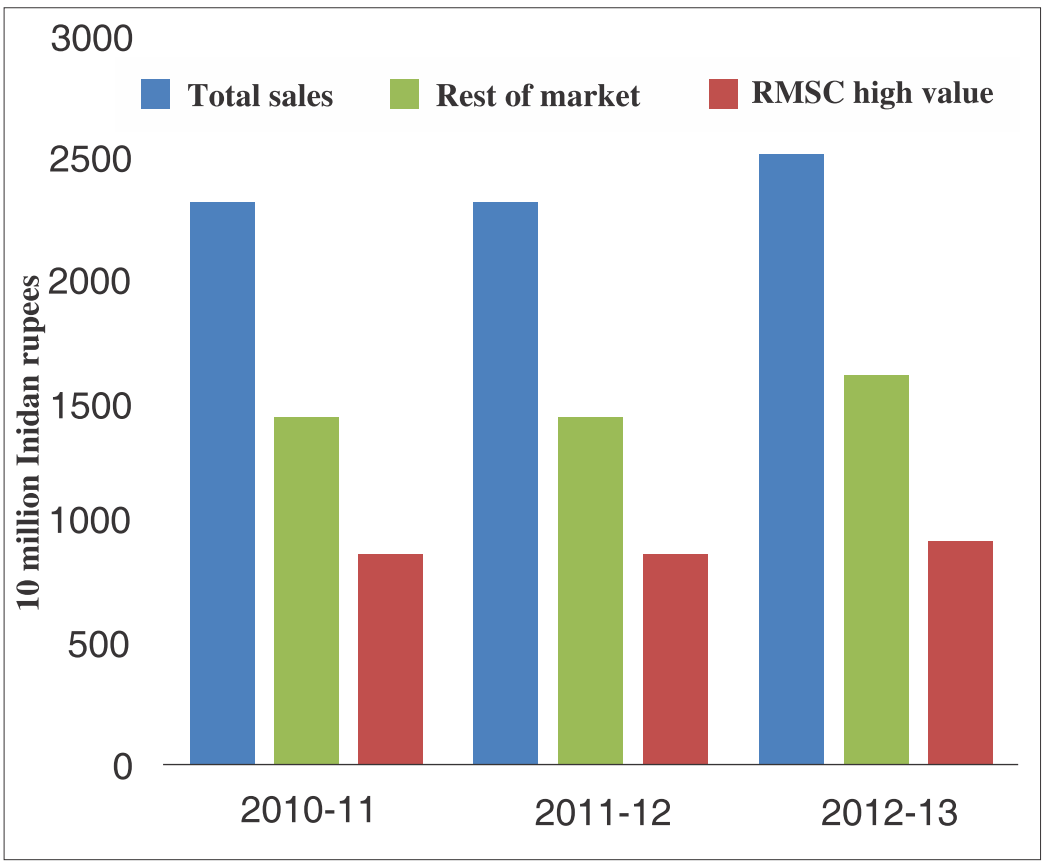


Table 8.1: Year-to-year growth rate of market and RMSC high-value products

	2010–11	2011–12	2012–13
Market	5.1	0.9	9.8
RMSC high value	5	-1.6	8.8
Rest of the market	5.2	0	7.2

A separate analysis of consumption was carried out based on a calculation of defined daily doses (DDDs) using the volume of medicines disbursed to health facilities. As defined by the WHO Collaborative Centre for Drug Statistics Methodology (WHOCC), the DDD is “the assumed average maintenance dose per day for a drug used for its main indication in adults". It is a stable medicine consumption metric that allows for comparisons across medicines independent of their strength. DDDs are strictly a unit of measurement and do not reflect the recommended or prescribed doses.

DDDs were derived from the WHOCC ATC/DDD Index 2013 for Category “A” medicines aggregated at the third level of ATC classification (WHO classification). DDDs are however not established for several products; for example, where there is great variation in dosing or dosing is dependent on the intensity of the disease such as topicals, vaccines, antineoplastic agents, contrast media, etc. Therefore, only ATC categories where DDDs could be ascertained for all medicines were included in the analysis. DDDs per thousand persons per day were calculated for 58 category “A” medicines (accounting for ~53% of total consumption value) using aggregated data on quantities dispersed by RMSC over the entire State (instead of facility-level data). The DDDs per 1000 persons per day measure can also be interpreted as the percentage of the population that consumes a single daily dose of the medicine.

The outcome indicator was aggregated across the third level of ATC classification (see Annex 9 for details), results for which are presented in Table 8.2 and Fig. 8.3.

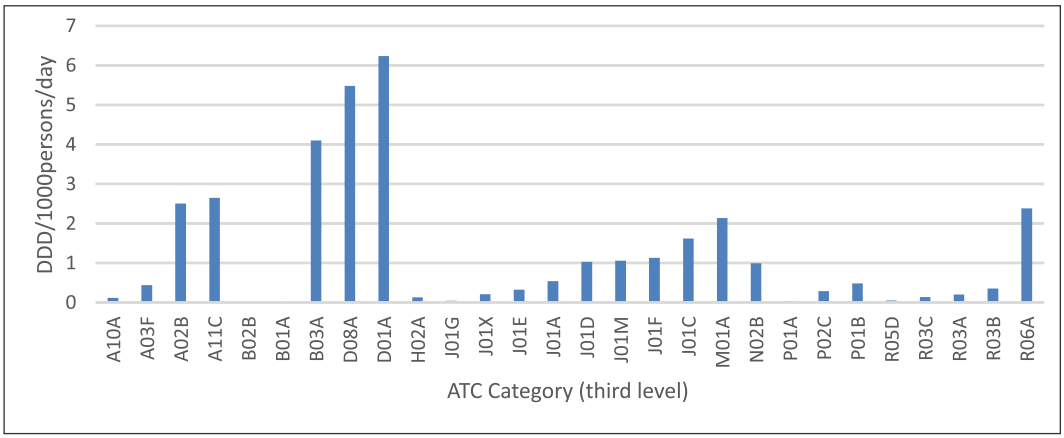
Table 8.2. Consumption of category "A" medicines in 2012–13 aggregated at the third level of ATC classification

ATC	ATC category name	DDDs/1000 persons/day
A10A	Insulins and analogues	0.12
A03F	Drugs for functional gastrointestinal disorders	0.44
A02B	Medicines for peptic ulcer and gastro-oesophageal reflux disease (GORD)	2.51
A11C	Vitamin A and D, including combinations of the two	2.65
B02B	Vitamin K and other haemostatics	0.00
B01A	Antithrombotic agents	0.02
B03A	Iron preparations	4.10
D08A	Antiseptics and disinfectants	5.48
D01A	Antifungals for topical use	6.24
H02A	Corticosteroids for systemic use, plain	0.13
J01G	Aminoglycoside antibacterials	0.05
J01X	Other antibacterials	0.21
J01E	Sulfonamides and trimethoprim	0.33
J01A	Tetracyclines	0.55
J01D	Other beta-lactam antibacterials	1.03
J01M	Quinolone antibacterials	1.06
J01F	Macrolides, lincosamides and streptogramins	1.13
J01C	Beta-lactam antibacterials, penicillins	1.62
M01A	Antiinflammatory and antirheumatic products	2.14
N02B	Other analgesics and antipyretics	1.00
P01A	Agents against amoebiasis and other protozoal diseases	0.03
P02C	Antinematodal agents	0.29
P01B	Antimalarials	0.49
R05D	Cough suppressants, excluding combinations with expectorants	0.06

Source: author's calculation based on RMSC passbook data

Aggregating consumption at the broadest therapeutic category level (first level of ATC), the highest use was in "dermatologicals" (D category). Within this category, the highest consumption was for clotrimazole 2% cream classified as "antifungals for topical use" (D01A) followed by povidone iodine 5% ointment classified under "antiseptics and disinfectants" (D08A).

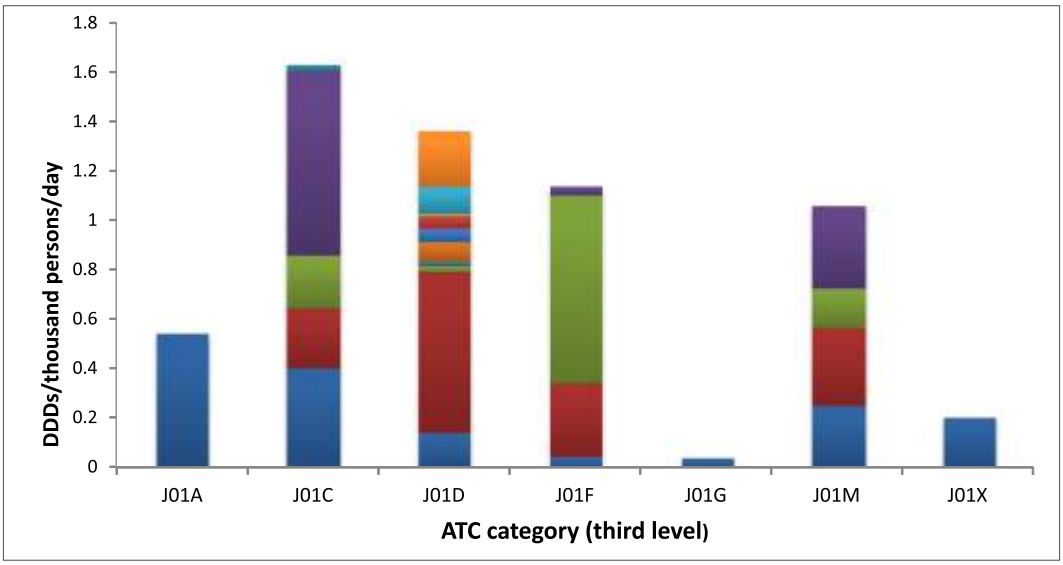
Fig. 8.3. Consumption of high-value medicines in Rajasthan health facilities



Source: author's calculation based on RMSC passbook data

The second highest consumption was observed in "J" category, "anti-infectives for systemic use", which also included the largest number of medicines (Fig. 8.4). Within anti-infectives, the most prominent therapeutic category was "beta-lactam antibacterials, penicillins" (J01C) consisting of amoxycillin and cloxacillin capsules (250mg+250mg), amoxycillin and potassium clavulanate tablets (500mg+125mg), amoxycillin capsules (250 mg, 500 mg) and piperacillin and tazobactum injections (4gm+500mg). Similarly, consumption of "other beta-lactam antibacterials" (J01D), "macrolides, lincosamides and streprogramins" (J01F) and "quinolone antibacterials" (J01M) classes of anti-infectives were aggregated across several medicines (represented by different colour stripes in the bar graph).

Fig 8.4. Consumption of anti-infectives for systemic use (category J) in Rajasthan health facilities



Source: author's calculation based on RMSC passbook data

Thus, the analysis broadly describes consumption patterns across all health facilities in Rajasthan and provides standardized estimates for utilization in both acute and chronic conditions. A measure of the cost per DDD was calculated for the medicines included in the previous analysis. This provides an estimate of the cost to RMSC for procuring a single daily dose of the medicine at the current procurement rates and volumes. Results are summarized in Annex 10.

The highest costs per DDD were for the medicines under the therapeutic category "vitamin K and other haemostatics" (B02B) composed of anti-inhibitor coagulation complex (human plasma protein with a factor VIII inhibitor), factor IX concentrate and dried factor VIII fraction. On the other hand, the lowest cost per DDD was for clotrimazole 2% cream under the therapeutic category "antifungals for topical use" (D01A).

The analysis was extended for 27 medicines that are classified as "anti-infecives for systemic use" (ATC category J). Assuming that a common course of treatment with antibiotics is for seven days, the costs per course of treatment were obtained. Highest cost per course of treatment was observed to be ₹ 2581 for meropenem (500mg injection) which was significantly higher than for other medicines in the same category (see Table 8.3). Lowest cost per course of treatment was for ₹ 3.7 for doxycycline (100mg capsule).

Table 8.3. Cost per course of treatment for antibiotics

ATC code, name of medicine	Cost/course of treatment (₹)	Annual courses of treatment (No)
J01A		1 960 746
Doxycycline cap. 100mg	3.7	1 960 746
J01C		5 830 443
Amoxycillin and cloxacillin cap. 250mg+250mg	8.8	1 469 077
Amoxycillin and potassium clavulanate tab. 500mg+125mg	58.7	855 524
Amoxycillin cap. 250mg	18.3	760 907
Amoxycillin cap. 500mg	16.1	2 663 750
Piperacillin and tazobactum inj. 4gm+500mg	119.2	81 185
J01D		3 708 448
Cefixime tab. 100mg	33.0	533 966
Cefixime tab. 200mg	30.7	2 322 312
Cefotaxime inj. 1g	254.5	76 853
Ceftazidime inj. 1g	504.0	24 730
Ceftriaxone inj. 500mg	168.7	46 819
Ceftriaxone inj. 1 g	141.7	270 569
Cephalexin cap. 250mg	54.3	199 227
Cephalexin cap. 500mg	52.8	170 028
Cephalexin oral susp. 125mg/5ml	108.3	47 066
Meropenem inj. 500mg	2581.6	16 879
J01E		1 179 670
Co-trimoxazole oral susp. 40mg+200mg/5ml	34.0	383 725
Co-trimoxazole tab. 80mg+400mg	14.1	795 945
J01F		136 6301
Azithromycin tab. 100mg	23.7	199 610
Azithromycin tab. 250mg	19.7	1 048 133
Erythromycin estolate oral susp. 125mg/5ml	76.1	118 559
J01G		168 823
Amikacin inj. 500mg	78.3	168 823
J01M		3 795 489
Ciprofloxacin tab. 250mg	17.1	934 872
Ciprofloxacin tab. 500mg	16.3	1 106 957
Norfloxacin tab. 400mg	12.3	575 356
Ofloxacin tab. 200mg	8.5	1 178 304
J01X		760 562
Metronidazole tab. 400mg	12.3	760 562

Source: author's calculation based on RMSC passbook data and rate contracts

Finally, the annual courses of treatment that could be made available under given procurement rates and issued volumes were estimated by dividing the total value of the medicines by the cost per course of treatment.

Aggregating these values across the third level of ATC classification, the highest annual courses of treatment provided were for “beta-lactam antibacterials, penicillins” (J01C). In theory, RMSC was able to provide a total of 5.8 million courses of treatment for the medicines under this category. Similarly, RMSC was able to provide 3.7 million treatment courses for medicines classified as “quinolone antibacterials” (J01M). The lowest treatment courses, 1.1million, were provided for “sulfonamides and trimethoprim” (J01E).

Tracking of consumption patterns can be used to inform procurement and adjust volume of purchases in line with the given resource limitations. Data on patient use of health services and independent estimates of disease burden can provide further information about the ability of the system to respond to patient needs. Pricing and medicine utilization parameters discussed in this chapter can be used as part of a monitoring and evaluation framework to assess and improve performance in procurement.

CHAPTER 9

CONCLUSIONS AND WAY FORWARD

9.1 CONCLUDING OBSERVATIONS

This study was intended to evaluate the MNDY scheme by examining the procesess and outcome measures. A two-stage stratified sampling method was adopted, and a survey of 112 public health facilities in Rajasthan was carried out. In addition, the passbook database of RMSC was utilized to understand several facets of the scheme. Several crucial aspects of the scheme's inputs were studied: the procurement processes and patterns, trends in public investments on medicines, the quality assurance process, supply chain management processes and the storage system and processes. In terms of outcomes, the study included: trends in outpatient and inpatient visits, impact on private spending on drugs, availability and stock-out of drugs, price variations in the procurement process, and prescription patterns.

The significant increase in outlays on medicines since the introduction of RMSC has been very encouraging. During 2013–14, a sum of 3200 million Indian rupees was allocated towards the scheme as against 1020 million Indian rupees in 2011–12. The State was spending less than 5% of its public expenditure on medicines in the pre-MNDY years. This has increased considerably since the launch of the scheme. The per capita health expenditure during the pre-MNDY era was estimated to be ₹ 5.70 which now stands close to ₹ 50. This has had a salutary impact on OOP reduction in the State. Early trends suggest that households' OOP payments have declined from 85% in 2004–05 to nearly 75% in 2011–12. Impoverishment caused due to high households' OOP expenditure on medicines appears to have reduced from 3.2% to 2.1%. Allocation of funds to districts has improved dramatically while inequality in distribution of funds across different levels of care has reduced considerably.

The rapid increase in outpatient and inpatient visits is a welcome sign for the public health system in Rajasthan. The combined outpatient and inpatient care visits experienced a rapid upswing from 3.45 million in July 2010 to 7.78 million in July

2013. As per estimates, around 11 million people were served at OPDs during 2011. This is expected to triple by 2013, as by June 2013 estimated OPD visits in PHCs had already increased to 15.8 million. The unprecedented upsurge in patient visits is caused partly by the explosion in the pent-up demand and also has the potential to trigger a cascading effect within the public health system in Rajasthan.

As medicines are now freely available, staff absenteeism appears to have reduced considerably, putting pressure on the health system infrastructure to improve further. The public health facilities have reported less shortages and stock-outs. The survey demonstrates that the availability of essential medicines has improved significantly. The average availability of essential medicines is 100 medicines at a PHC, 180 at a CHC and over 300 essential medicines at a district hospital. This is as per the data collected on the day of the survey. This median availability of drugs at PHCs, CHCs and district hospitals is 70%, 67% and 85%, respectively. The figure for stock-out days is quite low; and apart from a few medicines at particular levels, none have stock-outs of more than 30 days. An average stock-out of 12 days at the PHC level is considered very low compared to most developing country standards. Very low levels of stock-outs also suggest that most of the systemic deficiencies are being taken care of and efficiencies have been successfully brought in the supply chain. While analysing the budget data, it was seen that a progressively higher amount of funds are being spent on medicines in the State. However, the increase in spending is absorbed mostly at the tertiary level. This leaves further scope of improvement at the PHC level, where HR shortages are the most glaring. It is noted that RMSC has started procuring as many as 600 plus medicines, a large portion of which go towards tertiary care Of the 442 medicines procured till 2012, only 32 were exclusively for medical colleges (7%), whereas the current list has 84 medicines (16.5%) for the highest level of care.

The ABC analysis of disbursement of drug value shows that out of 442 medicines distributed by RMSC during 2012–13, 89 (20%), 113 (26%) and 240 (54%) drug items are category A, B and C items, respectively, accounting for 80%, 15% and 5%, respectively of the value. One area of concern remains that the value of medicines disbursed in 2012–13 is inclined to a particular therapeutic category (ATC J), consisting anti-infectives for systemic use, across all levels of care. On an average, at all levels of care, these comprise 50% of the value of all medicines disbursed. Further disaggregation of this particular therapeutic category shows that amphenicols (J01C) and other β-lactam anti-bacterials (other than penicillin) accounted for 50% of the value of medicines disbursed across all levels of care. The

rationale behind such a high use of anti-bacterials can be a further research question, especially at lower levels of care.

The Scheme is also expected to influence prescription and dispensing patterns. Our survey finds that on an average, 3.34 medicines are prescribed across different facilities. Among all the prescribed medicines, 97.3% of the medicines are prescribed using generic names, while 86.3% of the medicines prescribed were of the single medicine category as against fixed medicine combination. Antibiotics occupied 29% of all the medicines that were prescribed in the State, injectables were 7% and syrup preparations were 9% of the total preparations dispensed in public health facilities. The prescription analysis shows that use of vitamins (3.6% of total preparations) was quite low, an encouraging trend from the perspective of rational use of medicines.

As far as procurement prices are concerned, the RMSC rates did not differ by large margins from TNMSC rates – the majority of RMSC rates were within a 25% range of TNMSC rates. In fact, TNMSC rates were higher than RMSC rates for 19 medicines. It may also be observed that the market prices are on average 300% greater than RMSC prices. In a few cases, RMSC rates are higher than the market price, such as for anti-snake venom, factor VIII fraction and sodium chloride and dextrose injection. However, the relatively small number of suppliers for these formulations in the open market may be indicative of less competition in the specific medicine markets and the somewhat limited scope for improving the public procurement rate. The comparison of RMSC prices and market price shows the possible cost savings and efficiency gains through a centralized system whereby government acts as a monopolist to procure at a lower rate. The analysis of the procurement process shows that more than two third of the medicines procured had more than three bidders, suggesting adequate interest and competition among manufacturers. The checks and balances incorporated in the RMSC procurement system and demand estimation process at the beginning of the year are also allowing the government to avoid possible shortages in supply.

The 2-year experience of MNDY points to an overall improvement in health outcomes, financial risk protection and health system expansion. The efficiency of the procurement process has significantly improved, while delivery of medicines and supplies has been made very effective. While the underlying reforms associated with accelerated investment are a bold and innovative step, there is a need to emphase its sustenance. Rather than treating it as a one-off project-based initiative, the Government of Rajasthan must endeavour to institutionalize these

reforms. The experience and evidence generated from this study clearly points to the need for replication and rapid scale up of such a model in other states, endeavouring to make progress in medicine procurement and distribution.

Our ABC analysis of medicines distributed in the public health facilities underlines the need for taking a hard look at the consumption pattern, since a large share of the budget appears to be utilized for procuring and dispensing anti-infectives for systemic use. A systematic and a sustained prescription audit may be required at the facility level to contain overuse of antibiotics.

9.2 SURVEY CONCLUSIONS WITH REGARD TO UNIVERSAL HEALTH COVERAGE IN INDIA

The Millennium Development Goals (MDGs) clearly acknowledge the need to improve access by the poor to essential drugs on a sustainable basis. Essential pharmaceuticals in UHC have to be seen in the context of proper quality, availability, prices and procurement systems. A reliable supply of pharmaceuticals and consumables, good diagnostics, technologies such as information and communications technology (ICT) and other technologies as well as health facilities (PHCs, clinics, hospitals, etc.) are all also crucial.[24] However, assured access to essential medicines can only occur when there is government commitment, adequate public sector financing, careful selection, efficient procurement and distribution systems and up-to-date information about the availability and affordability of medicines at the point of care. This complex web of activities requires cooperation between the public and private sectors, prescribers and dispensers, and between different government institutions.

When medicines are not available in the public sector, patients are forced to purchase medicines OOP from the higher priced private sector, or forgo treatment altogether. Such expenditure is the main reason for the catastrophic and impoverishing health costs in India. Therefore, essential medicines which satisfy the priority health-care needs of the population should be made available within the context of the health system at all times in adequate amounts, in appropriate dosage forms, with assured quality and at a price the individual and the community can afford.

As brought out well by the High Level Expert Group on Universal Health Coverage (2012), many Indian states spend too little funds on medicines to allow for sufficient improvements in public health service provision. There is a clear need for states to substantially increase not only their health expenditure but also medicine expenditure.

To increase access to medicines in public health facilities requires setting up systems to make a substantial list of medicines available at affordable costs to society. Managing medicines supply for an entire state is a daunting task and requires substantial professional expertise that can only be built up over time, and with high-level financial, bureaucratic and political support. Tamil Nadu has built such a system over many years, and now Rajasthan has also demonstrated that it is possible to build such a capacity and infrastructure, albeit with several years of preparation and capacity building. The expertise and staff experience of both Tamil Nadu and Rajasthan can be used to support and build capacity in other states of India.

This report describes the developments and (intermediate) results of the Rajasthan MNDY system in great detail. The main achievements are: expenditure on essential medicines went up (tenfold); impoverishment due to medicines went down by one third; attendance at health facilities went up by two to three times and made public health care much more attractive for patients (as a result of which staff became more responsible and responsive); and medicines availability went up and stock-outs went down, substantially improving access to medication.

As often happens when a new system is installed, new challenges appear – largely thanks to better information becoming available. The increase in medicines spending went more to the tertiary level and less to the primary care level. This may be expected to change over time, as (a) a large proportion of patients are served at higher levels of care for their OPD medicines, and (b) people may have to get used to medicines being available in primary care facilities. The other remarkable finding is the concentration of costs in one therapeutic area "anti-infective for systemic use" (ATC J). A positive aspect is that such data on medicine use is now available and can be further analyzed. Another finding of the survey suggests that several rational drug use indicators are at quite an acceptable level. This is likely to be the result of substantial training, information provision and capacity building by the RMSC during the build-up and introduction of the MNDY scheme. In comparison to other central

medicine procurement schemes (in India and abroad), RMSC has invested heavily in the clinical side of medicines supply and in treatment guidelines. It is obviously paying off and will reduce irrational prescribing and wastage of scarce resources.
Within the common goals of UHC, the achievements to date of Rajasthan (and other states with similar systems and initiatives) are a clear signal that taking up of procurement and supply chain management of medicines supply as the first action point is improving the attractiveness of public health care, reducing the financial burden on the population and improving the working conditions and professionalism of the public health staff. While medicines supply has reached a sustainable level in Tamil Nadu, Rajasthan now has to demonstrate that it has also developed a sustainable system. To achieve this, continued political support is required.

Rajasthan, Tamil Nadu and several other states have also demonstrated that good management and the right organizational set-up are critical success factors. To adequately manage medicines supply, a dedicated organization solely focused on this important task is needed.

To ensure that similar initiatives in improving access to medicines take root in other states, lessons from successful implementation should be shared with the ministry of health of all states of India. Common challenges that can be addressed for each function of the medicines management system are as follows:

- A well-functioning IT system to manage the procurement, distribution, warehousing and dispensing of medicines is the backbone and a critical success factor. Investments in such a system are a necessary precondition for any access to medicines initiative.
- Estimation of the real requirements for medicines as per the level of care is difficult as attendance grows unevenly. Initial under- or over-supply is unavoidable.
- Access to medicines should prioritize primary care to allow more people to benefit (especially the poor), to prevent patients seeking medication at higher levels of care, and to encourage primary-care physicians in their professional practice.
- Selection of medicines from the state essential drug lists and compliance with standard treatment guidelines are necessary to ensure that the most cost-effective treatment is provided to improve treatment results, and to reduce costs for the state.

- Competitive bidding procedures are now common in procurement of medicines. However, more flexible arrangements are needed to allow cost-effective procurement of low volume and slow moving items, and to increase flexibility in the delivery schemes (quarterly deliveries based on needs) to reduce intermediate stock levels.
- The state level regulatory authorities should be strengthened in terms of manpower, capacity building and quality management systems. Quality assurance of medicines is an integral part of drug management. Successful programmes like Rajasthan, Tamil Nadu and others have made quality assistance and laboratory testing of samples a daily routine that is integrated in the supply chain. Quality control requires additional investments in equipment, facilities and staff. This must be taken care of from the beginning. Quality should never be compromised if one is to ensure continued trust in the medicines supplied.
- Increasing the use of quality-assured generic medicines could be a key strategy for improving the affordability of medicines. A range of policy options is available to promote the use of generics, including fostering and developing generic medicine policies and advocacy for their dissemination and use.
- Once medicines supply systems are in place, new tasks emerge. Logistic optimization is only possible once the system is filled with products and material flows are operational; efficiency gains can be achieved only then. The quality of the drug supply system itself (good practices) also needs further attention and improvement once systems are in place. Capacity building in medicines supply management at all levels needs to be taken to higher levels by continuous training which is embedded in the annual routine.

Rajasthan, Tamil Nadu and a few other states have demonstrated that access to medicines can be improved substantially with the right mix of technical skills, funding and political will and support. To contribute further to achieving UHC, access to medicines should move from being a political issue towards being a public health precondition.[25,26]

ANNEXES

ANNEX 1
LIST OF HEALTH FACILITIES SURVEYED

District hospital	CHC	PHC 1	PHC 2
Baran	Kishanganj	Bhanwargarh	Bohat
	Anta	Bambuliya maharaj	Barwa
	Mangrol	Relavan	Koyla
Barmer	Ramsar	Gagaria	Khandhin
	Dhudha (Kawas)	Batadu	Sawai Padamsing
	Baytu	Gida	Kanod
	Sindhri	Hodu	Shivkar
Bharatpur	Rarha	Ajan	Ambaar
	Kumher	Dehara	Dhanwara
	Uchchain	Behnara	Jhil ka Bara
	Nandbai	Barolichhar	Hantera
Bikaner	Gajner	Akkasar	Gadhiyala
	Deshnok	Palana	Barsingsar
	Loonkaransar	Surnana	Kalu
Chittorgarh	Bengu	Nandbai	Rayata
	Kapasan	Singhpur	Dhamana
	Kanera	Keli	Arnod
Churu	Dudhwakhara	Jodi	Sirsala
	Rajgarh	Dadrewa	Hameerwas
	Sardarsahar	Pulasar	Bandnhou
Jaipur	Chomu	Kushalpura	Samod
	Bassi	Tunga	Rajwari
	Phagi	Chauru	Madhorajpura
Jhalawar	Dug	Unhel Nageshwar	Gangadhar
	Jhalrapathan	Mandawar	Donda
	Khanpur	Panwada	Harigarh
	Sunel	Sirpoi	Sangriya
Karauli	Mandrayal	Langra	Kudgaon
	Masalpur	Fatehpur	Saypur
	Tadabhim	Balghat	Baunl
Udaipur	Barganw	Bedla	Losing
	Nai	Pai	Savinakhera
	Gogunda	Nandeshma	Padrada
	Jhadol	Mohmmad Phalasiya	Ogana

ANNEX 2

SURVEY INSTRUMENT FOR HEALTH SYSTEM PREPAREDNESS ON ACCESS TO MEDICINE

Form No. 1		
Tool for situational analysis of health system preparedness on access to medicines		1----------Yes 2----------No 3----------Do not know
Medicine supply system		
1	Is public sector medicine procurement pooled at the state level or is procurement done at regional/district levels?	
2	Who is responsible for public sector medicines procurement and distribution?	
	Department of Health (DOH)	
	Nongovernmental organizations (NGO)	
	Private institutions contracted by the government	
	Individual health institutions	
	Autonomous agencies/corporations	
	Other government departments	
3	What type of tender process is used for public sector procurement?	
	National competitive tender	
	International competitive tender	
	Negotiation/direct purchasing	
	Others (specify)	
4	Is there a governing board overseeing the medicine procurement in your state?	
5	Are there separate committees for different procurement steps – indenting, tender floating and opening bids and quality assurance?	
If the response to 5 is “no”, skip to 7		
6	Who are the persons involved in the committee?	
	DOH (Directorates of Public Health, Medical Education)	
	Non-administrative (doctors from medical colleges, pharmacologists, medical specialists)	
	Finance	
	Health managers/procurement specialists/district managers	
	NGOs	
	Academicians	
	Development partners (WHO, World Bank, USIAD, DfiD, etc.)	
7	Does the public sector medicines procurement procedure use a prequalification system?	
8	Is public sector procurement limited to medicines on the Essential Medicines List (EML)?	
If the response to 8 is “no”, skip to 10		

9	If yes, are there provisions for purchasing medicines not on the EML?	
Please capture the response here:		
10	Is there a medicine demand estimation process at the state level?	
	Consumption – based on previous year's consumption	
	Morbidity – based on epidemiological trends	
	Procurement – based on previous year's purchase	
	Finance – based on availability of funds	
	Others (specify)	
If "no" to 10, skip to question 12		
11	How often is demand estimation carried out? (monthly, quarterly, annually)	
12	How often is the tender floated? (monthly, quarterly, annually, need based)	
If the response to 12 is "nil", skip to 20		
13a	Does tender process have a two-bid system, separate for technical and financial?	
13b	Does the tender document have information on	
	Volume of medicines to be purchased	
	Qualification criteria	
	Schedule M	
	Need of pharmacist at production site	
	Annual turnover	
	Market standing	
	Price relaxation for SSI	
	Preference policy for PSU	
	Earnest money deposit	
	Tender opening date	
	Tender announcement process	
	Supply schedule	
	Quality criteria	
	Payment schedule	
	Distribution schedule	
	Penalty on quality	
	Penalty on supply schedule	
14	What is the active duration of a tender? (number of days)	
15	For how many medicines were tenders floated last year (enter the number) and how often is tender floated (collect the information on the name and the number of the medicine)?	

16	How many tender applications did you receive in the last year?	
17	How many tender applications were successful (collect the name and the number of medicines)?	
18	How many medicines were selected through these tenders (collect the name and the number of the medicines)?	
Collect above mentioned information for last three years		
19	How much time does it take from tender announcement to selection of parties for approval of tender or L1/L2/L3 rates?	
20	Do you have dedicated warehouse or storage space for medicines?	
21	At what level is the warehousing or storage done?	
	State level	
	District level	
	Facility level	
22	Is there a method in place to control temperature (e.g. roof and ceiling with space between them in hot climates, air conditioners, fans, etc.)?	
	Are there windows that can be opened or are there air vents?	
	Is there a cold storage in the facility?	
	Is there a regularly filled in temperature chart for the cold storage?	
	Are medicines stored directly on the floor?	
	Are medicines stored in a systematic way (e.g. alphabetical, pharmacological)?	
	Is inventory management done using first-expiry-first out (FEFO) or first-in-first-out (FIFO)?	
	Is there an evidence of pests in the area?	
23	How is your procurement management information system?	
	Internet enabled real time	
	Manual	
	System based offline	
24	Is you procurement payment mechanism electronic?	
25	On an average, how many days does it take to process the payment?	
26	What are the criteria for making payments?	
	Quality report	
	Delivery schedule compliance report	
	Any other	
Try to verify the time taken through physical verification of the documents as far as possible		

Do you want to share something else on the medicine procurement system of your state/ facility, verify information through the documents?		
Medicine financing		
27	What is the total public expenditure for medicines for the last three years for which data are available? (in rupees)	
28	What is the share of State and NRHM and other centrally funded schemes as part of the total government spending on medicine for last 3 years?	
	State allocation	
	NRHM and other central schemes	
29	Is there a state policy to provide at least some medicines free of charge (i.e. patients do not pay out-of-pocket for medicines) at public primary care facilities?	
	If yes (which all medicines)?	
	All EML	
	OPD	
	IPD	
	Malaria	
	Tuberculosis	
	HIV	
	Others	
30	Are there any fees charged for medicine at the facilities?	
31	Is revenue from fees or the sale of medicines used to pay the salaries or supplement the income of public health personnel in the same facility?	
Do you wish to share any other information on medicine financing at your state/facility?		
Rational use of medicines		
32	Is there a list of essential medicines in the State?	
If the response to 32 is “no” then skip to 45		
33	How many medicines are there in the state list of essential medicines/EML?	
34	Is the state list differentiated across the level of care?	
35	How many paediatric formulations are included in the state list of essential medicines?	
36	When was the state EML last updated?	
37	Is the state EML being used in public procurement?	
38	Is there a committee responsible for the selection of products on the state EML?	
39	Who are the representatives of the committee?	
	Clinical specialists	
	Pharmacologists	
	Directorate (DOH) representatives	

	Finance representatives	
	Procurement agency	
	Academia	
	District level representatives	
	Others	
40	Does the state have standard treatment guidelines (STGs)?	
41	For which conditions do you have STGs?	
42	Are STGs followed	
	Always	
	Often	
	Sometimes	
	Rarely	
	Never	
43	Do the following prescribing issues form a part of the basic curricula in the medical/pharmacy colleges?	
	EML based prescription for doctors	
	STG for doctors	
	Problem based pharmacotherapy for doctors	
	Rational prescription for doctors	
	EML based prescription for pharmacists	
	Problem based pharmacotherapy for pharmacists	
	Rational prescription substitution for pharmacists	
44	Have there been any public education campaigns about rational medicines use in the previous two years conducted by the Health Ministry, an NGO, or academia on the following topics?	
	Use of antibiotics	
	Use of injections	
	Other rational medicine use topics/issues	
45	Is there a mandatory requirement to organize/develop medicine and therapeutics committees at hospital level/district hospitals/CHCs, etc?	
46	What proportion of hospitals and regions has medicine and therapeutics committees?	
	Public facility	
	Private hospital	
Do you wish to share any other information on the rational use of medicine in your state/facility?		
Dispensing and prescription policy		
47	Are there legal provisions for the following:	
	Licensing and practice of prescribers	

	Licensing and practice of pharmacy	
48	Is prescribing by generic name obligatory in the:	
	Public sector	
	Private sector	
49	Is generic substitution (voluntary or obligatory) permitted in the :	
	Public sector	
	Private sector	
	Do you wish to share any other information on the dispensing and prescription policy of medicines in your state/facility?	
	State medicines policy	
50	Is there a comprehensive state medicines policy (SMP) document, which includes all aspects, inclusive of finance, procurement and dispensing of medicines, and access to medicine?	
If the answer to question 50 is “no”, skip to question no 57		
51	If yes, is it an official or draft document?	
52	What year was it last updated?	
53	Is there an SMP implementation plan that sets activities, responsibilities, budget and timeline?	
54	If yes, when was it last updated?	
55	Is the SMP integrated into or included in the published/official state health policy/plan?	
56	If yes, when was the state health policy/plan last updated?	
57	Has a state assessment/indicator study been conducted?	
If “no” to question 57, skip remaining questions		
58	If yes, which topics have been studied and when was the most recent study covering each topic conducted:	
	Overall pharmaceutical situation	
	Rational use/prescription audit	
	Access (i.e. prices, affordability and/or availability) to medicines	
Do you wish to share any other information on the state medicine policies in your state/facility?		

ANNEX 3

SURVEY INSTRUMENT FOR PUBLIC HEALTH FACILITIES

Form No. 2	
Facility level medicine availability and stock out tool for health facility	
Questionnaire number (in three digits e.g. 001)	
Team number	
State (with State Code) (Ref. Annex 1)	
District in which facility is located (with district code) (Ref. Annex 2)	
Type and name of facility	Medical college 1
	District hospital 2
	Sub-divisional hospital 3
	CHC 4
	PHC 5
Date of interview	
Job title of respondent (registration certificate / license details, if private facility)	Medical Officer 1
	Pharmacist 2
	Procurement officer 3
	Others 4

(I) Facility level case load				
Number of outpatients	**Day (previous)**	**Week (previous)**	**Month (previous)**	**Year**
2012–2013				
2011–2012	Not applicable			
2010–2011				
Number of Inpatients				
2012–2013				
2011–2012	Not applicable			
2010–2011				

(II) Budget allocation/expenditure (₹)						
	Overall Budget	**Other state programme budget (1)**	**Other state programme budget (2)**	**NRHM budget**	**Other national programmes**	**Others**
2012–2013						
2011–2012						
2010–2011						
2009–2010						
2008–2009						

(III) Storage Conditions	
Do you have dedicated warehouse or storage space for medicines?	Yes_____1 No_____2 Do not know__3
Is there a method in place to control temperature (e.g. roof and ceiling with space between them in hot climates, air conditioners, fans, etc.)?	Yes_____1 No_____2 Do not know__3
Are there windows that can be opened or there are air vents?	Yes_____1 No_____2 Do not know__3
Is there a cold storage in the facility?	Yes_____1 No_____2 Do not know__3
Is there a regularly filled in temperature chart for the cold storage?	Yes_____1 No_____2 Do not know__3
Are medicines stored directly on the floor?	Yes_____1 No_____2 Do not know__3
Are medicines stored in a systematic way (e.g. alphabetical, pharmacological)?	Yes_____1 No_____2 Do not know__3
Is there an evidence of pests in the area?	Yes_____1 No_____2
Is inventory management done using first expiry first out (FEFO) or first in first out (FIFO)method?	FEFO_____1 FIFO_____2 None_____3
How often do you indent medicines for your facility? Capture the response in number of days.	
What is the average number of medicines that you indent each time (number of medicines and not the type of medicines)?	
Do you receive all indented medicines?	
What is the average number of medicines received in last three indents (% of the number of medicines indented)?	
Do you always get the medicines indented or you also receive non-indented medicines?	Indented only
Indented +non indented	
Which are the major medicines you indent? (collect photocopy of the indent)	
Do you consult any one before indenting?	
If yes, whom do you consult and why?	
Who is responsible for indenting of medicines at your facility?	

How is payment done of medicines that you receive at your facility?			
How much time does it take for you to receive indented medicines from the day of indent?			
(IV) Human resources			
Who manages the medicine procurement system at the facility level?			Medical Officer Pharmacist Manager Other-pleasespeci-fy(_____)
Was a pharmacist there during the time of visit?			Yes_____1 No_____2 Do not know__3
Who was dispensing medicines during the time of visit?			Pharmacist Health assistant Nurse Untrained staff Do not know

ANNEX 4

SURVEY INSTRUMENT FOR PRIVATE PHARMACIES

Form No. 3	
Facility availability and stock out tool for private chemist	
Questionnaire number (in three digits, e.g. 001)	
Team number	
State (with State Code) (Ref. Annex I)	
District in which facility is located (with district Code) (Ref. Annexure –II)	
Pharmacy is close to which facility	Medical college 1 2 3 4
District hospital	
Sub-divisional hospital	
CHC	
Date of interview	
Job title of respondent (Registration certificate/license details, if private facility)	Owner of the store 1 Pharmacist 2 Other 3
Storage conditions	
Do you have any other place to store medicines apart from the pharmacy?	Yes_____1 No_____2 Do not know__3
Is there a method in place to control the temperature in the pharmacy and store as well (e.g. roof and ceiling with space between them for hot climates, air conditioners, fans, etc.).	Yes_____1 No_____2 Do not know__3
Are there windows that can be opened or are there air vents?	Yes_____1 No_____2 Do not know__3
Is there a cold storage in the facility?	Yes_____1 No_____2 Do not know__3
Is there a regularly filled in temperature chart for the cold storage?	Yes_____1 No_____2 Do not know__3
Are medicines stored directly on the floor?	Yes_____1 No_____2 Do not know__3
Are medicines stored in a systematic way (e.g. alphabetical, pharmacological)?	Yes_____1 No_____2 Do not know__3
Is there an evidence of pests in the area?	Yes_____1 No_____2
Inventory management	
Is inventory management done using first-expiry-first out (FEFO) or first in first out (FIFO)?	FEFO_____1 FIFO_____2 None_____3
How often do you order medicines for your store?	
Do you always get the medicines ordered?	Yes_____1 No_____2

Which are the major medicines you indent? (collect photocopy of the indent)	
What has been the reason for ordering those medicines?	
Do you consult any one before ordering and what is the purpose of the consultation?	
(Capture the response here)	
Who is responsible for ordering?	
What is the payment schedule to the stockist (credit period in days)?	
What is the approximate margin that you have on medicines? (%)	
What do you think is the margin of the stockist? (%)	
Are there any levels above the the stockist?	Yes/No
If yes, what are their margins?	
How much time does it take for you to receive medicines after order is placed? (in days)	
Does the stockist have all the items?	
If not, where do you get those medicines from?	
Are there any promotional schemes from the stockist where you indent medicines?	Yes_____1 No_____2
What are the types of promotional schemes?	
How do you know about promotional schemes?	
Is your indenting based on the schemes?	
Do you know what “essential medicine” means? Please explain.	
Human resources	
Was a pharmacist there during the time of visit?	Yes_____1 No_____2
Who was dispensing medicines during the time of visit?	Pharmacist
	Assistant
	Any other
	(_____)

Medicines availability at primary level						
Medicine code	**Medicine name**	**Type of formulation**	**Dosage**	**Availa-bility on the day of survey (yes/no)**	**Number of days of stock-outs in last 6 months (manual check of stock register)**	**Is there expired medicine on the shelf (yes/no)**
P01	Acetyl salicylic acid	Tablets	75mg, 100mg, 350 mg soluble/dispersible			
P02	Activated charcoal	Oral				
P03	Adrenaline bitartrate	Injection	1 mg/ml			
P04	Albendazole	Suspension	200 mg/5 ml			
P05	Albendazole	Tablets	400 mg			
P06	Alprazolam	Tablets	0.25 mg; 0.5 mg			
P07	Aluminium hydroxide + magnesium hydroxide	Tablet/suspension				
P08	Amlodipine	Tablets	2.5 mg; 5 mg			
P09	Atenolol	Tablets	50mg; 100 mg			
P10	Atropine sulphate	Injection	1 mg/ml			
P11	Beclomethasone dipropionate	Inhalation	50 µg, 250µg/dose			
P12	Benzyl benzoate	Lotion	25 %			
P13	Betamethasone dipropionate	Cream/ointment	0.05%			
P14	Calcium carbonate	Tablets	250 mg, 500 mg			
P15	Calcium gluconate	Injection	100mg/ml			
P16	Cetrizine	Syrup	5 mg/ml			
P17	Cetrizine	Tablets	10mg			
P18	Chloramphenicol	Drops/ointment	0.4%, 1%			
P19	Chlorpheniramine maleate	Tablets	4 mg			
P20	Ciprofloxacin hydrochloride	Drops/ointment	0.3%			

P21	Ciprofloxacin hydrochloride	Injection	200 mg /100 ml			
P22	Ciprofloxacin hydrochloride	Tablets	250 mg, 500 mg			
P23	Co-trimoxazole (trimethoprim+ sulphamethoxazole)	Suspension	160 + 800 mg; 40 + 200 mg/5 ml			
P24	Co-trimoxazole (trimethoprim+ sulphamethoxazole)	Tablets	80 + 400 mg,			
P25	Cyanocobalamin	Injection	1 mg/ml			
P26	Dexamethasone	Injection	4 mg/ml			
P27	Dexamethasone	Tablets	0.5 mg			
P28	Diazepam	Injection	5 mg/ml			
P29	Diazepam	Tablets	5 mg			
P30	Dicyclomine hydrochloride	Injection	10 mg/ml			
P31	Dicyclomine hydrochloride	Tablets	10 mg			
P32	Domperidone	Syrup	1 mg/ml			
P33	Domperidone	Tablets	10 mg			
P34	Ethinylestradiol + levonorgesterol	Tablets	0.03 mg +0.15 mg			
P35	Ferrous sulphate/fumrate	Tablets	Tablets equivalent to 60 mg elemental iron			
P36	Fluoxetine hydrochloride	Capsules	20 mg			
P37	Folic acid	Tablets	1 mg , 5mg			
P38	Furosemide	Injection	10 mg/ml			
P39	Furosemide	Tablets	40mg			
P40	Gentian violet	Paint	0.5%; 1%			
P41	Glibenclamide	Tablets	2.5 mg; 5mg			
P42	Glyceryl trinitrate	Injection	5mg/ml			
P43	Glyceryl trinitrate	Sublingual tablets	0.5 mg			
P44	Hydrocortisone sodium succinate	Injection	100 mg, 200mg, 400 mg			

P45	Ibuprofen	Syrup	100mg/5ml			
P46	Ibuprofen	Tablets	200 mg, 400 mg			
P47	Insulin injection (soluble)	Injection	40 iu/ml			
P48	Intermediate acting (lente/nph insulin)	Injection	40 iu/ml			
P49	Ipratropium bromide	Inhalation	20µg/metered dose			
P50	Isosorbide 5 mononitrate/dinitrate	Tablets	10 mg, 20 mg			
P51	Ketamine hydrochloride	Injection	10 mg///ml; 50 mg///ml			
P52	Levodopa+ carbidopa	Tablets	100 mg+10 mg; 250 mg +25 mg; 100 mg+25 mg			
P53	Levothyroxine	Tablets	50µg; 100 µg			
P54	Lignocaine hydrochloride	Injection	1-2%,			
P55	Lignocaine hydrochloride	Spinal	5% +7.5% glucose			
P56	Lignocaine hydrochloride	Topical forms	2-5%,			
P57	Mannitol	Injection	10%, 20%			
P58	Medroxy progesterone acetate	Tablets	5mg; 10mg			
P59	Metformin	Tablets	500mg			
P60	Methyl ergometrine	Injection	0.2mg/ml			
P61	Methyl ergometrine	Tablets	0.125mg			
P62	Metronidazole	Injection	500 mg /100 ml			
P63	Metronidazole	Tablets	200 mg, 400 mg			
P64	Multivitamins (As per Schedule V of Medicines and Cosmetics Rules)	Tablets				
P65	N-acetylcysteine	Injection	200 mg/ml (5 ml)			
P66	Neomycin + bacitracin	Ointment	5 mg + 500 iu //g			
P67	Normal saline	Injection	0.9%			

P68	Omeprazole	Capsules	10mg, 20mg, 40mg			
P69	Oral rehydration salts	Powder for solution	As per ip			
P70	Paracetamol	Syrup	125 mg //5ml			
P71	Paracetamol	Tablets	500 mg			
P72	Pheniramine maleate	Injection	22.75 mg //ml			
P73	Phenytoin sodium	Tablets or capsules	50mg,100 mg			
P74	Phenytoin sodium	Syrup	200 mg/ml			
P75	Phenytoin sodium	Injection	20 mg/5ml			
P76	Polyvalent antisnake venom	Injection	10 ml			
P77	Povidone iodine	Solution or ointment	5%			
P78	Pralidoxime chloride(2-pam)	Injection	25 mg/ml			
P79	Prednisolone	Tablets	5mg,10mg, 20 mg			
P80	Prednisolone acetate	Drops	0.1%			
P81	Premix Insulin 30:70 injection	Injection	40IU/ml			
P82	Promethazine	Syrup	5 mg //5 ml			
P83	Rabies vaccine	Injection				
P84	Ranitidine	Injection	25 mg //ml			
P85	Salbutamol sulphate	Inhalation	100µg/dose			
P86	Salbutamol sulphate	Syrup	2mg/5ml			
P87	Salbutamol sulphate	Tablets	2mg, 4mg			
P88	Silver sulphadiazine	Cream	1%			
P89	Sodium valproate	Syrup	200 mg/ml			
P90	Sodium valproate	Tablets	200mg,500 mg			
P91	Tetanus toxoid	Injection				
P92	Vitamin A	Tablets Capsules	5000 IU, 50000IU, 100000 IU			

P68	Omeprazole	Capsules	10mg, 20mg, 40mg			
P69	Oral rehydration salts	Powder for solution	As per ip			
P70	Paracetamol	Syrup	125 mg //5ml			
P71	Paracetamol	Tablets	500 mg			
P72	Pheniramine maleate	Injection	22.75 mg //ml			
P73	Phenytoin sodium	Tablets or capsules	50mg,100 mg			
P74	Phenytoin sodium	Syrup	200 mg/ml			
P75	Phenytoin sodium	Injection	20 mg/5ml			
P76	Polyvalent antisnake venom	Injection	10 ml			
P77	Povidone iodine	Solution or ointment	5%			
P78	Pralidoxime chloride(2-pam)	Injection	25 mg/ml			
P79	Prednisolone	Tablets	5mg,10mg, 20 mg			
P80	Prednisolone acetate	Drops	0.1%			
P81	Premix Insulin 30:70 injection	Injection	40IU/ml			
P82	Promethazine	Syrup	5 mg //5 ml			
P83	Rabies vaccine	Injection				
P84	Ranitidine	Injection	25 mg //ml			
P85	Salbutamol sulphate	Inhalation	100µg/dose			
P86	Salbutamol sulphate	Syrup	2mg/5ml			
P87	Salbutamol sulphate	Tablets	2mg, 4mg			
P88	Silver sulphadiazine	Cream	1%			
P89	Sodium valproate	Syrup	200 mg/ml			
P90	Sodium valproate	Tablets	200mg,500 mg			
P91	Tetanus toxoid	Injection				
P92	Vitamin A	Tablets Capsules	5000 IU, 50000IU, 100000 IU			

S21	Dopamine hydrochloride	Injection	40 mg//ml			
S22	Factor VIII concentrate	Injection	Dried			
S23	Fluconazole	Capsules or tablets	50mg, 100mg, 150mg, 200mg			
S24	Heparin sodium	Injection	1000 iu /ml; 5000 iu/ml			
S25	Iron dextran	Injection	50 mg iron/ml			
S26	Losartan potassium	Tablets	25 mg; 50 mg			
S27	Magnesium sulphate	Injection	500 mg /ml			
S28	Methotrexate	Tablets	5mg, 7.5mg, 10mg			
S29	Methyl prednisolone	Injection	40 mg/ml			
S30	Morphine sulphate	Tablets	10 mg			
S31	Nifedipine	Capsules/tablets Sustained release tablets/capsules	5 mg, 10mg, 10mg, 20mg			
S32	Ondansetron	Injection	2mg/ml			
S33	Ondansetron	Syrup	2 mg/ml			
S34	Ondansetron	Tablet	4mg, 8 mg			
S35	Oxytocin	Injection	5 IU/ml; 10IU/ml			
S36	Permethrin	Cream/lotion	5%//1%, 5%			
S37	Streptokinase	Injection	750,000 IU; 15,00,000 IU			
S38	Tramadol	Capsule	50 mg,100 mg			
S39	Tramadol	Injection	50 mg/ml			
S40	Warfarin sodium	Tablets	5 mg			

Medicines availability at primary level						
Medicine code	**Medicine name**	**Type of formulation**	**Dosage**	**Availability on the day of survey (yes/no)**	**Number of days of stock-outs in last 6 months (manual check of the stock register)**	**Is there any expired medicine on the shelf (yes/no)**
T01	Allopurinol	Tablets	100 mg			
T02	Alpha interferon	Injection	3 million IU			
T03	Amoxicillin + clavulinic acid	Injection	600mg, 1.2gm			
T04	Amoxicillin + clavulinic acid	Powder for suspension	228.5mg/5ml			
T05	Amoxicillin + clavulinic acid	Tablets	625 mg			
T06	Betaxolol hydrochloride	Drops	0.25%, 0.5%			
T07	Cefixime	Tablet	100, 200mg			
T08	Clomiphene citrate	Tablets	50mg, 100mg			
T09	Clopidogrel	Tablets	75 mg			
T10	Cyclophosphamide	Injection	500 mg			
T11	Cyclophosphamide	Tablets	50 mg, 200mg			
T12	Cyclosporine	Capsules	10mg, 25mg, 50mg, 100mg			
T13	Diclofenac	Injection	25 mg/ml			
T14	Fresh frozen plasma	Injection				
T15	Glucagon	Injection	1mg/ml			
T16	Imatinib	Tablets	100 mg, 400 mg			
T17	Lithium carbonate	Tablets	300 mg			
T18	Methyl cellulose	Injection	2%			
T19	Mifepristone	Tablets	200mg			

T20	Misoprostol	Tablets	100µg			
T21	Morphine sulphate	Tablets	10 mg			
T22	Pantoprazole	Injection	40 mg			
T23	Sodium valproate	Injection	100 mg/5ml			
T24	Tamoxifen citrate	Tablets	10 mg, 20 mg			
T25	Testosterone	Capsules	40mg(as undecanoate)			
T26	Testosterone	Injection	25mg/ml(as propionate)			
T27	Urokinase	Injection	500,000 iu/ml; 10,00,000 iu/ml			
T28	Vancomycin hydrochloride	Injection	500 mg, 1 g			

Rajasthan medicine code	Name of medicine 2012–13	quantity consumed	Unit	Average approved rate for procurement from the private sector in 2012–13 (₹)	TNMSC approved rate in 2012-13 (₹)	TNMSC rate / RMSC rate	Percentage change from RMSC rate(`)
12	Lignocaine gel 2%	361 238	30 gm tube	18.4	11.6	0.6	-37
17	Diclofenac gel 1%	1 949 774	20 gm tube	3.6	3.1	0.8	-15
19	Diclofenac sodium inj. 25mg/ml	595 060	3 ml amp X 10	12.2	10.8	0.9	-11
27	Paracetamol syrup 125mg/5ml	3 309 609	60 ml bottle	4.3	4.8	1.1	11
28	Paracetamol tab. 500mg	1 402 620.96	10 x 10 tab	18.7	18.8	1.0	0
36	Cetirizine tab. 10mg	598 349.83	10 x 10 tab	6.9	9.7	1.4	40
42	Hydrocortisone sod. succinate inj. 100mg/vial	490 926	Vial	10.6	10.5	1.0	-1
44	Methyl prednisolone sodium succinate inj. 500mg	65 250	Vial	103.9	97.3	0.9	-6
65	Albendazole oral susp. 400mg/10ml	7 330 667	10 ml bottle	3.2	3.3	1.0	4
68	Amikacin inj. 500mg	2 363 524	2 ml vial	5.6	6.3	1.1	12
71	Amoxycillin cap. 250mg	213 053.82	10 x 10 cap	65.3	61.6	0.9	-6
79	Azithromycin tab. 250mg	88 043.14	10 x 10 tab	235.0	245.0	1.0	4
87	Cefotaxime inj. 1g	2 151 895	Vial	9.1	9.5	1.0	4
93	Ceftriaxone injection 1 g	3 787 963	Vial	10.1	10.0	1.0	-1
96	Cephalexin cap. 250mg	111 566.89	10 x 10 cap	96.9	103.5	1.1	7
107	Co-trimoxazole oral susp. 40mg+200mg/5ml	2 148 858	50 ml bottle	6.1	5.9	1.0	-3
109	Co-trimoxazole tab. 80mg+400mg	222 864.61	10 x 10 tab	50.5	43.2	0.9	-15
111	Doxycycline cap. 100mg	137 252.22	10 x 10 cap	53.0	57.0	1.1	8
119	Meropenem inj. 500mg	472 606	Vial	92.2	93.9	1.0	2

121	Metronidazole benzoate oral susp. 100mg/5ml	819 499	60 ml bottle	5.6	7.4	1.3	31
124	Norfloxacin tab. 400mg	80 549.85	10 X 10 tab	87.7	78.7	0.9	-10
137	Cisplatin inj. 50mg/50ml	33 328	50 ml vial	143.0	200.5	1.4	40
221	Povidone iodine oint. 5%	1 837 342	15 gm tube	4.7	5.3	1.1	13
222	Povidone iodine sol. 5%	129 519	500 ml	187.7	49.5	0.3	-74
223	Powder neomycin, bacitracin with sulphacetamide 5mg+250units+60mg	372 202	10 gm plastic bottle	16.6	8.0	0.5	-52
235	Gadodiamide inj. 0.5mmol/ml	11 130	10 ml vial	720.0	802.5	1.1	11
249	Lysol cresol 50% + soap 50%	12 098.8	5 ltr. can	789.8	575.0	0.7	-27
267	Domperidone tab. 10mg	334 717.4	10 x 10 tab	12.0	10.0	0.8	-17
272	Omeprazole cap. 20mg	420087.86	10 x 10 cap	30.7	26.2	0.9	-15
274	ORS powder	4 945 313	Pouches 20.5 gms	1.8	1.6	0.9	-8
303	Human anti-d immunoglobulin inj. 300 mcg	18 889	PFS or vial	1684.0	1698.0	1.0	1
308	Snake venom anti serum (polyvalent)	128 322	10 ml vial	351.0	225.0	0.6	-36
368	Cough syrup	4 989 276	50 ml bottle	3.8	4.6	1.2	22
377	Sodium lactate inj.	1 227 175	500 ml FFS/ BFS bottle	14.0	7.5	0.5	-46
380	Dextrose inj. 5%	1 064 534	500 ml FFS/ BFS bottle	13.6	11.2	0.8	-18
385	Sodium chloride and dextrose inj. 0.9%+5%	1 083 018	500 ml FFS/ BFS bottle	13.8	11.2	0.8	-19
390	Ferrous sulphate and folic acid tab. 100mg+0.5mg	1 031 289.86	10 x 10 tab	9.8	8.0	0.8	-19
404	Water for Injection I.P.	119 080.5	10 ml amp x 50	65.5	54.5	0.8	-17

Rajasthan medicine code	Name of medicine	RMSC rate	Unit	Number of products considered	Median market price (₹)	Highest market price (₹)	Lowest market price (₹)	Volume weighted mean price (₹)	Volume weighted mean / RMSC rate(₹)	Change from RMSC rate (%)
12	Lignocaine gel 2%	18.38	30g	5	32.00	42.81	12.88	34.32	1.87	87
17	Diclofenac gel 1%	3.645	20g	14	10.24	23.73	4.82	9.91	2.72	172
19	Diclofenac sodium inj. 25mg/ml	1.22	3ml	10	2.86	6.56	1.50	2.39	1.96	96
22	Ibuprofen and paracetamol tab. 400mg+325mg	0.4046	tablet	37	0.63	5.47	0.42	0.67	1.66	66
24	Ibuprofen tab. 400mg	0.322	tablet	13	0.50	1.39	0.30	0.56	1.74	74
27	Paracetamol syrup 125mg/5ml	4.3	60ml	27	11.84	19.81	6.45	15.76	3.67	267
28	Paracetamol tab. 500mg	0.1868	tablet	90	0.64	4.40	0.14	0.71	3.83	283
36	Cetirizine tab. 10mg	0.0694	tablet	99	1.50	3.81	0.11	1.41	20.28	1928
42	Hydrocortisone sod. succinate inj. 100mg/vial	10.64	Vial	13	33.14	57.69	13.48	29.63	2.78	178
44	Methyl prednisolone sodium succinate inj. 500mg	103.91	vial	4	435.60	529.52	103.88	466.57	4.49	349
65	Albendazole oral susp. 400mg/10ml	3.16	10ml	80	13.37	23.98	5.00	16.30	5.16	416
68	Amikacin inj. 500mg	5.59	2ml vial	48	40.08	320.00	6.55	38.07	6.81	581

69	Amoxycillin and cloxacillin cap. 250mg+250mg	1.254 85	tablet	28	2.68	10.37	1.59	2.46	1.96	96
70	Amoxycillin and potassium clavulanate tab. 500mg+125mg	4.193	tablet	116	15.61	41.42	8.37	16.01	3.82	282
71	Amoxycillin cap. 250mg	0.6529	tablet	108	2.74	7.48	0.25	2.97	4.55	355
72	Amoxycillin cap. 500mg	1.1471	tablet	89	4.90	9.33	1.20	6.03	5.26	426
78	Azithromycin tab. 100mg	1.1283	tablet	44	4.49	12.35	1.38	4.98	4.41	341
79	Azithromycin tab. 250mg	2.3495	tablet	140	8.48	19.50	3.67	9.28	3.95	295
84	Cefixime tab. 100mg	1.1772	tablet	105	5.84	21.60	2.63	4.62	3.93	293
85	Cefixime tab. 200mg	2.1899	tablet	123	9.90	37.71	3.23	8.12	3.71	271
87	Cefotaxime inj. 1g	9.09	vial	39	24.06	46.20	16.40	24.33	2.68	168
89	Ceftazidime inj. 1g	18	vial	23	169.89	317.49	66.49	229.34	12.74	1174
93	Ceftriaxone injection 1 g	10.12	1g vial	85	51.20	135.22	14.85	50.86	5.03	403
95	Ceftriaxone inj. 500mg	6.025	vial	50	32.24	57.24	12.00	34.14	5.67	467

69	Amoxycillin and cloxacillin cap. 250mg+250mg	1.254 85	tablet	28	2.68	10.37	1.59	2.46	1.96	96
70	Amoxycillin and potassium clavulanate tab. 500mg+125mg	4.193	tablet	116	15.61	41.42	8.37	16.01	3.82	282
71	Amoxycillin cap. 250mg	0.6529	tablet	108	2.74	7.48	0.25	2.97	4.55	355
72	Amoxycillin cap. 500mg	1.1471	tablet	89	4.90	9.33	1.20	6.03	5.26	426
78	Azithromycin tab. 100mg	1.1283	tablet	44	4.49	12.35	1.38	4.98	4.41	341
79	Azithromycin tab. 250mg	2.3495	tablet	140	8.48	19.50	3.67	9.28	3.95	295
84	Cefixime tab. 100mg	1.1772	tablet	105	5.84	21.60	2.63	4.62	3.93	293
85	Cefixime tab. 200mg	2.1899	tablet	123	9.90	37.71	3.23	8.12	3.71	271
87	Cefotaxime inj. 1g	9.09	vial	39	24.06	46.20	16.40	24.33	2.68	168
89	Ceftazidime inj. 1g	18	vial	23	169.89	317.49	66.49	229.34	12.74	1174
93	Ceftriaxone injection 1 g	10.12	1g vial	85	51.20	135.22	14.85	50.86	5.03	403
95	Ceftriaxone inj. 500mg	6.025	vial	50	32.24	57.24	12.00	34.14	5.67	467

124	Norfloxacin tab. 400mg	0.877	tablet	26	1.34	6.80	0.81	2.53	2.89	189
125	Ofloxacin tab. 200mg	0.6095	tablet	143	3.52	26.54	0.89	3.55	5.83	483
137	Cisplatin inj. 50mg/50ml	143	50ml vial	4	208.94	435.35	168.40	343.03	2.40	140
155	Paclitaxel inj. 260mg	608.4	43.4ml vial	7	7666.93	11826.50	3151.65	7605.53	12.50	1150
166	Deferasirox tab. 500mg	33.4	tablet	1	40.13			40.13	1.20	20
171	Dried factor VIII fraction (IV use) 250 iu	2730	vial	1	1308.00			1308.00	0.48	-52
172	Enoxaparin sodium inj. 60mg	113.75	PFS vial	19	440.51	890.38	326.92	436.66	3.84	284
175	Human albumin sol. 20%	1990	100ml	8	2292.12	4087.50	1356.00	3009.17	1.51	51
216	Fusidic acid cream 2%	19.03	10g	10	545.85	726.82	277.50	659.95	34.68	3368
221	Povidone iodine oint. 5%	4.7	15g	27	22.97	60.00	7.10	44.79	9.53	853
222	Povidone iodine sol. 5%	187.65	500ml	16	83.17	211.50	57.37	182.81	0.97	-3
223	Powder neomycin, bacitracin with sulphacetamide 5mg+250units +60mg	16.59	10g	3	20.80	26.07	13.90	25.97	1.57	57
267	Domperidone tab. 10mg	0.1199	tablet	45	1.70	3.61	0.13	2.20	18.34	1734

272	Omeprazole cap. 20mg	0.3065	tablet	101	2.87	7.53	0.42	2.96	9.65	865
277	Ranitidine tab. 150mg	0.2248	tablet	56	0.43	7.52	0.27	0.45	2.01	101
303	Human anti-d immunoglobulin inj. 300 mcg	1684	PFS vial	1	2234.82			2234.82	1.33	33
308	Snake venom anti serum (polyvalent)	351	10ml vial	3	315.00	414.20	220.00	274.85	0.78	-22
366	Beclomethasone inh. 200mcg/dose	83.8	200 doses	1	264.73			264.73	3.16	216
371	Salbutamol inh. 100mcg/dose	44.93		8	68.39	148.27	59.50	79.57	1.77	77
380	Dextrose inj. 5%	13.57	500ml	9	12.50	32.00	11.48	12.07	0.89	-11
385	Sodium chloride and dextrose inj. 0.9%+5%	13.82	500ml	7	13.00	14.53	10.60	11.68	0.85	-15
427	Cephalexin oral susp. 125mg/5ml	5.8	30ml	18	19.14	32.16	9.19	27.92	4.81	381
432	Salbutamol syrup 2mg/5ml	5.62	100ml	4	10.76	11.54	9.59	10.52	1.87	87
445	Beclomethasone, neomycin and clotrimazole cream 0.025%+0.5%+1%	4.78	10g	17	26.20	56.51	9.50	44.56	9.32	832
468	Piperacillin and tazobactum inj. 4gm+500mg	48.64	vial	60	338.39	846.87	130.00	273.50	5.62	462

ANNEX 8

TOP THERAPEUTIC SEGMENTS ACCOUNTING FOR ~ 80% OF SALES IN 2012 (TOTAL MARKET ESTIMATED AT 710 MILLION INDIAN RUPEES)

Top segments by value (IMS group)	Total sales in 2012 (10 million Indian rupees)	Market share (%)
J01D Cephalosporins	5365.19	7.5
A10B Oral antidiabetics	3493.65	4.9
A02B Antipeptic ulcerants	3097.99	4.3
M01A Antirheumatic nonstr.	2444.81	3.4
J01C Ampicillin/amoxycillin	2159.64	3.0
R05B Cough preparations	1950.95	2.7
J01K All other antibiotics	1520.22	2.1
C10A Statins	1497.60	2.1
N03A ANTIEPILEPTICS	1418.89	2.0
B03A Haematinics-iron+comb	1372.27	1.9
A10C Human insulin n analogues	1240.84	1.7
J01L Quinolones	1176.26	1.7
R03C Bronchodil.inhalant prep.	1054.43	1.5
J01F Macrolides and similar	1017.23	1.4
C02F Hypotensive comb.	998.06	1.4
N02B Non-narcotics-antipyer.	989.65	1.4
C02G Diuretic combinations	929.59	1.3
B01A Anticoagulants	920.82	1.3
C01E Betablockers	815.00	1.1
A11A Multivit.with minerals	770.55	1.1
C02C Angiotensin receptor blck	770.48	1.1
H02A Sys.corticosteroids pl.	733.58	1.0
A12A Calcium prep.	722.74	1.0
R03D Bronchodilators solids	711.35	1.0
A05B Hepatic prot.lipotropic	710.21	1.0
A11F Vit.B12 and metabolites	699.82	1.0
M05C Anti-osteoporosis prep.	686.40	1.0
N06A Antidepressant-thymonal	680.14	1.0
R06A Antihistamines-systemic	679.95	1.0
A11E Vitamin B complex	641.03	0.9
C01D Calcium channel blockers	631.67	0.9
G03D Progestogen and simi.comb.	588.89	0.8
R05A Cold preparations	575.56	0.8
A02A Antacid-antiflatulents	560.56	0.8
P01D Antimalarials	543.91	0.8
M02A Topical antirheumatics	513.76	0.7
A06A Laxatives	512.28	0.7

G03K Antiprogestogens	501.71	0.7
A03C Antispasm.antichol. comb.	482.81	0.7
M03B Muscle relaxants systemic	476.05	0.7
V06B Protein and neutr. suppl.	443.99	0.6
J07C Toddler vaccine	418.81	0.6
B03C Other anti-anaemic prep.	402.37	0.6
D07D Cort.+antifung+antiinf.co	391.86	0.6
N07A Other cns medicines	391.59	0.5
N05B Tranquilizers	391.35	0.5
J04A Tuberculostatics ex	388.30	0.5
A09A Digestives inc.enzymes	387.43	0.5
V03D Medicines for sexual disorders	379.01	0.5
A01A Stomatologicals	378.34	0.5
A04C Antiemet.-antinaus sol.	378.07	0.5
A07G Ofloxacin comb.	375.35	0.5
D02A Emollients-protectives	366.34	0.5
C02B Ace inhibitors	363.39	0.5
A11I Antioxidants	345.45	0.5
G03G Gonadotrophins	330.43	0.5
H03A Thyroid preparations	316.41	0.4
A07K Oth.incl.lactic ferment	312.23	0.4
D06A Top.antibiotics plain	309.03	0.4
D08A Antiseptic-disinfectant	308.27	0.4
M05B Anti-arthritic prep.	307.77	0.4
G04B Oth.urological prep.	307.67	0.4
G03A Hormo.contracep.nontop.	305.81	0.4
V03A ALl oth.therapeutic prep.	298.69	0.4
N05A Antipsychotics	295.47	0.4
C03A Diuretics plain	295.01	0.4
G03J Medicines for BPH	292.85	0.4
D10A Antiacne preparations	287.02	0.4
L02B Other cytostatics	285.42	0.4
V06C Infant formulas	284.18	0.4
J07B Paediatric comb.vaccines	279.54	0.4

ANNEX 9

DDD FOR THIRD LEVEL OF ATC CLASSIFICATION

ATC category/name of medicine	DDDs/1000people/day
J01A	0.5458304
Doxycycline cap. 100mg	0.5458304
J01C	1.623072629
Amoxycillin and cloxacillin cap. 250mg+250mg	0.408960223
Amoxycillin and potassium clavulanate tab. 500mg+125mg	0.238159848
Amoxycillin cap. 250mg	0.211820348
Amoxycillin cap. 500mg	0.741531931
Piperacillin and tazobactum inj. 4gm+500mg	0.02260028
J01D	1.032353932
Cefixime tab. 100mg	0.148644921
Cefixime tab. 200mg	0.646482781
Cefotaxime inj. 1g	0.021394366
Ceftazidime inj. 1g	0.006884321
Ceftriaxone inj. 500mg	0.013033314
Ceftriaxone injection 1 g	0.075320653
Cephalexin cap. 250mg	0.055460487
Cephalexin cap. 500mg	0.047332076
Cephalexin oral susp. 125mg/5ml	0.013102313
Meropenem inj. 500mg	0.004698699
J01E	0.328395199
Co-trimoxazole oral susp. 40mg+200mg/5ml	0.106820861
Co-trimoxazole tab. 80mg+400mg	0.221574338
J01F	1.134911974
Azithromycin tab. 100mg	0.055567168
Azithromycin tab. 250mg	0.291778051
Azithromycin tab. 500mg	0.754562565
Erythromycin estolate oral susp. 125mg/5ml	0.03300419
J01G	0.046996808
Amikacin inj. 500mg	0.046996808
J01M	1.056584294
Ciprofloxacin tab. 250mg	0.260248636
Ciprofloxacin tab. 500mg	0.30815362
Norfloxacin tab. 400mg	0.160167015
Ofloxacin tab. 200mg	0.328015023
J01X	0.21172443
Metronidazole tab. 400mg	0.21172443

ANNEX 10

COST OF PROCURING A SINGLE DAILY DOSE AT CURRENT PROCUREMENT RATES

ATC code, name of medicine	Cost/DDD (₹)
A02B	
Omeprazole cap. 20mg	0.3
Pantoprazole inj. 40mg	6.0
Ranitidine tab. 150mg	0.4
A03F	
Domperidone tab. 10mg	0.4
A10A	
Biphasic isophane insulin inj. 30/70 40 IU/ml	4.3
A11C	
Vitamin A sol. 1 lac IU/ml	0.2
B01A	
Enoxaparin sodium inj. 60mg	37.9
B02B	
Anti-inhibitor coagulation complex (human plasma protein with a factor VIII inhibitor) 500IU	19 500
Dried factor VIII fraction (IV use) 250 IU	5460
Factor IX concentrate 600IU	6300
B03A	
Ferrous sulphate and folic acid tab. 100mg+0.5mg	0.1
D01A	
Clotrimazole cream 2%	0.03
D08A	
Povidone iodine oint. 5%	0.1
H02A	
Hydrocortisone sod. succinate inj. 100mg/vial	3.2
Methyl prednisolone sodium succinate inj. 500mg	4.2
J01A	
Doxycycline cap. 100mg	0.5
J01C	
Amoxycillin and cloxacillin cap. 250mg+250mg	1.3
Amoxycillin and potassium clavulanate tab. 500mg+125mg	8.4
Amoxycillin cap. 250mg	2.6
Amoxycillin cap. 500mg	2.3
Piperacillin and tazobactum inj. 4gm+500mg	17
J01D	
Cefixime tab. 100mg	4.7
Cefixime tab. 200mg	4.4
Cefotaxime inj. 1g	36.4

Ceftazidime inj. 1g	72.0
Ceftriaxone inj. 500mg	24.1
Ceftriaxone inj. 1 g	20.2
Cephalexin cap. 250mg	7.8
Cephalexin cap. 500mg	7.5
Cephalexin oral susp. 125mg/5ml	15.5
Meropenem inj. 500mg	368.8
J01E	
Co-trimoxazole oral susp. 40mg+200mg/5ml	4.9
Co-trimoxazole tab. 80mg+400mg	2.0
J01F	
Azithromycin tab. 100mg	3.4
Azithromycin tab. 250mg	2.8
Erythromycin estolate oral susp. 125mg/5ml	10.9
J01G	
Amikacin inj. 500mg	11.2
J01M	
Ciprofloxacin tab. 250mg	2.4
Ciprofloxacin tab. 500mg	2.3
Norfloxacin tab. 400mg	1.8
Ofloxacin tab. 200mg	1.2
J01X	
Metronidazole tab. 400mg	1.8
M01A	
Diclofenac sodium inj. 25mg/ml	1.6
Ibuprofen and paracetamol tab. 400mg+325mg	1.2
Ibuprofen tab. 400mg	1.0
N02B	
Paracetamol syrup 125mg/5ml	8.6
Paracetamol tab. 500mg	1.1
P01A	
Metronidazole benzoate oral susp. 100mg/5ml	9.4
Metronidazole inj. 500mg/100ml	21.2
P01B	
Chloroquine phosphate tab. 250mg	0.7
P02C	
Albendazole oral susp. 400mg/10ml	3.2
R03A	
Salbutamol inh. 100mcg/dose	1.8

R03B	
Beclomethasone inh. 200mcg/dose	1.7
R03C	
Salbutamol syrup 2mg/5ml	1.7
R05D	
Dextromethorphan hydrobromide syrup 13.5mg/5ml	8.1
R06A	
Cetirizine tab. 10mg	0.1

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