Article

What Causes Medicine Shortages in Primary Health Centres?: A Case Study of Availability and Supply System of Medicines in Select PHCs from Maharashtra

Journal of Health Management
17(1) 86–97

sagepub.in/home.nav
DOI: 10.1177/0972063414560873
http://jhm.sagepub.com

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Abstract

Availability of essential medicines in public health facilities is one of the issues of concern for effective health care delivery in Maharashtra. There are several implications of unavailability of medicines, such as unwarranted out-of-pocket expenditures and consequent indebtedness in some cases. Medicine unavailability is also one of the major reasons for lower utilization of the public health system. Thus, present study was undertaken to enhance understanding of the problem of medicine unavailability, as well as the process of indent and supply from the primary health centre (PHC) and other functional aspects linked with availability, such as inventory management and different sources of medicine supply. Using case study method, the study examines data from two PHCs in Pune district, Maharashtra. Findings of the study indicate several lacunae in the existing indent and supply system of medicines in Maharashtra. Some of the medicines were supplied through multiple sources and yet, these medicines were NIL in stock. Inventory management of the medicines was rather inadequate. Medicine supply system is not demand responsive. Hence, major reforms in the current medicine indent–supply system are essential to ensure adequate supply of medicines to the patients in the public health system.

Keywords

Medicines, public health centres, unavailability, procurement, distribution system

Introduction

As per World Health Organization (WHO 2000), one-third of the world's population lacks reliable access to required medicines and the situation is even worse in developing countries. In India, too, lack of

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access to medicines is an important problem plaguing the health care system. An estimated 649 million people in India lack access to essential medicines (WHO 2004). Given the high costs of medicines, it is essential for the public health system to provide the medicines free of cost. Expenditure on purchase of medicines is a significant portion of the total out-of-pocket expenditure on seeking health care services. The contradiction is that despite the presence of over 20,000 drug companies and over millions of formulations of drugs being sold in the drug market, medicines are still out of reach of millions of people.[1] The major reason for this is its high prices. High prices of medicines have direct impact on affordability and therefore, access to the essential medicine.

In the National Sample Survey (NSS) 60th Round (January–June 2004), information was sought regarding the medical expenditure for treatment during stay at hospitals as an inpatient (National Sample Survey Organization [NSSO] 2006). Analysis of this data revealed that the range of proportion of total expenditure on medicines was from 57 per cent to 66 per cent. The proportion of expenditure on medicines to total expenditure was higher in the public health facilities as compared to private health facilities. This clearly indicates that though the public health facilities are supposed to provide the health care services at minimal costs, due to the unavailability of essential medicines in these facilities, the actual costs borne by the patients are very high. Estimates from the 55th Expenditure Survey also reveal that three-fourths of the total out-of-pocket expenditure amount is spent on drugs in rural and urban areas (Sakthivel 2005).

On the same note, a survey was undertaken by Support for Advocacy and Training to Health Initiatives (SATHI) where information regarding the episodes of illnesses treated on outpatient department (OPD) basis as well as the hospitalization cases was collected from 1,659 households (8,373 persons). It revealed that more than half of the respondents (55 per cent) complained about the quality and availability of the medicines provided by the public health facilities, citing this as one of the main reasons for not seeking treatment from the public health system (Shukla, Sardeshpande and Padhye 2011).

A study carried out by Phadke, Fernandes, Sharda, Mane and Jesani (1995) showed that nearly 60 per cent of drugs supplied to PHCs were, in reality, not available for more than 75 per cent of the time in a year. While over 70 per cent of the drugs were not available for more than half the time in a year.

Though there is rudimentary evidence regarding availability of essential medicines at the facility level, there certainly exists a gap in knowledge about different functional aspects linked with the non-availability of medicines and the supply system of medicines from district level. In this context, the present study was undertaken to understand the issue of unavailability of medicines in depth.

Methodology

This study was undertaken with the objective to understand different functional aspects linked with the unavailability of medicines in the PHCs. The other objective was to monitor the availability of select medicines in select PHCs from Pune district of Maharashtra. This article focuses mainly on the functional aspects, whereas the issues related to availability have been only cursorily touched upon.

The study uses case study approach to understand the issues related to medicine availability. Pune district was selected purposively as it is touted as one of the better-performing districts as far as health systems are concerned and due to its physical proximity to the research organization, as the study mandated monthly visits to the selected PHCs.

About Pune District

Pune district is located in western region of the state of Maharashtra in India. It is the second-largest district in the state and is considered as one of the developed districts of Maharashtra. Pune city is the districts headquarter and is served by one district hospital, one trauma unit, one chest hospital, 21 rural hospitals, 96 PHCs and 539 sub-centres.

Selection of PHCs

Out of the 96 PHCs in the Pune district, this study conducted case study of two PHCs. These PHCs are part of the cohort of 15 PHCs where community-based monitoring (CBM) is being implemented since 2007, under National Rural Health Mission (NRHM). Out of these 15 PHCs, two PHCs were selected on the basis of two criteria, namely, accessibility to the PHCs and OPD attendance (or functioning of PHCs). One of the PHCs, though located near the bus stop, belongs to an arid, hilly and remote area, with limited modes of travelling. There are no other private or government health facilities near the PHC. Monthly OPD of the PHC is around 600–650, which goes up to 800 during the rainy season.

Another PHC is centrally located in the marketplace of the village. Despite having many small clinics and five to six hospitals in the ambit of PHC, it has a good OPD attendance, as people cannot afford the high charges of private hospitals. Monthly OPD is around 1,200–1,300, which goes up to 1,700–1,800 during the rainy season.

Selection of Medicines

The component of study which focused on availability of medicines at the PHC level studied, in-depth, 67 essential medicines out of around 116 medicines supplied to the PHCs. Medicines were selected considering their frequency of use in the selected PHCs and different forms, such as tablet, capsule, powder, syrup, cream, ointment as well as surgicals such as syringe and intravenous (IV) sets.

Data Collection

Data were collected through monthly monitoring visits, which included checking the stock register, actual stock in storage, expiry date of medicines, list of indent and supply, etc. Informal interviews and discussions with medical officers, pharmacists and other staff of the PHCs were also conducted during the monitoring visits.

Data from district level were obtained through meetings and discussions with district health officer (DHO), district programme manager (DPM) and zilla parishad (ZP) pharmacist. These discussions focused on understanding the process of medicine distribution from district to the PHC level.

A tool was prepared to seek following information during the monitoring visits:

- stock in register;
- actual stock in storage;
- expiry date of the medicines;

- list of indent and supply; and
- date and quantity of latest received stock from ZP.

Information related to the date and quantity of latest received stock from ZP was taken to corroborate the information about actual stock on the day of visit. The tools were pilot tested before actual study. Six rounds (April 2010–September 2010) of data collection were completed in both PHCs.

Data Analysis

Data on availability of medicines was analyzed in Excel, using three-month medicine requirement as a benchmark for analysis. According to the Maharashtra state government guidelines, every PHC should have medicine supply adequate for three months. For the purpose of this analysis, certain categories of stock availability were considered (Table 1).

Challenges in Data Collection

Major challenges encountered during the study were: non-availability of data regarding medicines distribution process at state and district levels; and access to the available data. Another major problem in obtaining information was multiplicity of levels and sources handling procurement and distribution system. There were lacunae and inconsistencies in the information provided by different officers. The information was available in piecemeal manner. During the course of data collection, a court case was filed by one of the drug manufacturing company challenging government's attempts to modify the medicine procurement system. Since the matter was sub judice, the officers refrained from commenting about the process.

Limitations of the Study

This study is in a form of a case study. Hence, the findings of the study cannot be generalized for the entire state.

Table 1. Categorization of 'Medicine Availability' in Terms of Stock Level

Categorization of Situation of Medicine Availability	Parameter Used in Terms of Stock Level
Nil	Nil stock of medicines in PHC.
Deficient	Stock is less than 60 per cent of benchmark.
Satisfactory	Stock is 60–600 per cent (sufficient for 1.5 years) of the benchmark.
Problematic excess	Stock is more than 600 per cent of the benchmark.

Source: Parameters are formed considering Maharashtra state government guidelines that every PHC should have medicine supply adequate for three months.

Findings and Discussion

Situation of Medicine Availability in Select PHCs

More than Half of the Medicines were Unavailable in PHCs

1. **Nil stock**: Analysis of the data reveals that, on an average, 40 per cent, that is, 27 out of 67, selected medicines were not available in the studied PHCs during all the six monitoring visits (Figure 1). Around 11 essential medicines were never supplied to PHCs. While going into details of NIL stock in PHCs, three patterns (medicines not supplied in six months; medicines supplied once in six months; and regular supply of medicines) of frequency of medicine supply emerged from the data (Figure 2). Medicines such as Aminophylline injection, Dextrose 25 per cent, Neostigmine injection, Oxytocin injection (essential during labour), Roxid tablet, Hydrocortisone injection and Dulcolax tablet were never supplied to both PHCs.
2. **Stock deficiency**: Figure 1 illustrates the situation of stock deficiency in the studied PHCs. It shows that, on an average, 24 per cent, that is, 14 out of 67, studied medicines were deficient in stock in both the PHCs; out of this, on an average, six medicines were showing deficiency throughout the six rounds of data collection. Despite high incidence of communicable diseases in monsoon, essential medicines like oral rehydration solution (ORS) (for rehydration) and Ringer Lactate were unavailable/deficient in the PHC.
3. **Satisfactory stock:** On an average, 31 per cent (that is, 17) medicines were found in a satisfactory situation in the both PHCs.
4. **Problematic excess of stock**: Along with deficient stocks of several medicines, excessive stock of some of the medicines was also found in the studied PHCs. Excessive stocking reflects

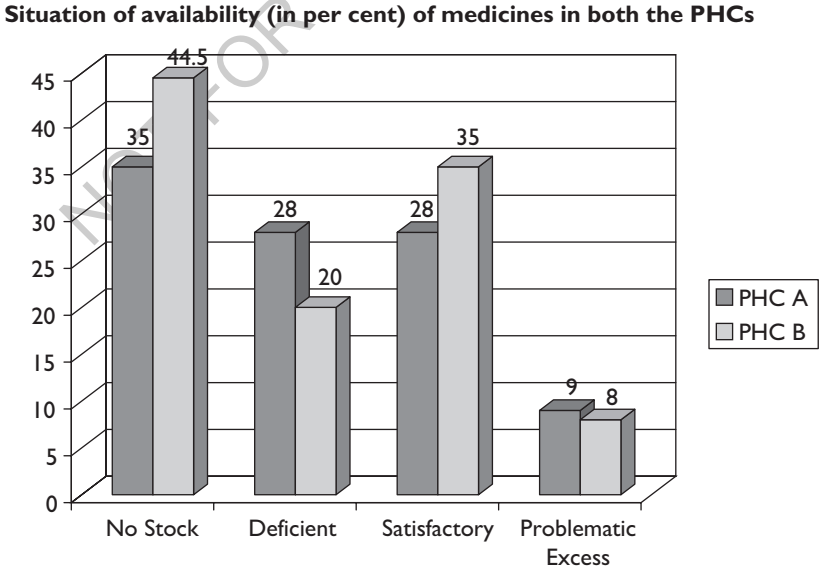

Figure 1. Overall Situation of Medicine Availability in PHCs A and B

Source: Derived from data collected during April–September 2010.

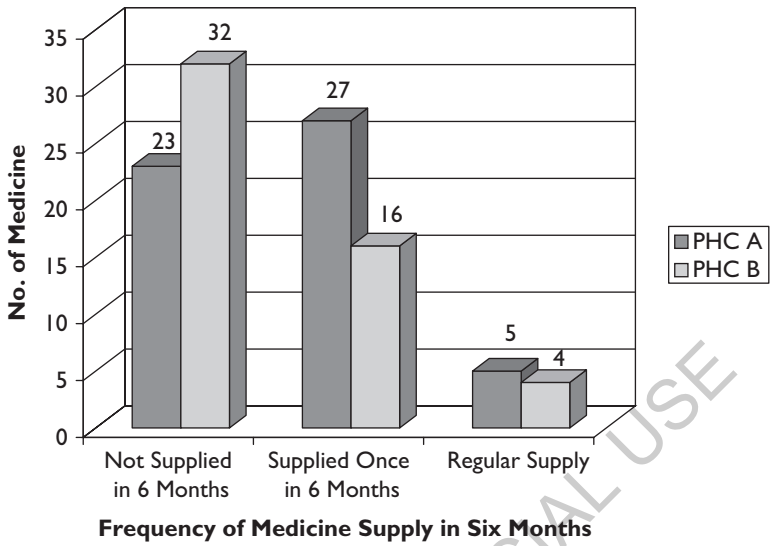

Figure 2. Pattern of Supply of Medicines in Both PHCs

Source: Derived from data collected during April–September 2010.

mismanagement in medicine supply and stock keeping. In both the PHCs, on an average, 9 per cent medicines were found to be in excess during the period of stock monitoring. Medicines like anti-snake venom (ASV) injection, Chlorpheniramine (CPM) tablets, Fluconazole tablets, Paracetamol tablets and Septran DS tablets, were found in excess by 10–30 times (1,000–3,000 per cent) of the three month's standard requirement.

PHC-level Systemic Issues Affecting the Availability of Medicines

Poor Inventory Management in the Pharmacy Store of PHC

It was observed that pharmacists from both the PHCs did not have a list of essential medicines in the PHC and were not even aware of any such list of essential medicines prepared for PHC.

Comparison of stock in register and actual stock revealed discrepancy in both the PHCs (Tables 2a, 2b). In case of 15–16 medicines, gross discrepancy was observed between actual stock in storage and stock in register where the difference was ranging from 200 to more than 1,000 tablets.

Expired Medicine Stock

- **Stock of medicines beyond its expiry date (at the time of the visit)**: During the six visits of data collection, it was found that there were seven medicines for which the expiry date had already crossed, and a significant amount of stock was still available.
- **Stock of medicines close to expiry date**: Stock of seven other medicines was close to expiry date. On seeing its stock in the register and the actual consumption of medicines in PHC for three months, it was deduced that, before the expiry date, the stock cannot be used and significant amount of expired stock would remain in the PHC (Table 3).

Table 2a. Discrepancy between Actual Stock in Storage and Stock in Register—At PHC A

At PHC A	Months					
Range of Discrepancy in the Stock (Quantity of Stock)	April	May	June	July	Aug	Sep
1–200	Tab B complex/ Leoplus	Inj ASV	Tab B complex/ Leoplus	–	Tab Cal-lactate, Inj ASV, Tab B complex/Leoplus	Tab B complex/ Leoplus
201–500				–	Tab Ciprofloxacin Cap Omeprazole, Cap Doxycycline	Cap Amoxicillin, Cap Doxycycline, Cap Omeprazole, Tab Paracetamol
501–1,000	Tab Cal-lactate			–		
Above 1,001			Cap Amoxycillin, Tab Diclofenac, Tab Paracetamol	–	Cap Amoxicillin, Tab Diclofenac, Cap Doxycycline, Tab Salbutamol/ Asthma forte	Tab Paracetamol, Tab Salbutamol/ Asthma forte

Source: Author's data collection during April–September 2010.
Note: Tab: tablet; Inj: injection; Cap: capsule.

Table 2b. Discrepancy between Actual Stock in Storage and Stock in Register—At PHC B

At PHC B	Month
Range of discrepancy in the stock (Quantity of stock)	April
1–200	–
201–500	Cap Doxycycline, Tab Norflox
501–1,000	–
Above 1,001	Tab Diclofenac

Source: Author's data collection during April–September 2010.
Note: Tab: tablet; Cap: capsule.

Large amount of expired medicine stock, again, indicates poor inventory management in the health facilities. It is worth noting that one of the pharmacists had joined almost a year back, yet she was not adequately apprised about the stock keeping. Hence, instead of continuing record keeping in the existing registers, she had started maintaining records in new registers. She was not provided any training about the medicine indent system.

Delay in Collecting Stock of Medicines

Availability of drugs in the PHC also depends on the proximity of the PHC from the ZP warehouse. Since many PHCs are located 40–50 kms away from Pune ZP, pharmacists from these PHCs cannot afford to visit ZP just for collecting medicines. So, they generally try to combine it with other tasks (such as attending meetings and submitting forms), which sometimes causes delay in collecting medicines and subsequent shortage of medicines in PHC. Availability of vehicle, driver and fuel in the PHC also determines the timely collection of medicines from ZP warehouse.

Table 3. List of Medicines with Stock beyond the Expiry Date

No.	Name of Medicine	Period Remaining to Expiry	Stock in Register	3 Months Actual Consumption in the PHC	As Per Consumption, Present Stock will Last for
1	Cap Doxycycline	1 month	1,500	385	15 months
2	Liquid Ringer Lactate	2 months	180	30	18 months
3	Tab Albendazole	2 months	150	300	1.5 months
4	Cap Amoxicillin	1 month	2,000	1,000	7 months
5	Tab Diclofenac	2 months	12,200	2,700	12 months
6	Inj Methargin	2 months	10	75	1 month
7	Tab Norflox	1 month	600	420	4 months

Source: Author's data collection during April–September 2010.
Note: Tab: tablet; Inj: injection; Cap: capsule.

Such logistical issues become important reasons for the non-availability of medicines in the facilities.

Local Purchase of Medicines

Under NRHM, each PHC is given INR 1,75,000 towards Rugn Kalyan Samiti (RKS) (Patients Welfare Committee). As per NRHM guidelines, the RKS funds can be used to purchase medicines at PHC level in case of emergency. However, in the studied PHCs, it was observed that a considerable amount of medicines were purchased locally. Details of the purchases could not be obtained as the register of local purchase was not maintained. One of the pharmacists informed that only the medical officer (MO) had the details and bills of the purchase; however, the MO also failed to show any of the details. Table 4 indicates that the rate of locally purchased medicines is, on an average, five times higher than the rate of medicines purchased under rate contracts made by government.

District-level Systemic Issues Affecting the Availability of Medicines (Related to Medicine Distribution System)

Lack of Demand-responsive Supply System

As shown in Table 5, medicines such as CPM tablet, ASV injection and Paracetamol tablet were found to be eight to 24 times excessive (compare to three months actual consumption in PHCs) in stock and were still supplied two to three times in six months to both PHCs .

In one of the PHCs, the episodes of snake bite were found be occasional, yet the supply of ASV was at par with other PHCs in the district, hence it had led excessive stock of ASV injection lying unused in that PHC.

The flow of indent and supply is one crucial aspect that determines the availability of the medicines in the PHC. Upon inquiry about the indent and supply list, the PHC pharmacist said that they do not send any periodic indents to the ZP. Only annual indent/requirement is prepared and sent to ZP, which is calculated by taking the average of past three years' consumption and additional 15 per cent is added to this three years' average consumption

It was learnt that in Pune district, all PHCs get a standard quota of medicines irrespective of their needs and the indents sent by the MO. The ZP staff also admitted that available stock is divided equally

Table 4. Difference between Rate of Local Purchase of Medicines and Rate under Rate Contract (RC) Made by Government

No.	Name of Medicine	Quantity	RC Rate (in ₹) (Year 2009)	Local Purchase Rate (in ₹) (Year 2009)	Local Purchase Prices are Higher than the Rate under RC by (per cent)
1	Inj Aminophylline	1 amp	2.45	6.73	300
2	Tab Ciprowin 500 mg	100 tabs	97.2	250.24	250
3	Tab Ciprowin 250 mg	100 tabs	53.1	170.14	300
4	Inj Dexamethasone	1 amp	2.3	24.04	1,000
5	Inj Diclofenac	1 amp	1.3	7.93	600
6	Tab Paracetamol	1 box	128	153.85	100
7	Tab CPM	100 tabs	3.08	21.64	700

Source: Author's data collection during April–September 2010 and RC book (Directorate of Medical Education and Research [DMER] 2008).
Note: Tab: tablet; Inj: injection; Cap: capsule; Amp: ampoule.

Table 5. List of Medicines with Excessive Stock and Still Supplied to the PHCs

Name of Medicine	Stock in Register	Three Months Actual Consumption in PHC	Percentage of Excessive Stock
In A PHC			
Tab CPM	55,000	2,500	22 times in excess
Inj ASV	250	12.5	20 times in excess
Tab Paracetamol	98,000	12,500	8 times in excess
In B PHC			
Tab CPM	59,500	2,500	24 times in excess

Source: Author's data collection during April–September 2010.
Note: Tab: tablet; Inj: injection.

among the number of PHCs in the district. For example, if one million tablets of Paracetamol are received from the supplier, it is equally divided among 96 PHCs present in the Pune district and 10,417 tablets are supplied to each PHC.

Irregular Supply of Medicines

During the span of six months, on an average, only four to five medicines were supplied regularly (bimonthly) to both the PHCs (Figure 2), while, on an average, 27 these medicines twice in the span of six months (Table 5).

All these findings denote that supply of essential medicines from ZP was not commensurate with the requirement and lacked management.

Lack of Computerized Linkage between Health Facilities and the District Headquarters

Despite computers being functional in all the PHCs, the computerized linkage between PHCs and district headquarters is completely lacking, which makes it difficult to track the flow of medicines.

Multiple Sources of Medicine Supply to the PHCs

Another important element that adds to the present poor management of medicine supply, and consequent non-availability, is the multiple sources of medicine supply to the PHC. There are three different sources of medicine supply to the PHC:

- National level: National schemes and programmes such as Reproductive and Child Health (RCH) programme, Revised National Tuberculosis Control Programme (RNTCP) and Vector Borne Disease Control Programme.
- State level: Directorate of Health Services (DHS), Mumbai (medicines purchased from Haffkine institute).
- District level: ZP, Pune (local level: fourth option remains with PHC to purchase medicines locally).

The ZP acts as a major source for medicine supply for PHCs. Medicines received from DHS and from national programmes comprise relatively lesser proportions of total medicine requirement of PHCs. Generally, medicines under national programmes or schemes are supplied once or twice in a year. DHS provides one medicine kit (Haffkine kits) to the PHC and two kits to the sub-center on an annual basis. There are certain medicines (Aminophylline injection, Neostigmine injection, Dextrose 25 per cent, Oxytocin injection, Diazepam tablet, Pethidine injection, Dinitrosalicylic Acid (DNS), Phenargan injection and Hydrocortisone injection) which are supplied through multiple sources; still, they were found NIL in stock for all six months of monitoring visits. Further, multiplicity of sources makes it difficult to monitor the procurement process.

Lack of Monitoring Mechanisms

There is no provision for monitoring the process of purchase and distribution at district level as well as stock position and utilization of medicines in PHCs. Due to lack of monitoring mechanisms, supply of medicines is not commensurate to actual requirement. It may also encourage malpractice, delay in payment, false payment, false bills, supply of stock with short expiry date and lead to poor control on medicine purchase process.

Without incorporating monitoring mechanisms, it would not be possible to bring transparency in the overall system as well.

Conclusion

This study indicates that there are several lacunae in the existing indent and supply system of medicines in Maharashtra, which result in inadequate medicine availability in the public health facilities. Some of the important problems plaguing the system are: poor inventory management of medicines in the PHCs; lack of demand-responsive nature; multiple sources of medicine supply; and lack of monitoring mechanisms over supply system and stock position at facility level (Figure 3). To address these problems, major reforms

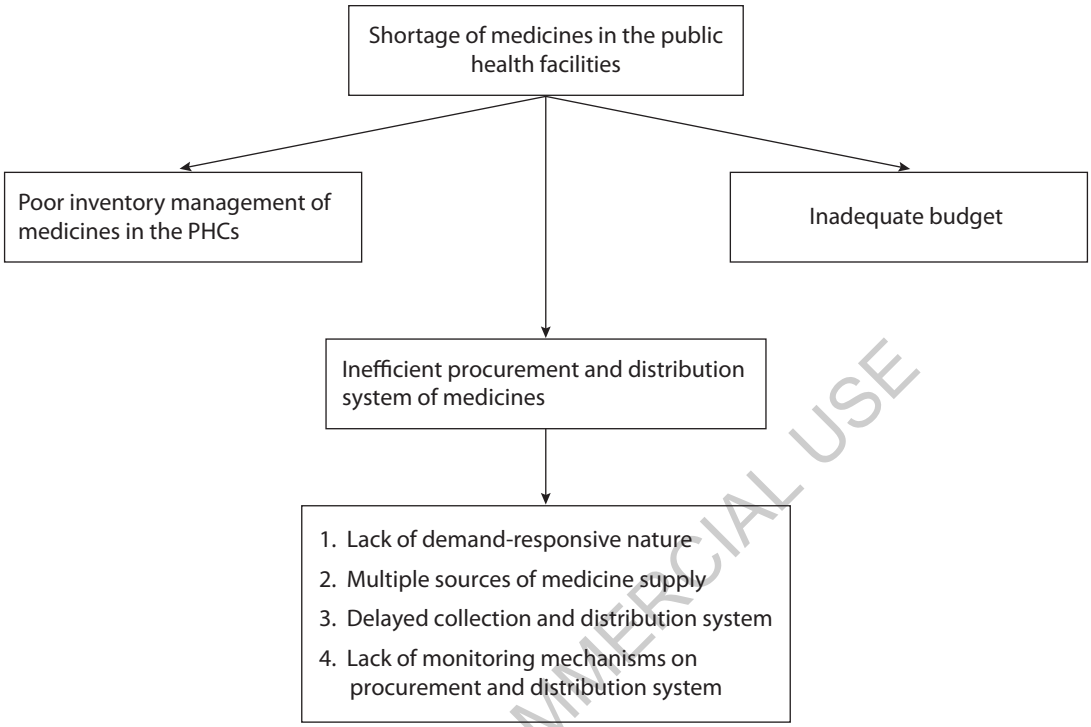

Figure 3. Problem of Medicine Shortage in the Public Health Facilities

in the current medicine indent–supply system are required. Keeping this in mind, demand-sensitive supply system, formation of monitoring mechanisms over indent–supply system and proper inventory management at facility level would be the core requirements of the effective and efficient indent supply system to ensure adequate supply of medicines to the patients in the public health system.

Acknowledgements

I would like to thank Dr Anant Phadke and Dr Abhay Shukla for their valuable inputs in conducting this study and also, International Budget Partnership (IBP) team for the financial as well as technical assistance which made this study possible.

Note

1. Documentation by Dr Sumit Sharma, Collector and District Magistrate, Chittorgarh, Rajasthan.

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